Comhar
Sustainable Development Council

Towards Sustainability in the National Development Plan 2007–2013

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Proceedings from the
Comhar National Conference

Davenport Hotel, Dublin
4th to 6th October, 2006

Foreword

The National Development Plan (NDP) 2007-2013 will set out investment priorities for the next seven years in all areas of the economy and society. There is a real opportunity to strengthen sustainable development by integrating sustainability concerns in a more systematic way across all elements in the implementation of the new plan. All of us in Comhar Sustainable Development Council (SDC) were delighted to have an opportunity to contribute to the preparatory process. The aim of the Comhar SDC conference was to facilitate an open discussion on how best to reflect the sustainability agenda in the new plan and the best options available to do this.

Comhar SDC commissioned briefing papers on the key sectoral areas as well as on quality of life to inform the conference proceedings and outputs. Opinions expressed in the briefing papers are not necessarily those of Comhar SDC but were intended to encourage debate and greater understanding of sustainability issues. We have taken the decision to publish the briefing papers, the summary of conference proceedings, and the subsequent Comhar SDC submission, as we consider them to be a valuable reference point for the new National Development Plan.

Following the conference, Comhar SDC submitted its recommendations to the Department of Finance addressing the key sectoral issues as well as process issues such as the need for appropriate indicators and measurement tools, investment in research and technological development and capacity building. A key recommendation is the establishment of a 'Sustainability Fund' – to invest in enterprise and community activity within and across sectors that achieve demonstrated improvement in environmental performance, while also advancing competitiveness and social cohesion.

The social partnership agreement, *Towards 2016*, commits the Government to the review of Ireland's national sustainable development strategy in 2007. I hope that the Comhar SDC recommendations on the NDP and further outputs in 2007 will help to inform that process and public discourse generally on sustainability issues.

Professor Frank Convery

Chairman of Comhar SDC

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Summary of proceedings

Comhar SDC hosted the conference 'Towards Sustainability in the National Development Plan' over three days in the Davenport Hotel October 4th-6th 2006. The objective of the conference was to gather input from a wide range of stakeholders in order to better inform Comhar SDC with recommendations for the Department of Finance on improving the sustainability of the NDP 2007-2013, particularly in the following areas:

- Quality of life and the macro-economy,
- Industry,
- Marine,
- Shaping Rural Life,
- Energy,
- Transport,
- Tourism,
- Households,
- Integration.

In advance of the conference, Comhar SDC commissioned briefing papers in each area by experts in these fields, which provided a framework for the conference discussion. Each paper examined how Ireland has performed economically, socially and environmentally to date and looked at the options available for enhancing Ireland's performance over the life of the next NDP (2007-2013). The papers are compiled in this volume of the proceedings of the conference and are also available from the Comhar SDC website[1].

Government departments were strongly represented: Dermot McCarthy, Secretary General to the Government, chaired the opening session and the subsequent sessions were each chaired by the responsible Assistant Secretary Generals. The format of the sessions consisted of a presentation by the briefing paper authors, followed by a discussion of the investment priorities for the next NDP with a selected panel of stakeholders and the audience.

The conference opened with a welcome from Professor Frank Convery, the chairman of Comhar SDC, and an introduction to the objectives of Comhar SDC and the principles of sustainable development.

In the first presentation of the conference, Dermot Nolan of the Department of Finance presented an overview of the priorities for the next NDP as comprising economic infrastructure, social infrastructure, human capital, enterprise, science and innovation, and social inclusion. In order to achieve a stable competitive economy and sound public finances to fund public services by 2013, the government

1 http://www.comhar-nsdp.ie/conference2006/index.html

intends to put in place world class economic and social infrastructure, a skilled and adaptable workforce with high levels of employment, and overall a socially inclusive and regionally well balanced society. An essential part of this strategy involves social provision for vulnerable groups, which will lead to a society with strong community spirit that enjoys a good work/life balance. A high quality environment is considered integral to this 'vision' for 2013. There are horizontal themes across all priorities in the NDP including: synergy with an anti-poverty strategy, childcare, education, community development, justice and equality.

Subsequent to this introduction, more detailed presentations were made on the various aspects and sectors included in the NDP 2007-2013 and a summary is given here as a prelude to the individual expert briefing papers provided in these proceedings of the conference.

Shaping the Macro-economy and Quality of Life

Chair: *Dermot Mc Carthy (Secretary General, Department of the Taoiseach)*
Presenters: *Brendan Walsh, Peter Clinch, Susana Ferreria (UCD)*
Panellists: *Mary Kelly (EPA), Paul Sweeney (ICTU).*

Professor Brendan Walsh provided an overview of the performance of the Irish macro-economy over the last ten years, followed by a presentation by Professor Peter Clinch and Dr. Susana Ferreira on quality of life in Ireland and how this can be measured. From both presentations and the ensuing discussion it became apparent that it is unclear what the goal of public policy should be – is it overall economic growth or is it to increase the well-being of all?

These presentations demonstrated that economic growth might not be the parameter that best describes quality of life. The UCD studies show that people's happiness varies in Ireland depending on the county they live in, all else being equal. While people's income is important, in fact research shows that the environmental amenities available to people also play a significant role in determining their quality of life. Therefore it seems that the state of the environment is an important factor in our well being, as well as a health and perhaps even moral issue. The panellists and the contributions from the conference delegates supported the idea of environment and sustainability as an integral part of the NDP. There was also strong support for the view that the Department of Finance should carry out a Strategic Environmental Assessment (SEA) of the next NDP.

Transport

Chair: *Pat Mangan (Assistant Secretary, Department of Transport)*
Presenter: *Kevin Leyden (West Virginia University)*
Panellists: *Fred Barry (National Roads Authority), Jeremy Ryan (Dublin Transportation Office).*

Dr. Kevin Leyden's presentation highlighted the problem in Ireland of substantial greenfield developments far from urban areas without the development of associated transport systems to facilitate commuting to employment centres and related social, health and education services. The integration of planning and

future transport systems is a fundamental requirement in order to arrest this trend – capacity building, support for provision of water supply, waste treatment, schools and other infrastructure at key transport nodes need to be developed to appropriate scale and scope. Transport is now the fastest growing source of greenhouse gas emissions in Ireland and a major cause of other problems such as congestions, air pollution, noise and accidents. Funding must therefore be made available to integrate land use planning and transport provision and land use related funding should be 'packaged' with transport budgets, so that they roll out in an appropriately efficient sequence.

Aside from land use planning, it was suggested that there are other basic deficiencies in the transport system in Ireland that can be put right in the next NDP. The conference participants identified walking and cycling as important and integral components of mobility and in need of appropriate financial support. Funding is required to assess the real mobility needs of people, and how they can best be met. The Department of the Environment's consultation document 'Ireland's Pathway to Kyoto Compliance' (August 2006) draws attention to the need for investment in demand-side management infrastructure and pricing to ensure that multi-billion transport road and rail assets are effectively used by all modes. Intelligent transport systems can be effective and logistical improvements in road freight transport can increase efficiency and reduce congestion.

Some of the work carried out under the previous NDPs should be completed, such as the completion of inter-urban routes, and (especially) the cost effective delivery of the public transport elements of 'Transport 21'. Comprehensive public transport in the major urban centres could significantly contribute to reducing the negative effects of transport such as congestion, greenhouse gas emissions and air quality problems. Freight is another element that must not be neglected when developing the potential of other modes of transport aside from road, with rail transport currently carrying only two per cent of Irish freight. Road freight volumes in Ireland are currently growing at a faster rate than passenger car volumes. A determination of the (full) costs and benefits of road vis-à-vis rail freight was found to be lacking at present in order to be able to make an informed decision on the longer-term strategic role of rail freight in Ireland.

Industry

Chair: *Seamus O'Moráin (Assistant Secretary General of the Department of Enterprise, Trade and Employment)*
Presenter: *David Browne (University of Limerick)*
Panellists: *Donal Buckley (IBEC), Brendan Finucane (Enterprise Ireland), Robin Curry (EnviroCentre).*

Dr. David Browne's presentation addressed investment in industry and the need to promote environmental protection and social cohesion while retaining competitiveness. Land use planning and transport are also crucial in improving the competitiveness of Irish industry. Environmental protection, economic growth and industrial competitiveness are mutual complementary goals. A healthy environment is paramount to maintaining the competitiveness of Ireland's food, agriculture and tourism industries, while also maintaining the viability of knowledge-based service industries. The Irish manufacturing industry has already succeeded in achieving absolute decoupling of economic growth

and greenhouse gas emissions and relative decoupling in the case of projected industrial waste as well as maintaining progress towards commercial and packaging waste targets.

The next stage for improving the sustainability of industry is the transition from reactive, ex-post environmental management and compliance with regulation transposed from EU legislation towards innovative, pre-emptive practices. Balanced regional industrial development should be achieved in accordance with the National Spatial Strategy.

Tourism

Chair: *Paul Bates (Assistant Secretary General, Department of Arts, Sport, and Tourism)*
Presenter: *Kevin Griffin (Dublin Institute of Technology)*
Panellists: *Paddy Matthews (Fáilte Ireland), Catherine Reilly (Irish Tourist Industry Federation), John Power (Irish Hotels Federation).*

Kevin Griffin highlighted that tourism is a key economic sector in Ireland closely linked to the environment. Many tourists come to Ireland to see our key asset, beautiful scenery, however a big challenge is that this is a public good and therefore not under the control of the industry. It must become a priority to protect the assets of the sector and meet many other objectives simultaneously. Tourism itself is part of the problem in bringing more people, resources and pressure on environmental endowments, including landscapes. However there is little data available in Ireland on the impact of tourism on the environment and this is one gap that needs to be filled in the coming years.

Coastal Zone Management is crucial in the context of tourism, since it is the coastal regions that sustain many of our key tourist sights. The next NDP should encourage investments that support new tourism infrastructure and services – including eco-tourism –- that provide a combination of competitiveness and environmental services. The proposed Sustainability Fund could potentially be used to fund projects that contribute to public goods infrastructure – buildings and streetscapes of character, cultural endowments, parks, and amenities usable by residents and visitors.

Energy

Chair: *Sara White (Deputy Secretary General, Department of Communications, Marine and Natural Resources)*
Presenter: *Thomas Legge (consultant)*
Panellists: *Larry Staudt (Dundalk Institute of Technology), David Taylor (Sustainable Energy Ireland).*

Thomas Legge's presentation addressed the growth in energy generation and consumption over the period of the last NDP. There has been very little decoupling with economic growth. The sustainability of energy in Ireland is challenged by our increasing total and per-capita consumption of energy, high dependence on imported fuels and on fossil fuels for electricity generation, and rising CO_2 emissions (expected to be 37 per cent above 1990 levels by 2010) and our related international obligations.

There are several areas of focus that should be included in the new NDP including: the interconnection of gas and electricity, improving energy efficiency particularly in households, increasing the share of renewables in the energy fuel mix, improving the national electricity grid with consideration given to the distributed generation potential with many small connections, and finally we need to support new energy supply and services – for example biofuels – that provide a combination of competitiveness and environmental services. In the energy area, all considered that getting prices right is essential to provide the right signals to consumers so that sustainable energy sources are supported.

Marine

Chair: *Dr. Cecil Beamish (Assistant Secretary General, Department of Communications, Marine and Natural Resources)*
Presenter: *Ken Whelan (Marine Institute)*
Panellists: *Frank Doyle (Irish Fisherman's Organisation), Karin Dubsky (Coastwatch).*

Dr. Ken Whelan's presentation stressed that enforcement of fishing quotas is a key challenge in Ireland. Some countries have solved this problem by putting GPS tracking on all vessels. Another way to address this issue is to invest in quality on-shore facilities to host landings and enable supervision of the quantities of fish landed. Without proper information it is impossible to know the extent of this problem and to know what fishing resources remain. R&D investment is needed to help to collect data and provide the basis for legal and other protection measures. The next NDP should invest in enforcement measures that achieve more than just paying their way but achieve longer-term goals.

The importance of the marine environment was highlighted; beyond economic value, the marine provides a host of other important services, i.e. amenity, biodiversity and ecosystems (i.e. medicinal), environmental quality, and climate regulation and therefore the sustainable development of the marine requires the safeguarding of all of these attributes. Along the coasts, measures to implement Coastal Zone Management are long overdue. Karin Dubsky emphasised proper land use planning with strong leadership as necessary in order to stop unsustainable building along coasts; for example it is currently possible to drain any wetland (unless part of Natura 2000) without planning permission under the 1949 Land Reclamation Act. A national coastal zone management strategy is required with a properly implementing body. Overall conference participants asserted that there is a need to integrate science, policy, and management in the marine sector.

Shaping Rural Life and Forestry

Chairs: *John Fox and Denis Byrne (Assistant Secretary Generals, Department of Agriculture and Food)*
Presenters: *David Styles (TCD) and Craig Bullock (UCD),* ***Forestry:*** *Kenneth Byrne (UCC)*
Panellists: *Ruairí Deasy (IFA), Liam Downey (NUI Maynooth), Anja Murray (An Taisce), Eugene Hendrick (Coford).*

The future holds many challenges for the agriculture sector, as the dependence on direct payments from Irish taxpayers and the EU increases, land prices rise, and the environment become more important.

Dr. David Styles presented the environmental challenges associated with agriculture; Dr. Craig Bullock demonstrated that there are opportunities that could be created in the rural economy as a result of the environmental issues of climate change, biodiversity, air quality and eutrophication. It will be necessary for the rest of society to recognise and pay for the value of the environmental services provided by rural Ireland. In order to do this we need to invest in new knowledge-based farming (particularly in environmental services) with R&D, demonstration, and risk capital.

Human resources are also essential to support rural development by investing in new off-farm enterprises and infrastructure to provide an alternative source of off-farm income to construction. Dr. Ken Byrne showed how tree farming could play an important role in this regard and support is needed for those who are serious about making forestry a competitive business. With regard to forestry, the new NDP should encourage the development of higher value-added forestry products, e.g. timber frames, all the time keeping an eye on the suitability of forests planted to sustain environmental objectives.

Households

Chair: *Mary Davis (Task Force on Active Citizenship)*
Presenter: *Peter Doran (Queen's University)*
Panellist: *Richard Moles (University of Limerick).*

Peter Doran and Richard Moles drew attention to the premise that eighty per cent of our environmental impact as consumers comes from just four everyday decisions – how we run our homes, what food we eat, how we get around, and holiday travel. A complex range of social, economic, demographic and other lifestyle-related factors influence household consumption of energy, food, and mobility, but income and prices are key influencers of consumption. Individually and collectively, sustainable consumption measures need to begin here. Households and communities can play a proactive role in embracing sustainable consumption – given an appropriate voice and support in strategic decision-making, perhaps encouraged by the next NDP.

The experiences of communities can influence patterns of consumption in a number of ways. At the most basic level, there is recognition that a protected environment is a significant contributor to our quality of social and individual life. The kind of natural and man-made environments, including the state of local neighbourhoods, impact hugely on the quality of family and community life. New bodies such as the National Consumer Agency could be given a statutory role in advancing sustainable consumption and sustainable household consumption. The Taoiseach's Task Force on Active Citizenship could also make a considerable contribution to the demand-side debates on responsible consumption.

Integration of sustainable development across sectoral policies

Chair: *Tom O'Mahony (Assistant Secretary General, Department of Environment, Heritage, and Local Government)*
Presenter: *Frank Convery (Comhar SDC)*
Panellists: *Helen Johnston (Combat Poverty Agency), John Fitzgerald (ESRI), Rory O'Donnell (National Economic & Social Development Office), Gavin Harte (An Taisce).*

The final session of the conference involved linking the ideas on sustainability and the NDP presented over the range of sectors into an integral policy. Professor Frank Convery presented a summary of the recommended investment priorities to increase the sustainability of each sector as a result of the presentations and discussions during the conference and showed that there were some recurring trends that arose across the conference presentations and discussions of all sectors. Spatial planning has a crucial influence in determining the sustainability of many areas. For example, an underlying root cause explaining the increased use of private cars in Ireland is the dispersed settlement pattern, which itself is a product of rapid growth in population and incomes, the search for affordable housing, life style preferences, the absence of affordable clusters of housing or sites available adjacent to schools, and public transport. Clustering of development in population centres helps the establishment of economies of scale and scope, which in turn can lead to ecological, economic and social gains.

Another integration theme for all sectors is the necessity for new knowledge, which can be generated by investing in research and development and human capital such as training and education. As the economic base of Ireland moves away from high labour-input industries towards more value-added lower energy-intensive industries and costs rise, high quality will become central to sustaining industrial competitiveness across all sectors. The provision of good information is necessary in assessing how we are progressing in terms of investment and its effectiveness in achieving the priorities set. Getting our prices right in the use of environmental services and resources will also go a long way in encouraging sustainability and promoting the 'right' products. The proposed Sustainability Fund should assist in this process, providing funds for environmental and societal goods.

Minister's Speech

Dick Roche T.D. (Department of the Environment, Heritage, and Local Government)

Minister for Environment, Heritage and Local Government, Dick Roche T.D., addressed the conference with the message that it is government policy to integrate sustainable development into all policy. The Minister reaffirmed that the environment is not an add-on but rather runs right through all government policy. There is an active subcommittee looking at this area for agriculture, transport and energy and they are investigating how policies pursued by different agencies integrate with each other.

All environmental policies are interrelated, e.g. the National Climate Change Strategy, the nitrates directive, and all relate back to finance policies because incentives are needed to send the right price signals to consumers and industry. The population of Ireland is increasing and the time has now come to prioritise environment. The social partnership agreement 'Towards 2016' recognises the role of the environment in economic and social growth. The NDP for 2007-1013 will contain many measures to ensure that the following environmental areas are given priority over the next seven years:

1. Meeting international commitments;
2. Waste management;
3. Water pollution and eutrophication.

Biodiversity is an issue that has not featured much in Irish policymaking in the past but the National Biodiversity Plan is now being implemented and a Biodiversity Forum has been established under the auspices of Comhar SDC. There are also many opportunities for north-south cooperation in Ireland on biodiversity projects. Implementation of the National Spatial Strategy remains a priority; there are currently 80,000 houses being built annually (this will soon be 90,000) so construction must take place in a sustainable way and the government plans to take action if local implementation plans are not in compliance. It is clear that Dublin cannot continue to spread outwards but cooperation is needed on planning. The Minister concluded his speech with the message that in reality sustainable development is simple if it is integrated into all policy areas.

Summary

The overriding principles of the NDP 2007-2013 should be to improve economic competitiveness, environmental quality and social cohesion. Comhar SDC believes that economic growth is compatible with environmental and social advancement and therefore that sustainability must be a fundamental principle in the preparation and implementation of the new NDP. The "Sustainability and NDP" conference provided significant contributions from stakeholders and these are reflected in the recommendations made by Comhar SDC on 16th October 2006 to the Department of Finance. In this publication, in addition to this short summary of the proceedings of the conference, we include the briefing papers on sectoral performance commissioned by Comhar SDC in advance of the conference, and the subsequent recommendations on enhancing the sustainability of the NDP that were developed by Comhar SDC, following the conference.

Shaping the macroeconomy and quality of life: towards sustainable growth

Comhar Briefing Paper[1]

Prepared by Brendan Walsh

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1 This briefing paper has been prepared to inform the proceedings of the Comhar Conference "Towards Sustainability in the National Development Plan 2007-2013" – 4th to 6th October 2006. Opinions expressed are not necessarily those of Comhar but are intended to encourage debate and greater understanding of sustainability issues.

1. Introduction

Ireland's strong macroeconomic performance since the second half of the 1990s is now well-known and widely admired. In round numbers, between 1995 and 2005 our national product increased by 90 per cent and living standards rose by 60 per cent. Over the same period the numbers at work increased by 50 per cent and the unemployment rate fell from 12 per cent to just over 4 per cent. Substantial net emigration was replaced by a large net inflow of population. Few, if any, countries can match these impressive economic statistics over this period. A prominent economist commented in 2002 "The Irish economic performance of the last fifteen years does look quite miraculous."[2]

None the less, questions may be raised about the quality and sustainability of Ireland's economic success. The increase in output and improvement in living standards have been dependent on an exceptional rate of population and employment growth, which in turn are increasingly dependent on an exceptional rate of immigration. "Extensive growth" of this type is not sustainable indefinitely. The sources of increases in the supply of labour eventually dry up as the immigration rate falls and participation rates level off. Sustained improvements in living standards require increasing productivity, rather than the deployment of more inputs at the same level of productivity. Furthermore, from the demand side, recent Irish growth has been dependent on a very high rate of investment in residential construction and it is clear that the present rate of increase in our housing stock will not be maintained over the medium term.

Ten years ago employment creation was reasonably equated with increasing welfare in Ireland. It led to lower unemployment and emigration and increased employment opportunities for those involuntarily "in home duties". But this phase faded into history as full employment was reached by the end of the 1990s. A continued emphasis on employment creation is now less appropriate because its link with further improvements in welfare is weaker. While there are benefits from extensive growth fed by high rates of immigration and the employment of more people at average levels of productivity, they are less clear than the gains associated with increasing the productivity of a slower-growing labour force. The issue also arises: What are we trying to maximise – the well being of those already in the country, in which case GNP per person is the most relevant economic indicator, or some wider concept that is more closely related to total GNP?

Wider issues may also be raised about the link between rapid growth and subjectively assessed "happiness" or "well-being". It is possible that negative spillovers become more significant when growth is dependent on labour force growth rather than higher productivity. Wider issues about the "sustainability" of this type of growth are beyond the scope of my contribution to this conference but will be addressed by other contributors. In my paper I aim to set the stage for others by presenting an overview of the principal indicators of the economy's performance since the mid-1990s and looking at various scenarios for the economy over the medium term. The emphasis is on real economic indicators with only passing reference to monetary and financial concerns.

2 Olivier Blanchard, *Comment* on Patrick Honohan and Brendan Walsh "Catching up with the Leaders: The Irish Hare" *Brookings Papers on Economic Activity* 2002:1, p. 58.

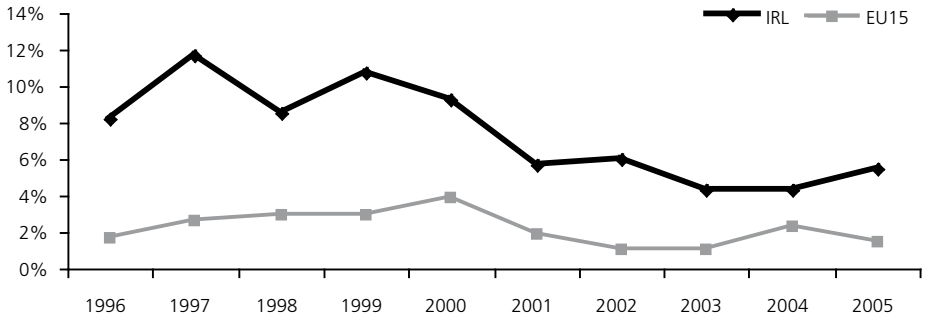
2. Ireland's success story

In this section I summarise the performance of the Irish economy over the past ten years and draw attention to some features of the record of particular relevance to the debate on "sustainability".

2.1. The growth of national product

Most international comparisons of economic performance use Gross Domestic Product (GDP) corrected for inflation as the key indicator.[3] Figure 1 shows the rate of growth of Irish and EU15 real GDP since 1995. Throughout the entire period the Irish growth rate exceeded the EU rate by a wide margin. The double-digit growth rates recorded in the late 1990s were truly exceptional, but even over the past five years Irish GDP growth averaged 5.2 per cent compared with an EU15 average of only 1.6 per cent.

Figure 1: GDP growth rates, Ireland and EU15



Source: CSO and EUROSTAT

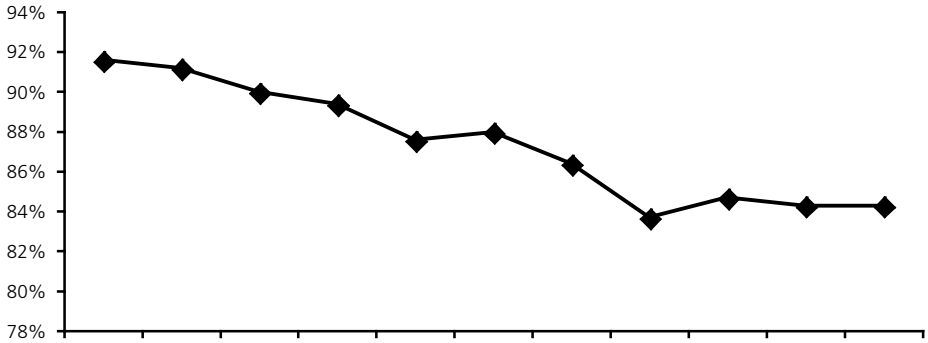
There is, however, a well-known problem in using GDP to assess Ireland's performance in international comparisons. In Ireland, unlike other EU countries, there is a large gap between Gross *National* Product (GNP) and Gross *Domestic* Product. Stated simply, the former refers to the income available to Irish residents (and is very closely related to Gross National Income[4]), while the latter measures gross value-added in the country, regardless to whom this accrues. The gap between the two is "net factor income from the rest of the world", the most important component of which is "net investment income from the rest of the world". Due to the importance of foreign-owned corporations in the economy, there is a very substantial net outflow of profits from the subsidiaries of multinational corporations from Ireland to the rest of the world. Over the period 1995-2002 GDP grew consistently faster than GNP and the gap between the two measures widened. Figure 2 shows that GNP fell from 92 to 84 per cent of GDP

3 Irish national accounts at constant prices chain-linked to 2003 are available from 1995 onwards. The Irish data are based primarily on the CSO's National Income and Expenditure 2004 (December 2005) and Annual Results for 2005 (July 2006).

4 The difference between GNI and GNP relates to tax flows between Ireland and the EU. In recent years the ratio of GNI to GNP has been stable at about 101 per cent.

and then stabilised at this level. In no other OECD is the GDP-GNP of such significance.[5] The size of the gap in Ireland is a measure of the degree to which the Irish economy has become dependent on foreign investment. It could be taken as a measure of the extent to which the country is serving as a production platform for foreign firms.

Figure 2: Irish GNP as per cent of GDP



Source: CSO

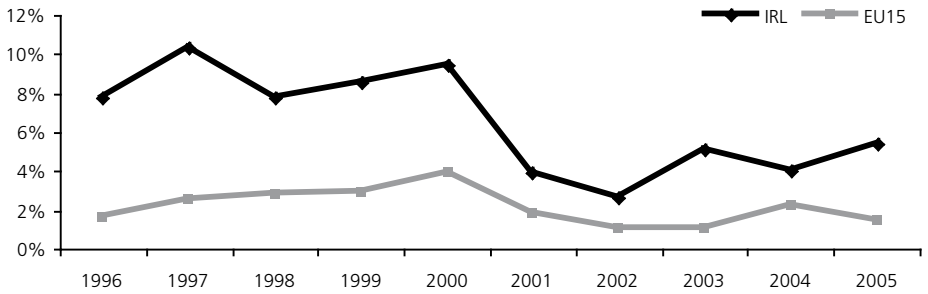
Because of these considerations, it is now generally accepted that it is preferable to use Irish GNP in international comparisons of economic performance, especially when the focus is on living standards.[6] Figure 3 compares Irish GNP growth with EU15 GDP growth. It is clear that even on this basis, the Irish performance remains very impressive. Over this period Irish GNP was higher than GDP growth in any other EU15 country. There is no evidence of a slow-down during 2006.

Irish GNP growth outpaced EU GDP growth over the entire ten-year period and in several years was more than double the EU rate. This out-performance was maintained over the past five years, when the Irish GNP growth rate averaged 4.2 per cent compared with the EU GDP growth rate of only 1.8 per cent.

5 The average GDP-GNP gap among the EU15 countries is less than two per cent. Only Luxembourg is comparable to Ireland in regard to the size of the gap. See Central Statistics Office, *Measuring Ireland's Progress 2005*, Table 1.2.

6 This actually over-corrects for the distortion because, for example, profits remitted from Ireland are liable to Irish corporation tax and make a significant contribution to the Exchequer.

Figure 3: Irish GNP and EU GDP growth rates



Source: CSO and EUROSTAT

Our discussion of living standards, below, uses GNP as the key indicator for Ireland.

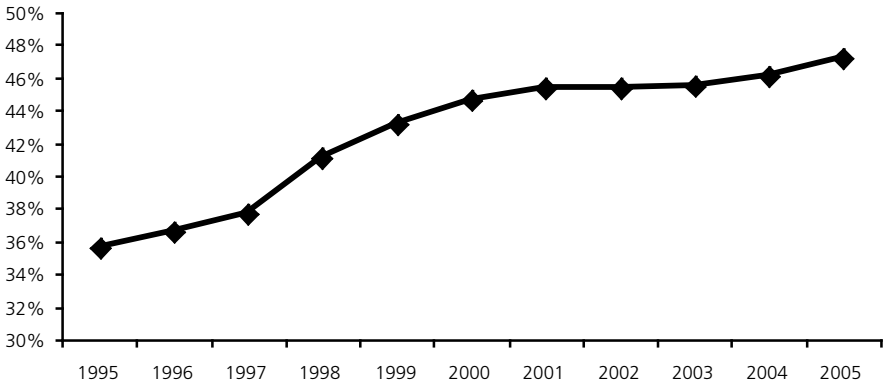
2.2. Population, Employment, and Unemployment

In the late 1980s Ireland's rate of net emigration exceeded its rate of natural increase (the excess of births over deaths) and the population declined. The 1986 population level was not regained until 1991. Projections prepared at that time extrapolated a high net emigration rate into the future and foresaw a sustained drop in population and in the numbers at work. This pessimistic scenario played a part in reducing the urgency attached to investing in infrastructure and bears some of the blame for the bottlenecks encountered as the economy began to grow rapidly in the 1990s.

In the 1990s, after a period of "employment-less growth", the numbers at work and the population rose rapidly. Between 1995 and 2006 the population grew from 3.6 to 4.2 million – an annual average rate of growth of 1.6 per cent – whilst the employed labour force grew from 1.282 to 2.017 million, an annual average growth rate of 4.6 per cent. No other EU or OECD country recorded comparable rates of increase in population or employment over this period. Indeed, this record has few parallels in history. In view of Ireland's long history of population decline and dearth of employment opportunities, this boom was very welcome, but the sudden and unexpected reversal of fortunes led to acute bottlenecks in transport infrastructure and contributed to a high rate of inflation in house prices.

As employment grew faster than the population, the employment rate (the proportion of the total population in gainful employment) increased by one third – from 36 to 47 per cent – over the 1995-2005 period (Figure 4). The rising employment rate was due to the growth in the proportion of the population in the 25-44 age groups where employment rates are highest and the rising labour force participation rate of women. Even if productivity (output per person employed) had not increased, the rising employment ratio would of itself have significantly increased income per head of population (see below).

Figure 4: Employment rate (employed as % of population)



Source: CSO

Ireland's employment boom moved its unemployment rate from considerably above to below the EU average (Figure 5). Between 1995 and 2001 the unemployment rate fell from 12 to 4 per cent – a truly remarkable outcome in view of stubbornly high rate of unemployment over the previous ten years and the continuing persistence of high unemployment in the larger continental EU countries. It is also striking that the marked slowdown in GNP growth after 2001 did not result in a significant rise in the unemployment rate, which has remained in the 4 to 4.5 per cent range over the past five years. Structural changes in the Irish labour market in the second half of the 1990s contributed to this favourable development.[7] In fact, Ireland's record in reducing unemployment and raising participation rates deserves far more international attention than it has received, particularly in light of the frequent expressions of concern about the low employment rate in the EU, most notably in the European Council declaration in Lisbon in March 2000. Little progress has been made in lowering unemployment or raising participation rates in the larger EU countries since then.[8]

It is also noteworthy that the decline in the overall unemployment rate was reflected in declines in unemployment rates among almost all demographic groups. The unemployment rate fell at a similar pace among men and women, in all age groups, across all regions, and at all educational levels (although those with few qualifications continue to be at a relative disadvantage).[9] Another important feature of the transformation of the labour market was the rise in the proportion of households in

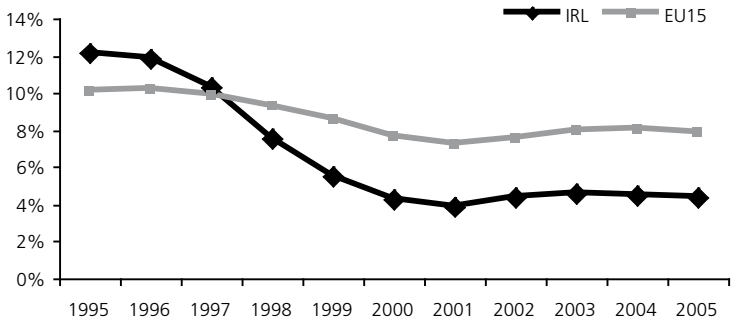
7 For a discussion of these issues see Brendan Walsh "When Unemployment Disappears: Ireland in the 1990s" Chapter 8 in Werding, Martin (ed.), *Structural Unemployment in Western Europe: Reasons and Remedies*, Cambridge MA, London UK: MIT Press, 2006, pp. 197-208.

8 The Lisbon Declaration set a target of 70 per cent for the employment rate (defined as the numbers at work relative to the population aged 15 to 64) in 2010. The Irish rate is now close to this level (se Figure 5) whereas the EU15 average is only 65.0 per cent. However, the meaningfulness of targets of this type is questionable.

9 For details see B. Walsh "The transformation of the Irish labour market: 1980-2003", Presidential Address to the Statistical and Social Inquiry Society of Ireland, 6th May 2004. For a detailed discussion of how the employment boom affected the regions see Brendan Walsh "Labour Market Adjustment in the Irish Regions, 1988-2005" Working Paper 06/05, GPEP UCD.

which more than one person was employed ("work rich" households) and the decline in the proportion in which no-one was employed ("work poor" households). This is shown in Table 1. In light of the link between unemployment and poverty, this development points to the effectiveness of the employment boom as a mechanism for reducing the level of absolute poverty.

Figure 5: Unemployment rate



Source: CSO and EUROSTAT

Table 1: Distribution of households by economic activity of members

	"Work rich" households	"Work poor" households
	per cent of all households	
1988	22.8	9.8
1997	30.9	6.8
2001	37.6	3.2
	per cent of households with at least one economically active member	
1988	29.4	12.6
1997	41.0	9.0
2001	50.0	4.3

A "work rich" household has two or more employed and no unemployed members
A "work poor" household has at least one unemployed and no employed member
Source: Labour Force Survey 1988 and 1997 Table 41 and QNHS 2001 Q 2, special tabulation.

2.3. The structure of output and employment

During the deep recession of the 1980s, it was hard to foresee how the Irish economy would be capable of generating jobs on the scale need to stabilise unemployment and check emigration. The country's "young and (potentially) rapidly growing population" seemed to pose an insurmountable challenge. With agricultural employment declining and public sector employment constrained by the need to restore order to the public finances, it seemed unlikely that industry and services would generate new employment opportunities on the required scale. Now, two decades later, we know that, although industrial employment recorded significant net gains until 2001 (against the European trend), new jobs were created at an unprecedented rate in a wide range of traded services, including the international financial services sector. The share of the broadly-defined public sector in the total declined from 24 per cent in the late 1980s to 18 per cent now. More recently, employment in the construction sector has been growing very rapidly. Since the mid-1990s, the numbers directly employed in Construction have risen two-and-a-half-fold and the proportion of total employment in this sector has risen from 7.5 to 13 per cent. Construction now accounts for 20 per cent of GDP[10] compared with just under 10 per cent in 1995, whilst the share of other forms of capital formation have remained static at 12 per cent. Since well over half of this static share is on residential dwellings, the urgency of alleviating transport bottlenecks does not seem to be adequately reflected in the pattern of investment. While there are obvious bottlenecks to a rapid increase in the spending on transport infrastructure, it is surely surprising that the outlay on new housing units is now about ten times the level of spending on roads.

It is beyond the scope of this paper to assess the financial backdrop to this exceptional expansion of the construction sector and the residential component of it in particular. However, it is well known (i) that it has been accompanied by a rate of house price inflation that is among the highest in the world[11] and (ii) a rate of domestic credit expansion that is also at record levels. Private Sector Credit grew by 42 per cent in 2005, bringing the level of credit outstanding close to twice GNP. To assess the significance of these numbers, however, we need to bear in mind that credit expansion is one side of the balance sheet. On the other side are the public's deposits with the banking system, which are assets of the household sector. These too have been growing rapidly, although not fully matching the growth in credit. The residual is represented by foreign borrowing by the banking system.

At the household level, much attention has been paid to the increase in private sector personal indebtedness, which rose from 48 per cent of personal disposable income in 1995 to 132 per cent in 2005.[12] However, the Irish ratio is not exceptionally high by comparison with other developed countries. Moreover, as mentioned above, the level of gross indebtedness is only one side of the balance sheet – the asset side of the household balance sheet needs to be taken into account. When account is taken of the acquisition of assets by Irish households, it is seen that here has been a large increase in Irish

10 Central Bank estimate for 2006.

11 *The Economist* newspaper, for example, has repeatedly drawn attention to Ireland as an outlier in terms of house price inflation and predicted that prices will fall.

12 For a recent review of the issues touched on in this sector, see John Kelly "The Net Worth of Irish Households" Central Bank Quarterly Bulletin Number 3, July 2006, pp. 79-92.

households' net worth since 1999.[13] This optimistic picture should, however, be modified by taking account of the less favourable net worth situation of many younger households, and of the general vulnerability of the household sector to higher interest rates and falling house prices.

A stabilisation of the (residential) construction sector would of itself have a dampening effect on growth. In a benign scenario, there would a gradual winding-down of the share of residential construction in the economy and resources would be smoothly switched to other sectors. The labour market would be helped to adjust by a lower rate of immigration or even a reversal of the net inflow as job opportunities shrink in a sector that has absorbed a significant proportion of the recent immigration. But it is possible to imagine less favourable outcomes, with a sharp drop in house prices leading to a loss of consumer confidence and wider adverse effects on the economy.

With employment in agriculture and industry now declining and the residential construction sector facing eventual retrenchment, further net employment growth will be dependent on the services and non-residential construction sectors.

The ability of the economy to weather a downturn in the residential construction will depend on the flexibility of the labour force now employed there. Those employed in house building are likely to be relatively mobile both geographically (including their propensity of emigrate) and their ability to transfer to other economic sectors (notably, of course, other types of construction activity). Nonetheless, public policy should take this issue into account through the design and phasing of pubic capital spending. A recurrent criticism of Irish economic policy stretching back over the decades has been its pro-cyclical nature – its tendency to aggravate the business cycle through stimulus in good times and cut-backs in bad times. The unsustainability of the present level of activity in the residential construction sector should be taken as a signal to prepare contingency capital spending in areas that would take up the slack that will emerge when the inevitable slowdown occurs.

While doubts may be expressed about the sustainability of continued rapid employment growth in services areas, a lesson to be learned from the widespread pessimism about employment prospects in the 1980s is that it is not possible to anticipate future patterns of employment. The increasing role of service employment in wealthy economies is now well-known, but the composition of this employment cannot be anticipated – it will evolve in response to changes in technologies and patterns of demand.

2.4. Immigration

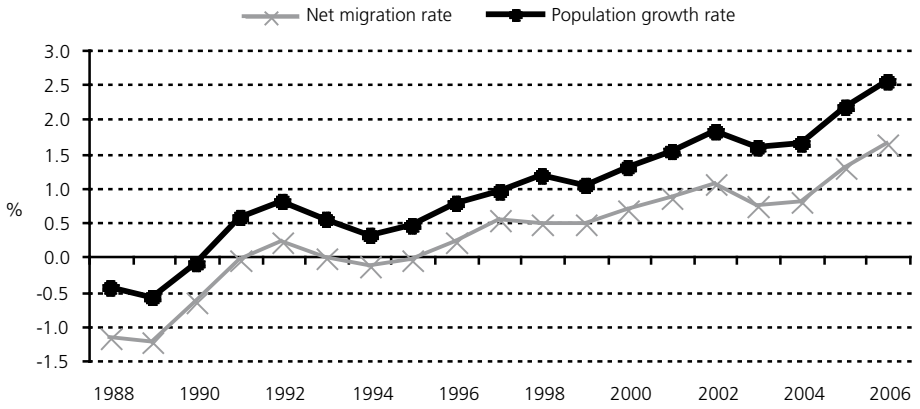
There was some time lag before the acceleration of economic growth in the 1990s led to increased employment. Higher levels of in employment then led to falling unemployment and emigration tapered off. Since the end of the decade a substantial net inflow of population has been an increasingly important feature of our economy.

13 See Kelly, Table 3.

The rate of population growth equals the rate of natural increase (the excess of births over deaths) plus the net migration rate. The rate of natural increase dipped from 0.9 per cent in the late 1980s to 0.5 per cent in the mid-1990s but has risen back to 0.9 per cent in recent years. This is the highest rate in the EU25 – where several countries (notably Germany and Italy) are now recording an excess of deaths over births – so that even if there were no net immigration to Ireland, our population would grow at about twice the EU average. When the Irish rate of natural increase is combined with a net migration rate over one per cent of population – as has been the case in recent years – the result is an exceptionally rapid rate of population growth. Since 1995 the population of the EU15 has grown by a total of only 3.5 per cent, whereas Ireland's population has increased by 15 per cent. Ireland's current rate of population growth – 2.5 per cent – contrasts with the EU rate of only 0.5 per cent.

From Figure 6 it is clear that net migration – rather than the rate of natural increase – has been the driving force behind the fluctuations in our rate of population growth.

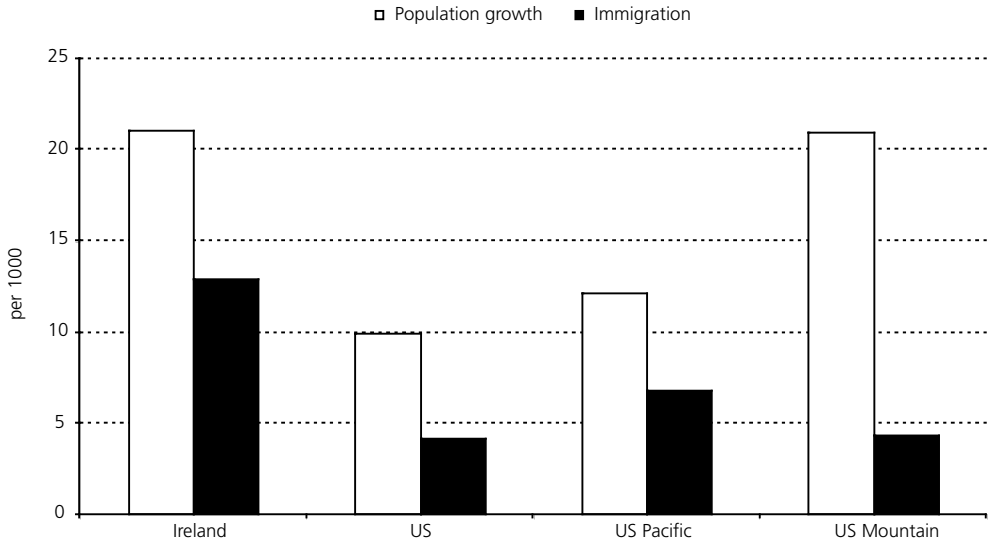
Figure 6: Population Growth and Net Migration



While we can welcome the reversal of the age-old pattern of emigration, the present high rate of net immigration is fuelling a rate of population growth that has few parallels among contemporary developed countries. Not only are the countries of Western Europe growing relatively slowly, but the same is also true of most European regions and metropolitan areas. In the developed world, we have to look to the fast growing regions of the US to find growth rates comparable to the Irish ones. Figure 7 compared Ireland's present population growth rate with those of the fastest growing US regions. It shows that the Irish rate of net immigration (from the rest of the world) is higher than that of the Pacific region, which has the highest immigration rate in the US.[14]

14 Note that the net immigration rate displayed in Figure 7 refer to in movement of non-nationals – obviously, the US Mountain Region has a high rate of in-movement from other US regions.

Figure 7: Ireland and US Regions: Population Growth and Immigration



While non-nationals' share of population and employment is still relatively low – equal to just 10 per cent at the beginning of 2006 – they accounted for 54.4 per cent of the increase in employment in between the first quarters of 2005 and 2006.[15] The number of Irish persons employed grew by 2.2 per cent over the year, while the number of non-nationals employed grew by 31.8 per cent. This increasing dependence on immigrant labour is a key feature of our recent performance. If extrapolated into the medium term, it implies substantial increases in the proportions of the population and labour force that are non-nationals, and, when account is taken of the births to these immigrants, even faster growth in the proportion of the population of non-Irish origins. The wider social implications of these trends should not be ignored, but they lie beyond the scope of the present paper. The implications of a high rate of immigration for living standards are discussed in a later section.

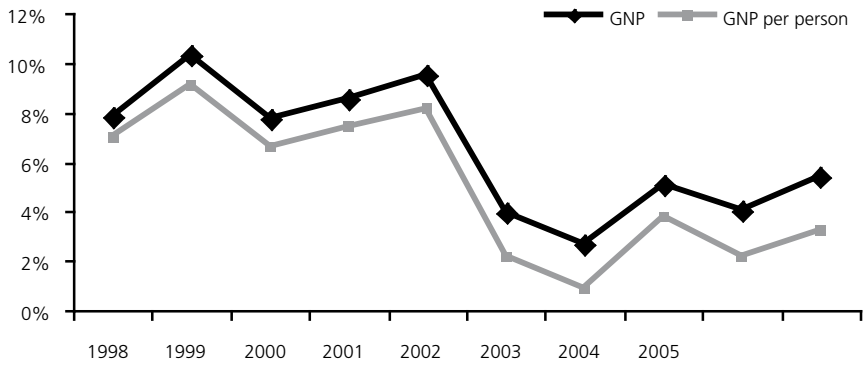
15 This is not far behind the estimated contribution of immigrants to the growth of the US labour force since 2002: "The number of new immigrants in the nation's civilian labor force increased by over 2.9 million between 2000 and the first four months of 2004, contributing between 60 and 62 per cent of the growth in the nation's resident labor force over this time period, exceeding the immigrant share of the nation's labor force growth in the 1990's, which was the highest in the twentieth century." Andrew Sum, Neeta Fogglshwar, Khatiwada and Sheila Palma, *Foreign Immigration and the Labor Force of the U.S.: The Contributions of New Foreign Immigration to the Growth of the Nation's Labor Force and Its Employed Population, 2000 to 2004*, Center for Labor Market Studies Northeastern University Boston, Massachusetts July 2004.

3. Trends in Living Standards

Our review of the growth of output, population, and employment displayed some very impressive figures. When, however, these growth rates are brought together they can be used to present a somewhat less impressive picture of Ireland's recent record in terms of improvements in productivity and living standards. Because population growth averaged 1.6 per cent over the past ten years, the annual growth rate of GNP per capita was 1.6 per cent less than that of total GNP (Figure 8). None the less, the rate of growth of GNP per capita was still high, average over 5 per cent a year since 1995, although the slowdown in the aftermath of the recession of 2001 appears more dramatic in terms of GNP per capita, whose growth averaged just 2.5 per cent over the years 2002-2005. None the less, Ireland average rate of growth of GNP per person over the period 1995-2005 is higher than the EU total GDP growth rates in each of these ten years.

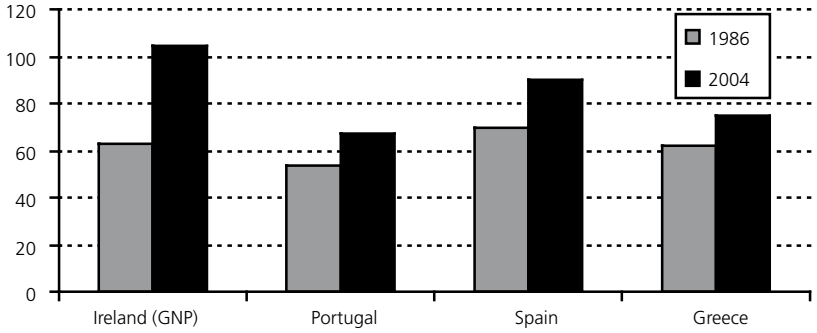
Ireland's out-performance in terms of output growth has had important implications for our position in the international living standards league tables. Comparisons of living standards are usually based on per capita GDP, adjusted for differences in the cost of living in individual countries by using Purchasing Power Parity (PPP) prices. Even if Ireland's *GNP* per capita is compared with the average of EU *GDP* per capita at PPPs, the effect of sustained out-performance on our international ranking in living standards is evident. Figure 9 shows how living standards in Ireland, Portugal, Spain, and Greece have moved relative to the EU15 average. In 1986 all four countries had relatively similar standards of living – between 60 and 70 per cent of the EU average. By 2004, however, the Irish situation was transformed. Our GNP per person is now above the EU GDP per person average. While Spain, Greece, and Portugal had made some gains relative to this average, they still lag. Perhaps more than any other simple comparison, this illustrates the achievements of the Irish economy during the 1990s.

Figure 8: Growth rates of GNP and GNP per person



Source: CSO

Figure 9: Living standards relative to EU average (see text for description of data)



We need to discuss the question of the distribution of the income gains, albeit briefly. In Table 1 we presented information showing that the fall in the overall unemployment rate had been accompanied by a sharp fall in the proportion of "workless households". The benefits of the increased availability of employment opportunities were thus widely dispersed. A recent review concluded that "economic vulnerability, as we have defined and measured it, declined sharply over the period under examination [*viz.* the 1990s]."[16] There is, however, some evidence that the distribution of income became more unequal. The ratio of the income of those in the highest to those in the lowest quintile of the income distribution has remained fairly stable at about 5 since 1995, slightly above the EU15 average of 4.8 in 2005.[17] Similarly, the "at-risk-of-poverty" rate[18] rose from 19 to 21 per cent between 1995 and 2005, which is above the EU average of 17 per cent. Because it really reflects income distribution rather than "poverty" in the conventional meaning of the word, the significance of this indicator for economic and social well-being is debated, with more weight attached to it in Europe than in the United States.[19]

16 Christopher T. Whelan, Brian Nolan And Bertrand Maître, "Trends in Economic Vulnerability in the Republic of Ireland" *The Economic and Social Review*, Vol. 37, No. 1, Spring, 2006, pp. 91-119.

17 The ratio of total income received by the 20% of the population with the highest income (top quintile) to that received by the 20% of the population with the lowest income (lowest quintile) – income defined as equivalised disposable income. (Source: EUROSTAT)

18 The share of persons with an equivalised disposable income below the risk-of-poverty threshold, which is set at 60% of the national median equivalised disposable income (after social transfers).

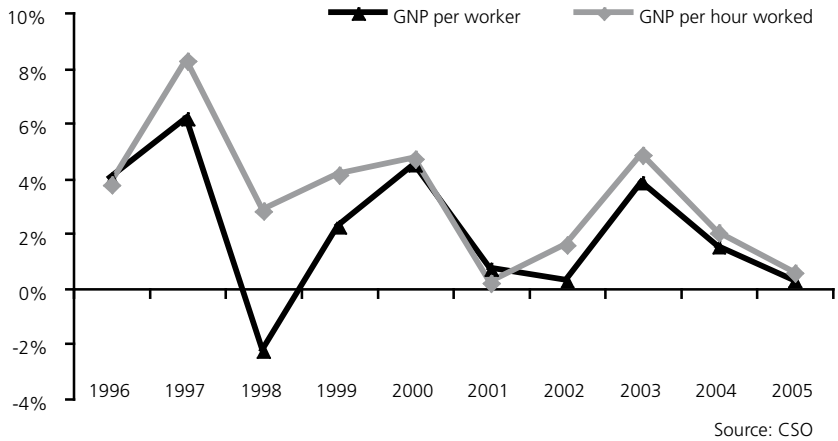
19 For a discussion of this issue see Alberto Alesina, Rafael Di Tella, and Robert MacCulloch "Inequality and Happiness: Are Europeans and Americans Different?" National Bureau of Economic Research Working Paper No. 8198, 2003.

4. Sustainability: Productivity and Competitiveness

Some of the factors that have underpinned Ireland's phenomenal economic growth since 1995 cannot be sustained indefinitely. We already drew attention to the extent to which it has been based on an exceptional rate of employment growth. This issue is pursued at greater length in this section.

We noted that the rate of increase in the numbers at work has been the really exceptional feature of the Irish economy's performance over the past ten years. The rate of growth of labour productivity (output per person employed or per hour worked) has been less spectacular, especially in recent years. This is evident from Figure 10, which shows the rate of growth of output (i) per person employed and (ii) per hour worked. Caution must be exercised in examining productivity figures that are not measured directly but as the ratio of two aggregates (output and employment). There is a risk that in a given year errors in the numerator and denominator could be compounding rather than offsetting. Such errors are likely to cancel out over the years, and the revealed medium-term in productivity is likely to be reliable.

Figure 10: Rate of growth of labour productivity



Source: CSO

The growth of output per worker has been quite erratic. Despite a recovery in 2003, it averaged only 1.3 per cent over the period 2001-2005. When account is taken of the fall in average hours worked,[20] this rises to 1.8 per cent – which is still modest. The slowdown in productivity may be in part due to the changing sectoral distribution of employment, as some high-productivity manufacturing sectors decline and lower-productivity construction and service sectors expand, but this does not minimise its significance.

20 The fall in average hours worked reflects factors such as the rise of part-time working, the declining importance of farming, and the slow fall in the average working week of those working full-time. Data from the QNHS show that the average length of the working week fell from 41.5 hours in 1995 to 37.0 hours in 2005. The big fall in 1998 coincides with an exceptional increase in the numbers employed, probably reflecting the increased coverage of the QNHS.

The relevance of the productivity figures to the sustainability issue is two-fold. In the first place, improvements in living standards depend ultimately on the growth in output per person employed or hour worked. Other sources – such as the rising numbers at work due to increased participation rates and changing age structure – will not be as important going forward as they were over the past ten years. The rise in the employment/population ratio will come to an end when the age structure of the population and age-specific participation rates stabilise. Indeed, over the medium term, the prospect is that the ageing of the Irish population will lead to a rise in the proportions in the elderly, non-active age groups. While there is still some room for further increases in participation rates, Irish rates are already above the EU average, and the economic benefits of higher participation rates among groups such as parents with young children do not come without offsetting costs – they require increases in the provision of childcare and early schooling and imply foregone leisure and household production. We are left, then, with higher productivity per hour worked as the only long-term sustainable source of higher living standards.

The other reason for focussing on productivity is that Ireland is a small economy heavily dependent on trade and inward direct investment to maintain and improve its living standards. Competitiveness is a key factor in our ability to gain export markets and attract new foreign investment. International competitiveness can be gauged by comparing what it costs to produce output of a given value in different countries. Wages are an important component of the cost bill – and one that can vary significantly between countries. With no control over our exchange rate, high labour costs have to be justified through high productivity. It is clear that over the past decade Ireland has become a high-wage country by international standards. Our performance on this front is monitored by the Central Bank. In its April 2006 *Bulletin* it commented that

> *"Relative labour cost competitiveness measures suggest a deterioration in our international competitiveness in recent years, and this has been compounded by strong increases across a range of non-labour business costs . . such that Ireland's ability to compete in terms of total business costs appears to have experienced a significant decline."*[21]

In its July commentary it noted:

> *"Labour costs competitiveness has deteriorated significantly in recent years, especially when viewed on a whole economy basis. Comparatively high increases in a range of non-labour costs have exacerbated this decline in cost competitiveness."*[22]

This trend is unlikely to be offset in the short- to medium-term by a moderation of Irish wage inflation relative to that occurring in our trading partners. The recently-concluded national wage agreement envisages that wage rates will rise by a further 10 per cent over the coming 27 months, at a time when wage rates in many European countries are rising at less than 3 per cent a year. If maintained, deteriorating competitiveness would tend to slow down Ireland's rapid growth.[23] An accelerated rate of increase in productivity is the key to maintaining our growth rate at its present high level.

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21 Central Bank of Ireland, *Quarterly Bulletin* 2006:2, p. 53. The Bank's measure of labour costs relates to manufacturing industry. It is very difficult to make international comparisons of output, productivity, and costs in the service (including public service) sectors, but these are crucial to the competitiveness of the economy and to our living standards.

22 Central Bank of Ireland, *Quarterly Bulletin*, July 2006, p. 52.

23 With our currency locked into the Eurozone and no possibility of an exchange rate depreciation to offset our relatively high wage inflation or higher national interest rates to slow our growth rate, we are experiencing a real appreciation, which could be regarded as a natural adjustment mechanism to the overheating of the our economy.

5. Overview of the sources of growth 1995-2005

The previous sections have presented a detailed picture of the growth performance of the Irish economy over the last ten years. We can summarise the evidence as showing:

(i) A very rapid growth rate of real GDP.

(ii) A somewhat lower rate of growth of real GNP, as the gap between GNP and GDP widened from 8 to 18 per cent.

(iii) An exceptionally rapid rate of growth in the numbers at work. Employment grew most rapidly in traded services but in recent years the construction industry has accounted for about one quarter of the increase.

(iv) The rapid growth in employment led to

   a. A sharp fall in the unemployment rate, and

   b. A marked rise in the employment rate, but none the less there was also a rapid rate of population growth.

(v) The rates of growth in labour productivity – output per employed person or hour worked – were less dramatic that that in total output or output per person.

These trends in turn led to:

(i) A significant increase in Irish living standards, measured in terms of GNP per person, both

   a. Absolutely, and

   b. Relative to the EU average.

Figure 11 brings these trends together and allows a comparison of the performance of the main indicators. In Figure 12 the ten-year period is divided into two five-year sub-periods, which brings out the sharp fall in all these growth rates in the second sub-period (Figure 12):

Figure 11: Annual average growth rates, 1996-2005

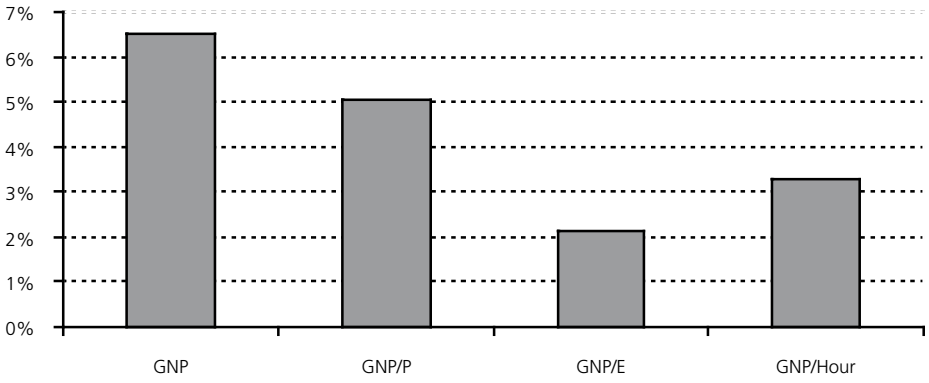
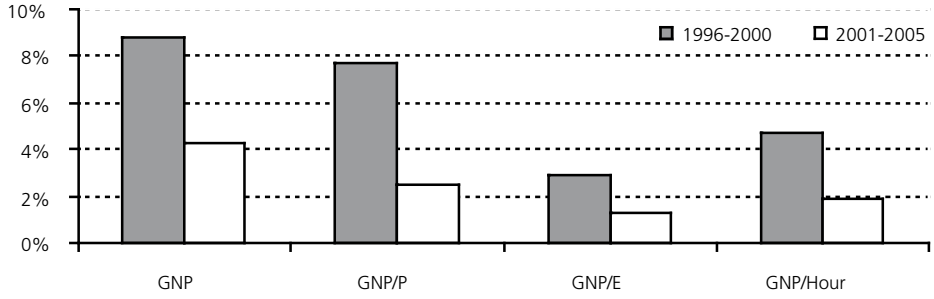


Figure 12: Annual average growth rates, 1996-2000 and 2001-2005



Whilst the rate of growth of GNP was halved, comparing 1996-2000 with 2001-2005, the rate of growth of output per hour worked fell even more sharply, from 4.7 to 1.8 per cent.

Another way of presenting these trends is to decompose the rate of growth of GNP into the rate of growth of

(i) Total population, P,

(ii) The employment rate, E/P,

(iii) Hours worker per person employed, H/E,

(iv) Output per hour worked, GNP/H.

Table 2 shows this decomposition for the two five-periods 1995-2002 and 2001-2005.

Table 2: Decomposition of growth of GNP 1995-2005

				Annual average growth rates	
	1995	2000	2005	1995-2000	2001-2005
				per cent	
Population (000)	3,601.3	3,789.5	4,130.7	1.0	1.7
Employment rate (per cent)	35.6	44.7	47.3	4.6	1.1
Average hours worked weekly	41.5	38.0	37.0	-1.7	-0.5
Output per hour € at 2003 prices	24.6	31.0	34.0	4.7	1.8
GNP € million at 2003 prices	68,153	103,716	127,570	8.8	4.2

The later period is characterised by several changes relative to the earlier one. The slower growth of employment in the second period reflects two offsetting developments – rate of population increase rose, but the rate of increase in the employment rate fell. This reflects stabilising of the birth rate and the proportion of the population aged under 15 and the tendency for the labour force participation rates of the population aged 15-64 to asymptote. The annual average rate of growth of output per hour worked fell by 60 per cent, from 4.7 to 1.8 per cent. The rate of population growth increased and the rate of decline in weekly hours worked slowed. In the second sub-period less than half (43 per cent) of the growth in GNP was attributable to the growth of productivity, compared with 53 per cent of a higher total in the first sub-period. From the viewpoint of sustainability, the rising contribution of increased work effort – as distinct from productivity – to a falling total growth rate is an adverse feature of the economy's recent performance.

6. Effect of Immigration on Living Standards

A salient point to emerge from the review in the foregoing sections is that recent Irish economic growth has become more dependent on the growth of the labour input and that this, in turn, has been sustained by the growing contribution of net immigration to the work force. It is important, therefore, to discuss the implications of immigration for living standards and economic well-being.

Ireland is still relatively new to the experience of large-scale immigration and much of the information that will be required for an evaluation of its impact on the economy is as yet unavailable. The following commentary is based on the limited research that has been undertaken on the recent Irish experience and on some research from other countries, notably the United States.

Studies of the inflow to Ireland in the 1990s indicate that the immigrants have relatively high educational levels and the possibility that their qualifications are not fully utilised in Ireland.[24] The upsurge in immigration form the new EU accession states after 2003 has yet to be analysed in any detail. However, the evidence to date shows that immigrants do not seem to displace the incumbent labour force, resulting in higher unemployment. A study based on data for 2004 and 2005 concluded:

> *"In relation to Ireland, the evidence suggests that displacement of Irish workers by lower paid immigrants is not a source of disturbance in the labour market. To the extent that there has been displacement in some sectors it could be accounted for, at least in part, by the normal dynamics of the labour market in which Irish workers move to better-paid jobs and are replaced by lower-paid immigrants."*[25]

Assessing the longer-term effects of large-scale immigration on the wage rates and living standards of the Irish labour force will only be possible as more information becomes available and is analysed. We can gain some insights from *a priori* economic reasoning, such as the logic that demand curves – including that for labour – slope downwards. A substantial increase in supply – due for example to the opening up of our labour market to nationals of countries like Poland – implies, *other things equal*, a fall or a slow-down in the rate of increase in wage rates among native-born workers competing with the immigrants.[26] But is also obvious that in the absence of immigration the Irish economy could not have achieved the high rates of output growth documented earlier in this paper. As we saw, half the new jobs created in the economy in 2005 were filled by non-Irish nations. Without immigration several sectors (the "hospitality industry" and construction in particular) that are highly dependent on immigrant workers would have been constrained by labour shortages and wage rates would have been bid up faster than was the case. The output of these sectors would have grown more slowly and become more

24 Alan Barrett, Adele Bergin and David Duffy "The Labour Market Characteristics And Labour Market Impacts Of Immigrants In Ireland" *The Economic And Social Review*, Vol. 37, No. 1, Spring, 2006, pp. 1-26

25 Doyle, N, Hughes, G, Wadensjo, E, *Freedom of Movement for Workers from Central and Eastern Europe: Experiences in Ireland and Sweden*, Swedish Institute for European Policy Studies (Sieps), Stockholm, May 2006 Report No. 5

26 The strongest proponent of this view of recent US immigration is George Borjas, who concludes that "that immigration lowers the wage of competing workers: a 10 per cent increase in supply reduces wages by 3 to 4 per cent" see George J. Borjas, "The Labor Demand Curve is Downward Sloping: Re-examining the Impact of Immigration on the Labor Market,"*Quarterly Journal of Economics*, November 2003, pp. 1335-1374.

expensive, to the benefit of Irish people employed there but at the expense of Irish consumers of their output. And other things are *not* equal. Immigration on the scale we are now experiencing it raises demand as well as increasingly supply and the higher rate of growth offsets the depressing effect of the increased supply of labour on wage rates.

A recent review of the long-run impact of large-scale immigration of low-skilled workers from Mexico on the US economy argued that, although in the long-run large-scale immigration had little impact on wages levels as the capital stock expended to match the increased supply of labour, the new immigrants have been slow to acquire qualifications and education. In the transition period they have lowered the earnings of comparable native-born groups:

> *"Although the earnings of non-Mexican immigrants converge to those of their native-born counterparts as the immigrants accumulate work experience in the U.S. labor market, this type of wage convergence has been much weaker on average for Mexican immigrants than for other immigrant groups. . . . The large Mexican influx in recent decades widened the U.S. wage structure by adversely affecting the earnings of less-educated native workers and improving the earnings of college graduates. These wage effects have, in turn, lowered the prices of non-traded goods and services that are low-skill labor intensive."*[27]

However, these negative impacts of Mexican immigration have been disputed;

> *"At the aggregate level, the wage gap between dropouts and high school graduates has remained nearly constant since 1980, despite supply pressure from immigration and the rise of other education-related wage gaps. Overall, evidence that immigrants have harmed the opportunities of less educated natives is scant. . . On the question of assimilation, the success of the U.S.-born children of immigrants is a key yardstick. By this metric, post-1965 immigrants are doing reasonably well: second generation sons and daughters have higher education and wages than the children of natives. Even children of the least educated immigrant origin groups have closed most of the education gap with the children of natives."*[28]

Other studies also present a more favourable view of the impact of immigration on the native population.

> *"Making the crucial assumption that U.S. and foreign-born workers with similar education and experience levels may nevertheless be imperfectly substitutable, and allowing for endogenous capital accumulation. This function successfully accounts for the negative impact of the relative skill levels of immigrants on the relative wages of U.S. workers. However, contrary to the findings of previous literature, overall immigration generates a large positive effect on the average wages of U.S.-born workers."*[29]

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27 *The Evolution Of The Mexican-Born Workforce In The United States*, George J. Borjas and Lawrence F. Katz National Bureau of Economic Research, Working Paper 11281, April 2005, Http://Www.Nber.Org/Papers/W11281.

28 David Card "Is the New Immigration Really So Bad?" National Bureau of Economic Research Working Paper 11547, August 2005., Http://Www.Nber.Org/Papers/W11547

29 Gianmarco Ottaviano and Giovanni Peri: "Rethinking the Gains from Immigration: Theory and Evidence from the U.S." National Bureau of Economic Research Working Paper 11672, October 2005.

Closer to home, a recent study of the effect of immigration on the Spanish economy concluded that Spain's output per capita might have fallen slightly over the past 10 years instead of growing by an average of 2.6 per cent a year, had it not been for the influx of more than three million immigrants.[30]

The relevance of this discussion of the effects of large-scale Mexican immigration on the earnings of the US population to the present influx of Polish and other immigrant workers to Ireland may be disputed. It may be that our immigrants have higher levels of human capital and will move up the earnings distribution faster than is the happening among immigrants to the US from Latin America. However, it is worth quoting these recent reviews of the US experience because they illustrate the point that despite a long tradition of research on the topic, there are still areas of substantial disagreement among US economists about how immigration on the scale now being experienced in Ireland affects the US economy.

Immigration also has implications for the housing market. We saw that immigrants now account for about half the Irish rate of population growth and thus are an important component of the demand for entry-level housing. A recent study of the impact of immigration on rental markets in the US concluded:

> *Immigration pushes up rents and housing values in US destination cities. The positive association of rent growth and immigrant inflows is pervasive in time series for all metropolitan areas. . . . An immigration inflow equal to 1 per cent of a city's population is associated with increases in average rents and housing values of about 1 per cent. The results suggest an economic impact that is an order of magnitude bigger than that found in labor markets.*[31]

Given the scale of immigration to Ireland, a similar effect would be very significant in terms of our housing market. Counterbalancing this effect, however, is the fact that the construction industry is a large employer of immigrants, who thus increase the supply of, as well as the demand for, housing. However, given the other constraints on the supply of housing – such as the availability of sites and planning permissions – the demand-side effect is likely to considerably outweigh the supply side one.

It should also be noted that the rate of increase in home ownership among immigrants is important to their eventual integration into the host society. The severe social problems among large immigrants populations in several European countries may be exacerbated by the tendency to segregate them into low rent accommodation in economically and socially isolated ghettoes.

A broader consideration is the issue of how large and rapidly growing a population we wish to see in Ireland. The undesirable side effects of growth on pollution, housing prices, and congestion have to weighed against the benefits from a broader tax base, better age structure, and increased capacity to fund social security pensions.

The balance between the costs and benefits of large-scale immigration of the type that has fuelled our recent growth depends heavily on the answers to these questions.

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30 "Spanish study points to benefits of immigration", Victoria Burnett, *Financial Times*, August 30 2006

31 Albert Saiz, "Immigration and Housing Rents in American Cities" IZA Discussion Paper No. 2189, 2006.

7. Medium Term Prospects

The point of departure for a discussion of Ireland's medium-term growth prospects is the population projections published by the Central Statistics Office (CSO) in 2004 using the results of the 2002 Census of Population.[32] These projections are based on assumptions about the evolution of Irish birth, death, and net migration rates. By applying participation rates to the projected population, the projected labour force is obtained. These projections – and indeed medium term economic projections – generally abstract from the possibility of short-term cyclical fluctuation and try to delineate the bounds within which population and the economy will grow over the medium-term.

Birth and death rates are reasonably regarded as exogenous to the performance of the economy, and although a tighter labour market will induce higher participation rates, these are likely to fall within fairly narrow ranges. Migration, however, is very sensitive to the performance of the economy – rapid growth and a tight labour market draw migrants into the country, a recession and rising unemployment would quickly bring about a reversal of the inflow. The CSO population projections yielded the following ranges for the three five-year periods 2001-2006, 2006-2011 and 2011-2016:

Population Growth Rate per cent p.a.			Labour Force Growth Rate per cent p.a.		
2001-2006	2006-2011	2011-2016	2001-2006	2006-2011	2011-2016
1.61 –1.59	1.57 –1.19	1.50 – 0.81	2.6	1.8 – 1.5	1.3 – 0.7

A comparison of these projections with the information now available for the period 2001-2005 illustrates the hazards of forecasts and projections. Over these four years population both the population and labour force grew faster than projected – at 1.8 per cent and 2.8 per cent a year, respectively. Looking ahead to 2011 and 2016, the CSO projections suggest that the rate of increase in the labour force will decline at a rate that depends on the assumed rate of net immigration. The higher projected labour force growth rates (1.8 and 1.3 per cent annually for the five-year intervals 2006-2011 and 2011-2016 respectively) assume net immigration of 30,000 a year. This is less than half the 69,900 estimated inflow in 2005-06. Acknowledging the link between the rate of growth of the labour force and net immigration, the CSO comments "for every 10,000 shortfall/surplus in the projected labour supply an adjustment of approximately 15,000 would be required to the underlying migration assumption" (p. 31). Provided the overall macroeconomic situation remains favourable and the unemployment rate low, it is plausible to assume that immigrants will continue to be attracted to the country by our relatively high wage rates (including one of the highest minimum wage rates in Europe) and relatively flexible labour market. This will in turn both facilitate and fuel faster growth – on the supply side, by increasing the supply of labour at present wage levels, on the demand side by boosting the requirements for housing and services. Thus the higher end of the CSO's population and labour force projections are the most relevant.

32 Central Statistics Office, *Population and Labour Force Projections 2006-2036* December 2004.

Because average hours worked are still relatively high in Ireland, it is plausible to project forward some further reductions in average hours worked, say at 0.5 per cent a year. Using the above projections of the growth in the numbers at work, this fall in hours worked would reduce the rate of growth of the labour input to the range 1.0 - 1.3 per cent over the coming five years, and to 0.8 to 0.2 per cent over the following quinquennium. If the recent two per cent rate of growth of productivity (output per hour worked) is extrapolated, these assumptions imply that GNP will increase by 3.0 to 3.3 per cent over the coming five years and by 2.8 to 2.2 per cent over the period 2011-2016.

These projections are mechanical and subject to many caveats. They do not allow for any cyclical fluctuations arising from external or domestic shocks. But they provide some idea of the range within which growth might lie between now and 2016. Even if the upper end of these ranges is adopted, the projected annual GNP growth rate falls from just over 4 per cent in 2000-2005 to say 3.5 per cent until 2010 and then to under 3 per cent. At the time of writing (mid-2006) the consensus forecast a GNP growth rate of about 5 per cent in 2006 and 2007. Our projections suggest that this high growth rate is unlikely to be maintained.

It is of interest to compare these numbers with other available forecasts. The Economic and Social Research Institute in its Medium-Term Review 2005-2012[33] forecasts for real GNP growth over the period 2005-2010 range from 4.9 to 3.5 per cent, and for 2010-2015 from 3.3 to 3.1 per cent. These are roughly one per cent point higher than those presented above. The difference arises mainly because the ESRI assume that rate of productivity growth will recover to the rate recorded in the early 1990s.[34]

A second view of the likely trajectory of the economy is provided in the recently-published *2020 Vision*.[35] This projection is based on an assumed 2015 population in the range between 4.8 to 6.5 million, compared with the CSO's range (for 2016) of 4.6 - 4.9 million. The labour force is assumed to grow by 2.2 per cent a year over the period 2005-2015, compared with CSO's high projection of 1.8 per cent. These upward divergences reflect assumed higher rates of immigration and participation rates. The authors further assume that productivity will grow at an annual rate of 3 per cent until 2020. Putting all of these factors together yields a projected rate of growth of GDP of 5.75 per cent for 2005-2010 and 5 per cent between 2011 and 2015.

We can conclude that the Irish economy is believed likely to grow at between 3 and 5 per cent a year between now and 2011. To achieve the growth at the higher end of this range, higher levels of immigration and/or higher rates of improvement in productivity will be required. These are the type of growth rates that should be used as a backdrop to discussions of sustainability in areas such as land use, energy demands, and planning.

33 John FitzGerald *et al., Medium-Term Review 2005-2012* ESRI, Dublin: December 2005.

34 It also reflects the fact that the ESRI make no allowance for a reduction in hours worked.

35 *2020 Vision: Ireland's Demographic Dividend* NCB Stockbrokers Dublin, March 2006.

8. Policy Issues

This paper has review Ireland's impressive growth record over the past ten years and the prospects for the coming decade.

While acknowledging that Ireland has had the highest growth rate, and the lowest unemployment rate, in the EU for some years now, we drew attention to the slowdown in the rate of growth in productivity that has occurred since 2000 and the increasing share of output growth that has been due to increasing the labour input to the economy rather than increased output per hour worked. It is likely that recent relatively low rates of productivity growth will continue as the economy shifts more towards service sector and immigrant-dependent employment. Maintaining high growth rates in this environment will require a high rate of labour force growth, fed by a high net immigration rate. The large gap between GNP and GDP, which reflects the dependence of the economy on foreign-owned exporting firms, was also highlighted. The economy is unique in its joint dependence on an inflow of capital and labour to maintain its high growth rate.

These features of the Irish economy raise issues about what our economic goals should be. Traditionally, increasing the rate of growth of total GNP was viewed as desirable because it maximised employment opportunities, lowered unemployment, checked emigration, and raised the living standards of the incumbent population. The nature of our recent economic performance suggests that a significant proportion of our growth has had the result of offering profit opportunities to foreign-owned firms and employment opportunities to immigrants, while some negative spillovers of this growth (increased congestion, house price inflation) bear heavily on some segments of the incumbent population.

In an earlier section, some of the costs and benefits of large-scale immigration were discussed. On the benefit side, immigration facilitates faster economic growth and moderates the rate of inflation in domestically-supplied output, especially services. On the cost side, the faster rate of population growth implies increased pressure on infrastructure and the housing market, in the short-run at least, and, taking the experience of other European countries as a guideline, the prospect of new social tensions in the future. As yet there is no evidence of adverse effects on the living standards of the native-born population, although obviously increased competition in certain segments of the labour market must moderate the rate of increase of wage rates.

It is not clear how much control we could exercise over the rate of immigration. We are committed to the free movement of labour within the enlarged EU25. With a population of 4.2 million in an enlarged community of 460 million, with wage rates that are among the highest, and an unemployment rate that is one of the lowest in the Community, it is clear that we will continue to attract large inflows. A comparison between Ireland and Poland serves to bring this point home:

- The population of Poland is about nine times that of Ireland,
- Ireland's unemployment rate is now 4.4 per cent, Poland's 17.7 per cent,

- Irish average hourly wage rates in industry and services are about €15, Poland's about €3,
- Ireland spends almost €6,000 a year per head of population on social protection, Poland just €1,100,
- There is a well-established network of migrants from Poland already in Ireland,
- A return airfare between Dublin and several Polish centres is €200 or less.

The debate on the level of immigration from the accession states that joined the EU in 2004 to the existing 15 member states appears to have seriously underestimated the magnitude of the flow. The numbers coming to Britain alone have been a multiple of the projected total movement and some twenty times the official government estimate for Britain. Of course, the inflow to Britain, Ireland, and Sweden was greater than anticipated in part because the other 12 member states have postponed opening their labour markets.

With the forthcoming enlargement of the EU in 2007, we are also facing the prospect of opening our labour markets to Bulgaria and Romania, whose living standards are lower than Poland's. It is unusual to have completely free movement of labour between countries at such disparate levels of economic development. Despite the relatively high cost of living in Ireland, especially the cost of accommodation, the pull of the Irish economy on migrants from these countries will be very strong, especially if, as was the case in 2004, we are in a minority of countries allowing a free inflow of population from the new member states.

This implies that our policy towards the new member states will have a crucial bearing on the potential future growth rate of economy. A liberal immigration and work permit policy would undoubtedly relax the constraint of labour shortages and make continued rapid growth in total GNP more likely. Its effects on measures more relevant to economic well being, such as GNP per person or per worker, would be less clear cut, while its effects on congestion, house price inflation, and social cohesion are likely to be negative. On the other hand, the owners of inputs to the economy whose supply elasticity is low – incumbent businesses, owners or houses and sites with planning permission, professionals protected by entry restrictions – all stand to gain from faster total GNP, even if productivity does not increase rapidly. Divergent interests are served by different policies on immigration.

The attractiveness of Ireland as a location for inward investment is heavily dependent our low corporation tax regime, as well as on low wage costs and the efficiency of our business environment. The Irish corporation tax rate is lower than that in the rich EU countries, although it is now but matched by some of the new EU accession states, such as Estonia. While a low corporation tax rate is defensible in its own right,[36] a policy of awarding grants to inward investment on "job creation" grounds is not justified in an economy where additional jobs are increasingly likely to be filled by immigrants. A system for appraising grant-aided projects exists. This views such grants as justified only if labour markets are distorted (so that market wage rates do not reflect true opportunity costs) and/or there are worthwhile

36 Economists have never been convinced of the logic of taxes on corporation profits, which tend to be shifted back to the factors employed by firms, including labour. Many European countries argue for higher rates of corporation taxes mainly because their Exchequers are dependent on them.

positive "spillovers" or "agglomeration effects" from the proposed investments.[37] The increased dependence of our labour force growth on immigration should strengthen the discipline implied by this appraisal system.

Our review of the structure of recent Irish growth highlighted its increasing dependence on the growth of the activity in the residential construction sector. This growth is widely acknowledged to be unsustainable and there is an obvious need to prepare to ease the adjustment problems that will have to be faced when the slowdown comes. An appropriate response would be to accelerate the most cost-effective components of the public capital programme to take up any emergent slack in the construction sector.

Finally, it is timely to ask for an informed debate on the goals of our economy and the need to achieve a balance between the growth of total GNP, dependent on a high immigration rate, and higher living standards and quality of life for the incumbent population, which depends on a high rate of productivity growth rather than on a high growth rate of total output.

37 See Anthony Murphy, Brendan Walsh, and Frank Barry, *The Economic Appraisal System for Projects seeking support from the Industrial development Agencies*, 2003, Dublin: Forfás.

Understanding and measuring quality of life in Ireland: sustainability, happiness and well-being

Briefing Paper for Comhar[1]

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Abstract

In the last decade, the 'Celtic Tiger' economy grew at a record rate for a developed country. Nevertheless, there has been much concern regarding the implications of the pace of economic growth for localised environmental quality and life satisfaction generally. It has long been recognised by economists, psychologists and others that traditional macro-measures of national income such as GDP and GNP are inadequate measures of the performance of an economy and wider society – such measures are unable to give value to environmental and social capital and are unable to capture the performance of a country in sustainability terms. The briefing note outlines the various approaches to measuring quality of life and sustainability for Ireland specifically focusing on a modified genuine savings approach and the use of life satisfaction scores to measure well-being and individual happiness with life. The paper presents results for Ireland. Finally, the paper discusses the importance of this research for developing an evidence-base for public policy and sets out the need for investment in such research.

Introduction

The ultimate goal of public policy is the improvement of well-being in society. Economists have traditionally employed the concept of 'utility'[2] to measure welfare, which in traditional economic models is assumed to be an increasing function of present and future consumption of goods, leisure and amenities. Due to the difficulty of measuring utility, income was generally used as a proxy, using personal income at an individual level, and national income –Gross National Product (GNP) and Gross Domestic Product (GDP) – at the macro level, as measures of individual and societal performance. However it has long been recognised that such measures are poor indicators of the sustainability of an economy and society and of the quality of life or well-being of individuals and the population (e.g., United Nations, 1954; Erikson, 1993). As Robert F. Kennedy declared (perhaps rather generously) "*GDP measures everything…except that which makes our lives worthwhile*".[3]

Nevertheless, Western governments tend to prioritise macroeconomic growth, assuming that this will bring sufficient benefits and revenue to offset any consequent external and/or social costs. Individuals too are often resigned to an assumption that short term sacrifices are necessary to achieve financial stability or higher living standards in the long-run. However, the use of monetary indicators alone to measure performance run the risk of leaving governments in the position of having to resolve subsequent social problems such as inequality or low levels of social capital (e.g. poor community spirit and support) or environmental problems such as past pollution or excessive carbon emissions. For the individuals, the short-term sacrifices may include long working hours, impacts on family life, reduced social interaction, reduced amenity time, loss of environmental quality and possibly indebtedness. In some cases, personal lifestyle choices have to be made that may have adverse impacts on private incomes.

2 See Collison Black (1998) for a summary of economic thought on this concept.

3 Present John F. Kennedy, 18th March 1968.

Aside from the problems of measuring quality of life in terms of economic growth, there are problems with the measure itself. For example, GDP ignores household production such as the effort that goes into the rearing of children, the benefits that this provides for society and the public expenditure that is avoided. Neither are costs treated equally with the benefits. GDP counts all economic activities irrespective of whether they are positive or negative. For instance, expenditure on pollution abatement appears to increase GDP even though it is correcting the negative impacts of earlier economic output. Hence, there is a degree of double-counting.

A major criticism of economic measures such as GDP is that these tend to equate societal welfare with consumption measured according to revealed preferences based on purchases of material goods. An obvious problem with this approach is that there is no market for public goods such as environmental quality and or social cohesion. Consequently, environmental goods that may be critical to continued consumption and to sustainable development are abused or depleted in the absence of market prices that signal their true value or scarcity. Furthermore, environmental goods provide utility in their natural state as well as through consumption. As well as the stock of natural capital, there are issues in relation to the quality of the environment that may have a great influence on quality of life. Measures of GNP and GDP also exclude all interpersonal relationships not based on money and the destruction of utility is partly measured as output and thus raises GDP. Aspects of income distribution and its change are also neglected, though it is known that relative income matters greatly for well-being (Luttmer, 2004).

In addition to the problems of traditional macro measures of performance, personal and/or household disposable income has also been recognised as being inadequate to measure the well-being of individuals and this has been more fully acknowledged by economists in recent years (e.g., Ng, 1997; Frey and Stutzer, 2002a; Gowdy, 2004). The criticisms of using income as the dominant method of assessing well-being include that, while at the margin, utility (satisfaction) corresponds to price, this does not hold for the consumption for earlier (intra-marginal) units and hence, the value of the aggregate bundle of goods and services is seriously underestimated (Frey and Stutzer, 2002a).

In the last decade, the 'Celtic Tiger' economy grew at a record rate for a developed country. Nevertheless, there has been much concern regarding the implications of the pace of economic growth for localised environmental quality and life satisfaction generally (EPA, 2004a; Clinch, 2001). At the macro level it is far from clear whether the economy is on a sustainable growth pattern as this is not measured by GDP or GNP. In addition, anecdotal evidence would suggest that, despite significant increases in individual disposable income, people's perception of their well-being is that it has not increased. Despite increasing concerns at governmental level regarding quality of life and sustainability, there has been a lack of alternative measures to be used for the purposes of providing an evidence-base for policymaking. Sustainability, for example, has tended to be a term that is abused as those advocating it rarely define, in operational terms, what they mean by the phrase. At the same time, there is a lot of discussion of quality of life issues but little data upon which to act to affect improvements.

The questions to be addressed, therefore, in this briefing note are:

- if traditional income measures are inadequate indicators of the level of welfare in society, what new measures of sustainability and individual and macro quality of life should be used to measure performance?
- what do the current results from those measures tell us?
- what research is required to further develop such measures so that they can be used as an evidence-base for policy?

Improving macroeconomic measures of performance: sustainability measures

The impacts of economic growth on the environment and concerns about the long-run consequences of natural resource depletion and environmental degradation have revived the interest in the relationships among national income, wealth, and welfare. This interest is very marked in Ireland where impressive economic growth in the 1990s attracted the world's attention, but also generated questions regarding its implications for environmental quality and life satisfaction.[4]

As stated in the introduction, well-known macroeconomic measures, such as GNP or GDP, have often been taken as indicators of economic and social progress. The economic system's success or failure is assessed, most of the time, based on these conventional economic measures of growth. Economic growth, defined in this manner, obtains the highest priority in international and national agendas. However, the growth of national income so measured can be accompanied by the erosion of important assets that are not included into those indicators, but are very important for human and social well-being. Human, social and natural resources and the value of their depletion (economic depreciation) are not included in the United Nation System of National Accounts (SNA), even if the main purpose of national accounts is to provide a comprehensive view of a nation's economy (Repetto *et al.,* 1989).

Human capital generally refers to the health, well-being, and productivity potential of a society. Types of human capital include mental and physical health, proper housing and sanitation, education, and work skills. These elements do not only contribute to a happy, healthy society, but improve the opportunities for economic development through a productive workforce.

Social capital, like human capital, is related to human well-being, but on a societal rather than individual level. It consists of the social networks that support an efficient, cohesive society, and facilitate social and intellectual interactions among its members. Social capital refers to those stocks of social trust, norms and strengths of citizens' organisation that bind individuals and society together and help to create a more stable and trusting social environment that is also critical for efficient and sustainable economic activity (Serageldin and Steer, 1994). Examples of social capital include neighbourhood associations, civic organisations, and cooperatives. Political stability, democracy, government efficiency, and social equity are also considered part of social capital.

4 See Clinch (2001) for a broad overview of key environmental issues facing Ireland in the new millennium.

Natural capital constitutes the source of all economic activity. It provides a source of low entropy resources and it assimilates high entropy wastes. Natural capital is more than the sum of renewable and nonrenewable resources (biomass, stocks and energy flows). It provides a range of life support services necessary to maintain the habitability of the planet Earth (Jansson, *et al.,* 1994; Costanza *et al.,* 1997). All these services can be divided in: direct contributions to economic activity (raw materials, energy); goods and services for final consumption; services provided by the environment, which range from current values such as extractive uses (fish, pharmaceuticals), non-extractive uses (recreation, aesthetic), and maintenance of life support systems (watershed protection, nutrient cycling) to future values (options and existence values).

The current system of national accounts in most countries concentrates on labour and man-made capital in concordance with a Keynesian macroeconomic view that was dominant when the system was developed in the 1940s and 1950s (Repetto *et al*. 1989). The National Accounts are still the most important measures of overall economic activity and national income for a nation, but net national product cannot be an accurate indicator of sustainable income unless all market and non-market stocks of capital valued at the appropriate scarcity prices are considered in its calculation. In particular, the omission of fundamental nonmarket activities such as unpaid work, the value of leisure time, investment in human capital and the environment and health status, generated concerns that the accounts are incomplete and misleading from its very inception (Nordhaus, 2000).

The observation that environmental and social degradation and depletion can occur while GDP is growing, and that this depreciation can affect future sustainability and welfare, has lead a wide range of authors to criticize narrow measures of economic and social development since the early 1950s (Boulding, 1949-1950; Daly and Cobb, 1989; Repetto 1992; Fuà, 1993). Many of those have examined whether national income data adequately measures the level of changes in economic well-being. For example, Kapp (1950) recognised that the increase in national product was based on unaccounted irreversible environmental destruction. Galbraith (1958) made clear that the overexpansion of production and consumption could be seen as a "bad" rather than a "good" and criticised the overemphasis on high rates of production as a measure of economic prosperity, suggesting that other factors may be of greater importance.

It is clear that in order to have a better view about the performance of an economic system, some other more comprehensive macroeconomic "barometers" must be computed. Ekins (2000) provides an excellent synthesis on economic growth and sustainability from which much of this brief discussion is drawn. There is disagreement within the economics discipline, and even more so, between disciplines, on the concept of sustainable economic growth. For example, Daly (1990) views sustainable economic growth as an oxymoron whereas Goldin and Winters (1995) view economic growth and environmental protection as perfectly consistent. One's opinion should depend largely on the definition of 'sustainability'. This makes it all the more unhelpful that people generally, and politicians in particular, make widespread use of the term without explaining what they mean by it.

In the early 1970s, the concern was that economic growth would be limited by ecological constraints (the 'limits to growth' literature – see Meadows *et al*. (1974)). Whether one is convinced or otherwise by the limits to growth literature depends more or less on one's opinion as to substitution possibilities (e.g. the practicality of renewable in place of non-renewable energy sources) and the ability of humans to sustain technological progress (Lecomber, 1975)[5]. However, environmental economists would believe that, rather than manipulating economic growth directly to reduce the possibility that, as Meadows *et al*. (1974) described it, a "sudden and uncontrollable decline in both population and industrial capacity" might occur, policymakers should introduce a surrogate price on environmental goods that are free (e.g. for emissions to air) to reflect such (potential) damage[6].

Ultimately, physical sustainability is limited by the second law of thermodynamics. The entropy law tells us that complete de-coupling of economic growth and the production of waste can never occur. However, many economists believe that the gap can be narrowed continuously by innovation and substitution in the time period of relevance to human existence. However, it is important to note that, even if there is a limit to physical sustainability, it is not necessarily optimal to restrict economic growth. The net benefits of development may outweigh the ultimate costs of physical unsustainability (particularly if externalities are internalised), i.e. the long-run destruction of environmental resources may be optimal. However, this controversial suggestion depends on how we tradeoff the future against the present ('discounting', which is of huge significance in the global-warming debate). Therefore, there may be a conflict between economic and environmental policy, although, to environmental economists, these policies should never be considered as separate.

Hirsch (1976) believes that the efforts of those who advocate a sudden crisis point being reached far in the future are misplaced. Rather, the concern should be with the overall welfare of society. Mishan (1977) puts this most strongly when he postulates that economic growth will actually end up reducing the welfare of society because of the negative externalities (spillovers) produced such as the declining architectural endowment, increased noise, and other pollution.

We take the approach that the key is to ensure that people's quality of life is sustainable. This is the focus of the economics literature on sustainability. Pearce *et al*. (1989) and Pezzey (1989) define sustainable development as some indicator of well-being that does not decline over time. The issue of intergenerational equity and the difficulty of knowing the preferences of future generations now emerges as an issue. Leaving this aside for the moment, if we assume that we can develop such indicators of well-being, the discussion moves on to the conditions required to satisfy this concept of non-declining well-being. The Hartwick (1977) Rule prescribes that rents from the exploitation of renewable resources should be invested in order to ensure constant consumption over time. Solow (1986) and Mäler (1991) view a constant capital stock as a necessary condition for ensuring constant consumption.

5 The literature on the economics of uncertainty is very relevant to this debate.

6 Once any environmental externalities are priced (e.g. using a carbon tax), price premiums or restrictions on the use of exhaustible resources should not be necessary if the market works well, as the price should reflect any potential scarcity and lack of substitutes in the future. In the oil market, this is complicated by the presence of a cartel.

The issue then revolves around the sort of capital we have in mind. Pearce and Atkinson (1995) see the overall capital stock as consisting of man-made (reproducible) capital (such as machines, buildings, roads), human capital (the knowledge and skill of people), and natural capital (which delivers ecological services). 'Weak Sustainability' is achieved when the overall capital stock does not decline whereas 'Strong Sustainability' involves conserving certain components of the natural capital stock while ensuring that the overall capital stock is sustained (Pearce *et al.,* 1996). 'Ecological' (as opposed to neoclassical 'environmental') economists, who favour the goal of strong sustainability, tend to use the concept of 'carrying capacity' which is defined in terms of ecological limits or 'sustainability constraints'. Such constraints include that pollution should not exceed the assimilative capacity of the environment and that the harvest of renewable natural resources should not be greater than natural growth (Pearce *et al*. 1996).

The comprehensive net investment measures employed in the early literature became operational in the late 1990s. The term "genuine savings" was coined to designate savings adjusted not only for depreciation of human-made capital stock but also for depletion of natural resources, degradation of the environment and human capital accumulation, and initial attempts towards their estimation were made (see e.g. Repetto *et al.,* 1989; Ahmad *et al*. 1989, Solórzano *et al.,* 1991; Pearce and Atkinson, 1993). Pearce and Atkinson (1995) identified the equivalence between nonnegative genuine savings and weak sustainability, and used the existence of nonnegative genuine savings as a test for whether a country's development is weakly sustainable. They found that many countries can be on an unsustainable path though their net savings conventionally defined are positive.

Although the savings rules have been criticised for being only concerned with weak sustainability (see, for example, Martinez-Alier 1995), Pearce, Hamilton and Atkinson (1996) convincingly argue that, even if some amount of a critical resource must be preserved to meet the criteria of strong sustainability, savings rules are still required for the remaining resources if sustainability is to be achieved.

Measuring sustainability: empirical studies

There have been some steps towards the inclusion of nonmarket activities into national accounting systems, but given the difficulty in finding even a satisfactory definition of sustainability, it is not surprising that 'operationalizing' the concept of sustainable income has proven complicated. The most remarkable efforts to broaden the set of productive assets considered when analyzing economic activity and computing the national accounts have fallen into four categories:

(i) *Development of satellite accounts*. For example, the United States Bureau of Economic Analysis started considering the contribution of natural and environmental resources to the national income in this form in 1994 (see Landefeld and Carson, 1994).

(ii) *Case studies*. Early efforts to construct comprehensive measures of net investment focused on individual countries, most notably Indonesia (Repetto *et al.,* 1989) and Costa Rica (Solórzano *et al.,* 1991). Pearce and Atkinson (1993) published the first cross-country estimates, but their estimates covered only 18 countries and a single year.

(iii) *The World Bank's comprehensive estimates of net investment, or "genuine savings."* The World Bank's annual "Little Green Data Book" and the inclusion of genuine savings in its widely used cross-country database, the *World Development Indicators* (WDI) (Hamilton and Clemens, 1999), by the World Bank, are probably the most ambitious efforts so far.

(iv) *Measures of the national wealth*. Some early attempts in the literature are Lange (2003) and Lange *et al*. (2003). Another ambitious project is the *World Bank's Wealth Estimates* (World Bank, 2006) where the classical concept of wealth of nations (Smith, 1776) is actually computed for each nation, by identifying and pricing, in addition to produced capital, natural capital and intangible capital (human capital, quality of institutions, governance).

Improving measures of happiness and quality of life: the subjective well-being approach

Just as monetary measures of macro performance are inadequate measures of performance, individual and household income is an inadequate measure of individual well-being. So what is the alternative? Psychologists have traditionally studied the determinants of subjective well-being and happiness (see Carr, 2004; Diener, 1984; Argyle, 1987; Myers, 1993 or Diener *et al.,* 1999 for a survey) and interpret life satisfaction scores as cardinal. Economists were once less convinced by this claim. However Oswald (1997) has pointed out that psychologists are, perhaps, more qualified to make this judgment. Recent theoretical studies have added weight to the claim that happiness scores are useful in the analysis of welfare (Kahneman *et al*. 1999; Ferrer-i-Carbonell and Frijters, 2004) and that they are interpersonally comparable (in Layard, 2005).[7]

The economic psychology literature employs happiness data from surveys as empirical approximations of individual well-being. The specific question asked varies throughout the literature in terms of subject matter (questions on happiness and life satisfaction are frequently employed) and range of scale (three-point to ten-point scales have been employed in the literature). Measures such as these have been found to have a high scientific standard in terms of internal consistency, reliability and validity (Diener *et al.,* 1999; Lopez, & Snyder, 2003) and have been used extensively in the economics literature in recent decades (see, e.g., Easterlin 1974; 1995; 2001; Veenhoven, 1997; Frey and Stutzer, 2000; Frey and Stutzer, 2002; Alesina *et al.,* 2004; Stutzer, 2004; Blanchflower and Oswald, 2004a; 2004b; Frijters *et al.,* 2004 or Bell and Blanchflower, 2004). Unlike traditional economic tools for the estimation of implicit prices of non-market goods, this well-being approach does not require awareness of cause-effect relationships on the part of the individual (Welsch, 2006). Moreover, evidence from neuro-science suggests that subjective well-being measures are associated with a physiological response (Layard, 2005).

Researchers have examined the impact on life-satisfaction of personal life (e.g., Oswald, 1997; Frey and Stutzer, 2002 or Stutzer, 2004); political institutions (e.g., Frey and Stutzer, 2000); the macroeconomy in general (e.g., Oswald, 1997; Di Tella *et al.,* 2001); and environmental factors (e.g., van Praag and Baarsma, 2005; Welsch, 2006; Brereton, Clinch and Ferreira, 2006a, 2006b). The macroeconomic characteristics examined include income, unemployment and inflation (e.g., Clark and Oswald, 1994; Gerlach and Stephan, 1996; Oswald, 1997; Di Tella *et al.,* 2001).

7 Sen (1999) states that in judging alternative policies, interpersonal comparisons of utility are both necessary and desirable.

Mainstream economists had assumed an increase in well-being with rises in income, but empirical literature suggests that the link is ambiguous (e.g., Easterlin, 1974; 1995; 2001). This limited role of income as a determinant of life satisfaction has lead authors to examine income aspirations (e.g., Easterlin, 1995; Stutzer, 2004; Frijters *et al.,* 2004; Gardner and Oswald, 2001; 2004), positional externalities (e.g., Frank, 1997; 2003) and inequality (e.g., Alesina *et al.,* 2004) as further influences. The general result is that some measure of relative income has a significant impact on self-reported life satisfaction (e.g., Easterlin, 2001; Luttmer, 2004). Factors such as health and family circumstances tend to show a more marked influence on quality of life than standard economic measures (e.g., Clark and Oswald, 1994; Winkelmann and Winkelmann, 1998). Further refinements include the examination of the effects of institutional factors such as the degree of democratic participation (e.g., Frey and Stutzer, 2000; 2002) and environmental factors (e.g., van Praag and Baarsma, 2005; Welsch, 2006, Brereton, Clinch and Ferreira, 2006a, 2006b).

Measuring happiness and well-being: empirical results

Employment status (especially unemployment) is found to have profound effects on individual well-being, independent of income. Being employed, self-employed, retired, or in full-time education (Di Tella *et al.,* 2001; Blanchflower and Oswald, 2004a; Frijters *et al.,* 2004) is associated with high well-being, while being engaged in household duties is associated with reduced well-being (Stutzer, 2004; Blanchflower and Oswald, 2004a), other things being equal.[8]

Unemployment has been found to be the primary economic source of unhappiness (Oswald, 1997). Contrary to traditional economic belief, unemployment has negative impacts on the mental state of the individual (see, e.g., Darity and Goldsmith, 1996; Bjorklund, 1985 or Mayer and Roy, 1991) above and beyond any fall in income (Clark and Oswald, 1994; Winkelmann and Winkelmann, 1998) and to 'compensate' men exactly for unemployment would take a rise in income of approximately $60,000 per annum (Blanchflower and Oswald, 2004a). The most obvious cost of unemployment is to the unemployed themselves, firstly, through the direct financial cost of loss of earnings, but also the more personal costs, such as loss of job skills, self-esteem and increased stress.[9] The general finding is that unemployment is associated with substantial negative non-pecuniary effects (see, e.g., Jensen and Smith, 1990). Additionally, Winkelmann and Winkelmann (1998) report that the social costs of unemployment substantially exceed the costs of an economy operating below its potential. This literature has also concluded that unemployment affects a male more severely than a female, that it is easier being unemployed once one has been without work for some time (e.g., Blanchflower and Oswald, 2004a), but that it is harder being unemployed when the unemployment rate is low (e.g., Clark and Oswald, 2002; Bell and Blanchflower, 2004).[10] Di Tella *et al*. (2001) examine unemployment at the macro level and show that people are happier when the unemployment rate is low.

8 These results do not hold consistently across countries however. Frey and Stutzer (2000), for example, in their study of Swiss cantons, find housewives to be more satisfied than the employed and Blanchflower and Oswald (2004b), in their study of happiness in the United States, find no statistically significant difference between housewives and the employed.

9 These and other costs are documented in, for example, Clark and Oswald (1994).

10 However, Winkelmann and Winkelmann (1998) find no evidence that the long-term unemployed get used to their situation and partially recover from the initial adverse effect.

Further evidence of the importance of employment status on well-being is found in individuals' responses to questions on work commitment after hypothetical lottery wins. These studies find that a large proportion of individuals would prefer to continue working rather than leave their jobs after a large windfall gain (reported in Layard, 2005). Employment is not only a source of income to individuals but also a provider of social relationships, identity in society and individual self-esteem (Winkelmann and Winkelmann, 1998). Brereton, Clinch and Ferreira (2006) extended the international literature to examine the welfare impacts of additional employment status categories on well-being, including part-time employment, disconnection from the labour force and being disabled, unable to work. They find that being long-term unemployed, disabled and unable to work or in part-time employment has a significant negative effect on life satisfaction, particularly for males.

This literature consistently finds that married individuals are more satisfied than are the single (never-married), separated, divorced or widowed (e.g., Clark and Oswald, 1994; Blanchflower and Oswald, 2004b) and that the divorced, separated and widowed are less happy than singles (never married) (e.g., Alesina *et al.,* 2004). Studies of self-reported happiness also indicate that the married are happier than the unmarried and the co-habiting (e.g., Bradburn, 1969; Bell and Blanchflower, 2004), that couples without children are happier than singles, single parents and people living in collective households (e.g., Frey and Stutzer, 2000) and that couples with young children are much more satisfied than singles with young children (Stutzer, 2004). Clark and Oswald (1994) find that married people have the lowest degree of mental distress, while Gardner and Oswald (2001) provide evidence that marriage has a much more important (positive) effect on longevity than does high income.

The psychological literature on well-being provides insights into these findings.[11] Research in this field has found that married couples are higher in their degree of mutual support than are other couples, the never married (e.g., Stack and Eshleman 1998; Joung *et al.,* 1997) and other social groups (Stroebe and Stroebe, 1987) and marriage is believed by psychologists and psychiatrists to provide a protective effect to well-being (e.g., Argyle, 1989; Cochrane, 1996). Status integration, selectivity and marital protection theories assert that, compared with unmarried individuals, married individuals have more social bonds, are healthier and exhibit favourable psychological behaviour.

Along the lines of the social causation theory, the literature on personal well-being tends to find that married individuals, especially married men, experience less stress and emotional pathology than do their unmarried counterparts, because they have continuous companionship with a spouse who provides interpersonal closeness and emotional support in dealing with daily stress (Gove, 1973). Coombs (1991) reviews 130 empirical studies on a number of well-being indices and suggests that these indicate that

11 Two theories are generally put forward as to why married persons report greater happiness than their separated, divorced, remarried and never married counterparts. Social causation theory contends that marriage increases happiness by providing emotional and financial support to both spouses (Stack and Eshleman, 1998; Coombs, 1991; Joung *et al.,* 1997). In addition, according to this theory, married individuals are more likely to avoid health damaging behaviour such as smoking and excessive alcohol intake and lead more secure and scheduled lifestyles (Rogers, 1995). On the other hand, social selection theory contends that persons who are already high in qualities like psychological health or financial status are more likely to marry in the first place (Stack and Eshleman, 1998).

married men and women are generally happier and less stressed than the unmarried. Glenn and Weaver (1981) find that the estimated contribution of marital happiness is far greater than the estimated contribution of seven other aspects of life, ranging from work to friendship. Additionally, some authors have looked at the impact of being married on well-being, through the expansion of financial resources (Rogers, 1995) and the physical health and provision of emotional support effects (e.g., Joung *et al.,* 1997). Hughes and Gove (1981) found that the difference, in relation to well-being, is between married people and others, not between people who live alone and others.

McCrate (1989) proposes that the objective of the marriage contract itself is the efficient production of children and hence it could be hypothesised that the successful fulfilment of this objective leads to greater happiness. However, some theorists suggest that children actually decrease the physical and psychological well-being of parents, especially mothers (e.g., Clark and Oswald, 1994; Ross *et al.,* 1990). Additionally, the effect of children on well-being has been found to be either negative or neutral (Ross *et al.,* 1990; Glenn and McLanahan, 1981).

The bulk of research on single parenthood is in relation to parental quality (e.g., Hanson and Sporakowski, 1986) and child welfare (e.g., Asmussen and Larson, 1991 or Hall *et al.,* 1995) rather than well-being. However, the literature suggests that single parent households hold a disadvantageous position in society relative to other family groups since they are characterised by a high rate of poverty, minority representation, and low mobility and education, and that this is more often true for single mothers than for single fathers (Hall *et al.,* 1995).[12] In the life-satisfaction literature, studies have found that single parents are less happy than married parents (Frey and Stutzer, 2000). Additionally, research has found that single mothers are at a particularly high risk of job/family role strain and reduced levels of physical and emotional well-being (Hanson and Sporakowski; 1986), although Veroff *et al*. (1981) indicate that single parents experience more parental satisfaction and fewer strains associated with parenting than do married parents.

In recent papers on well-being, authors have begun including a more diverse range of dummy variables for household formation, examining the effect of partnerships on life satisfaction (Frey and Stutzer, 2004) and also household size, number of children and a number of different variables describing household composition. Stutzer (2004) examines couples with grown up children, single parents with young children, single parents with grown up children and single respondents living with parents. He finds that couples are more satisfied than singles, but not statistically significantly so. In addition, Frey and Stutzer (2000) control for 'other private household' and 'collective household'. Brereton, Clinch and Ferreira (2006) extended the international literature to examine the role of adult support in the household on well-being. They find that the large negative effect of being a single parent on life satisfaction, found in the literature, is present only in households in which there are no other adults.

12 Hall *et al*. (1995) find that single mothers reported slightly less education, but approximately 50 per cent less household income than single fathers. Rogers (1995) reports that in the US in 1990, 33 per cent of female-headed families with no husband present lived in poverty, compared to just 5.7 per cent of married couples.

Additionally, the role of location-specific factors in explaining life satisfaction has recently started to be explored. In the last few years, authors have started analyzing the trade-offs between life satisfaction and specific environmental attributes. This literature has led to an alternative method for measuring the value of environmental amenities[13] i.e., using individuals' responses to questions on their overall well-being to estimate the impact on utility of specific attributes. Unknown to the individuals themselves, their answers move systematically with changes in environmental attributes (van Praag and Baarsma, 2005).

The connection between the environment and human psychology has been studied for some time[14] (Kellert and Wilson, 1993). The benefits of environment can vary from active recreational uses to passive use in terms of viewing scenic landscapes (Carson *et al.,* 2003). The growing application of subjective well-being indicators in the economic literature as measures of well-being, has led researchers to examine the impact on utility from changes in terrorist threats (Frey *et al.,* 2005), climate change (Rehdanz and Maddison, 2005), environmental attitudes (Ferrer-i-Carbonell and Gowdy, 2005), aircraft noise (van Praag and Baarsma, 2005) and air pollution (Welsch, 2005).

Welsch (2002) examines the trade-off between prosperity and environmental quality while van Praag and Baarsma (2005) value the cost to individuals from aircraft noise and find it to be high. Frey and Stutzer (2002) argue that happier people may be more likely to exhibit positive attitudes toward the environment, Rehdanz and Maddison (2005) examine the influence on well-being of climatic conditions, Welsch (2005) uses life satisfaction scores to value air pollution in European countries while Frey *et al.,* (2005) in their analysis of the negative affects on well-being of terrorism, measure the level of terrorism across three regions (namely, Northern Ireland, the Republic of Ireland and the United Kingdom).[15]

Van Praag and Baarsma (2005) examine a localised problem and use postcodes to link their respondents to objective noise burden. Ferrer-i-Carbonell and Gowdy (2005) include a set of dummy variables indicating the region where the individual lives. These variables are included in order to capture the (natural) environment where individuals live proxying, for example, London and Manchester as polluted areas. In Brereton, Clinch and Ferreira (2006a) factors such as population density, access to and quality of facilities and services, environment and climate, are shown to be extremely important determinants of well-being. Brereton, Clinch and Ferreira (2006a) advanced the international literature further by using Geographic Information Systems (GIS) to link individuals spatially to the amenities and disamenities in their area in order to analyse the extent to which individuals, their surroundings and well-being are interrelated. As in the previous literature, they find that environmental amenities have a direct impact on well-being. However, the proximity to, and type of, amenity are important. For example, access to transport emerges as both an amenity and disamenity, depending on the transport type. Proximity to international, national and regional airports and major roads are found to influence well-being differently, depending on the proximity of individuals to them.

13 The utility from these public goods (or bads) is inherently difficult to measure as they are not traded on the open market and hence do not command a price.

14 Hardin (1964) is a seminal contribution.

15 Sample homogeneity problems may arise in this approach, however, as terrorism in Northern Ireland is generally restricted to isolated areas in West Belfast.

Empirical Results for Ireland

This section presents the results that are currently emerging from research at UCD into the measures presented above.

Sustainability indicators for Ireland: genuine savings and total wealth

The World Bank first published cross-country estimates of genuine savings in 1997 (World Bank, 1997). It began including them in the WDI in 1999. The 2006 WDI contains estimates for about 200 countries, including Ireland, during 1970-2004 (partial series for some countries). Following the definition of weak sustainability, the Bank constructs these estimates by making a series of adjustments to gross national savings. First, a depreciation allowance for human-made capital stocks is deducted to obtain conventional net national savings. Second, a proxy for investment in human capital (the current public expenditure on education – in standard national accounting these expenditures are treated as consumption) is added to net national savings. Third, depletion allowances for a variety of natural resources (fossil fuels, minerals and timber) are deducted to reflect the decline in asset values associated with their extraction and harvest. And fourth, deductions are made for damages from carbon dioxide and particulate emissions.

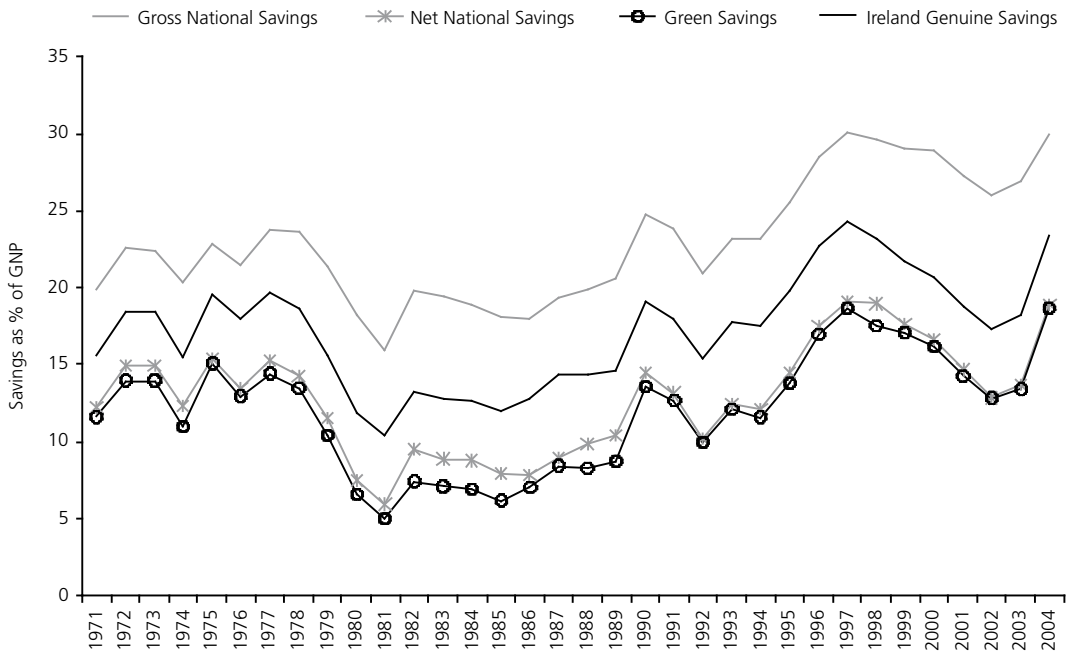
As Pearce and Atkinson (1995), Hamilton and Clemens (1999) used the genuine savings indicators to test whether a country's development path is weakly sustainable: countries with persistently negative genuine savings are on an economic unsustainable path. They also found that many countries fail this test even when their 'conventional' net savings are positive.The same test can be applied to Ireland. From Figure 1 it is clear that Ireland has consistently exhibited positive and increasing savings rates over the last three decades. In Figure 2 the trend of Irish Genuine Savings is compared with selected and comparable high-income countries. As shown, Ireland performed better than the average of the OECD countries and its performance over time is lower to Singapore and Korea only.

However, as Clinch (2001) points out, the World Bank data do not capture Irish-specific aspects of quality of life. In particular, the estimates on environmental degradation used by the World Bank do not include emissions of Sulfur dioxide, Carbon monoxide, Nitric oxide and Nitrogen dioxide, Nitrous oxide and Volatile Organic Compounds[16]. Other environmental aspects not captured in the genuine savings estimates especially relevant to Ireland are noise pollution, road congestion and water quality. Together with these environmental features, very important for a developed country are performances in health, human capital accumulation and its quality. More generally, the omission of adjustments to other assets from the World Bank estimates is due to the cross-country focus of the WDI and the lack of internationally comparable data.

16 Recently the World Bank has started including emissions of PM10 in its adjustments to savings. However, these estimates are available only from 1990 (WDI, 2006).

Table 1 and Table 2 compare the good performance of Ireland in terms of Genuine Savings in 2004 with other countries. When Genuine Savings is expressed as a percentage of GNI, Ireland ranked 9th in the world and 3rd among the high-income countries. A significant weakness, among those already discussed, is that Genuine Savings tend to favour small countries and economies that consume imported energy (Singapore, Korea, Hong Kong, Luxembourg and also Ireland) rather than resource-based economies that depend on energy extraction and production, no matter if the are classified as high or low income countries (Oman, Saudi Arabia, Chad, Uzbekistan, Kuwait, Trinidad and Tobago, etc.).[17]

Figure 1: Savings Indicators – Ireland (% of GNI)



Gross Savings = Gross national income – total consumption + net current transfers

Net Conventional Savings = Gross Savings – Consumption of Fixed Capital

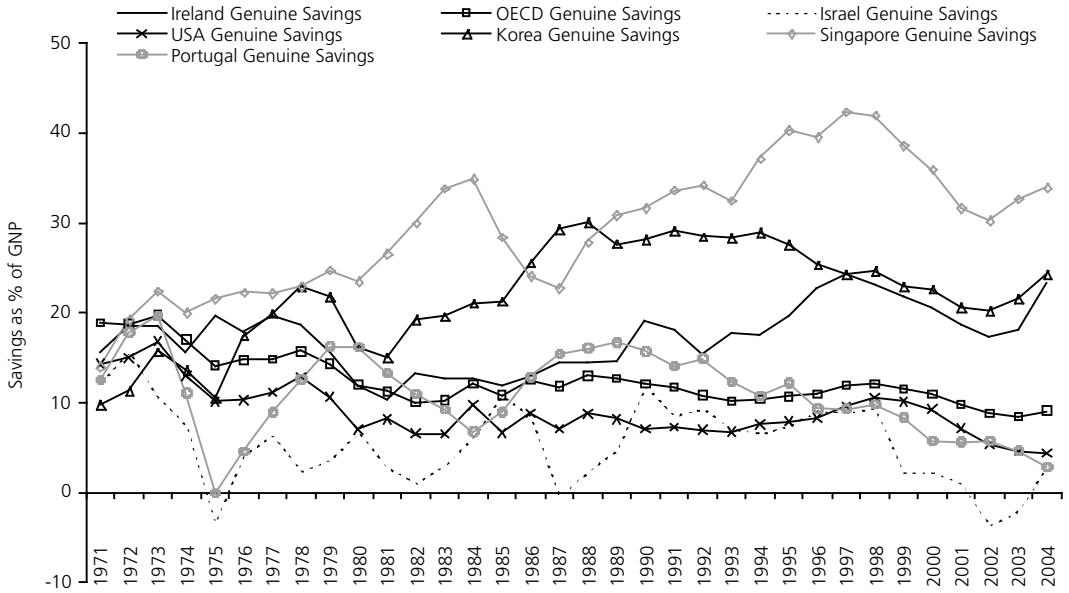
'Green' Savings = Net Conventional Savings – Energy and mineral depletion – Forest depletion

'Genuine' Savings = 'Green' Savings + Education Expenditure

Source: Authors' calculations from WDI (2006) estimates.

17 The high ranking of Botswana in Table 1 is mainly due to the exclusion of an adjustment for diamond extraction from the genuine savings figures.

Figure 2: Genuine Savings – comparison with selected high income Countries



Source: Authors' calculations from WDI (2006) estimates.

Table 1: Genuine Savings estimates, 2004

Top 10 Countries	Genuine Savings as % of GNI
1. Namibia	34.53
2. Singapore	33.94
3. Botswana	30.75
4. China	29.27
5. Maldives	28.39
6. Mongolia	26.60
7. Philippines	26.15
8. Korea	24.23
9. Ireland	23.40
10. Morocco	22.53
Bottom 10 Countries	
1. Chad	-81.51
2. Oman	-39.45
3. Azerbaijan	-39.26
4. Uzbekistan	-36.31
5. Angola	-35.22
6. Trinidad and Tobago	-28.29
7. Congo, Rep.	-27.81
8. Syrian Arab Republic	-27.47
9. Nigeria	-27.27
10. Kazakhstan	-25.07

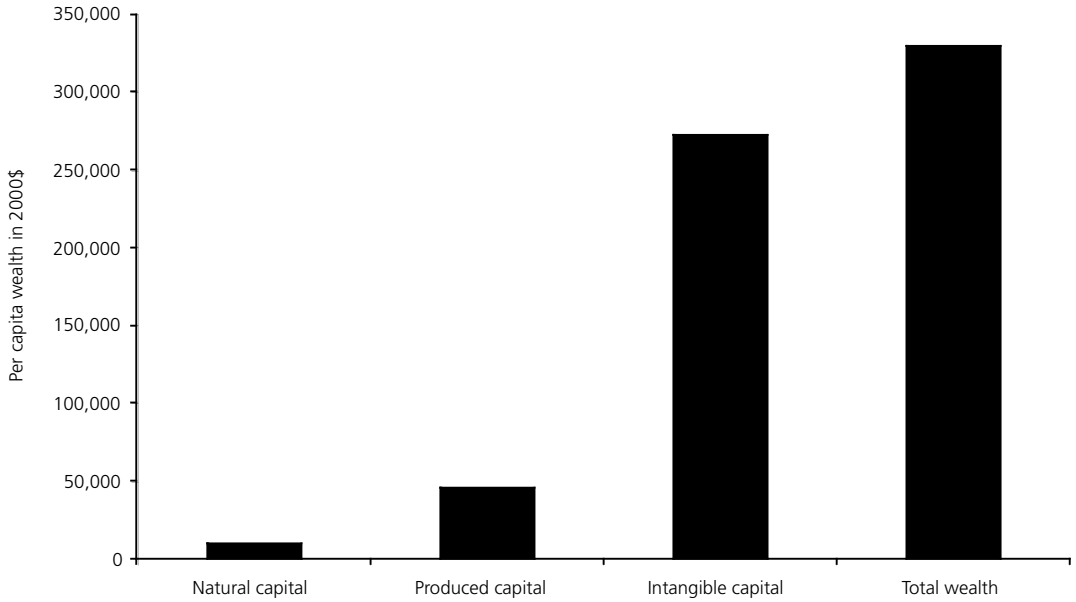
Table 2: Genuine Savings estimates for selected high income Countries, 2004

Top 10 high income Countries	Genuine Savings as % of GNI
1. Singapore	33.94
2. Korea, Rep.	24.23
3. Ireland	23.40
4. Hong Kong, China	21.46
5. Sweden	19.44
6. Luxembourg	19.00
7. Slovenia	17.41
8. Austria	15.17
9. Japan	14.93
10. Norway	14.87
Bottom 10 high income Countries	
1. Saudi Arabia	-10.11
2. Bahrain	-9.28
3. Kuwait	-7.79
4. Portugal	2.79
5. Israel	2.82
6. United States	4.38
7. Canada	5.53
8. Australia	6.06
9. Iceland	7.95
10. United Kingdom	8.19

Source: Authors' calculations from WDI (2006) estimates.

A country's income and economic well-being depend on its wealth, where wealth is defined in the broadest sense to include produced, natural, human and social capital. Economic development can be seen as a process of 'portfolio management' that seeks to optimise the management of each asset and the distribution of wealth among different kinds of assets. This simple idea can be operationalised in Ireland only when comprehensive estimates of the total wealth of Ireland are provided. Again the World Bank provides some crude estimates for the year 2000 (Figure 3). The same general drawbacks discussed previously for the Genuine Savings estimate can be applied here, in this case for the definition of Irish natural capital.

Figure 3: Composition of national wealth – Ireland



Source: Authors' calculations from World Bank (2006a) estimates.

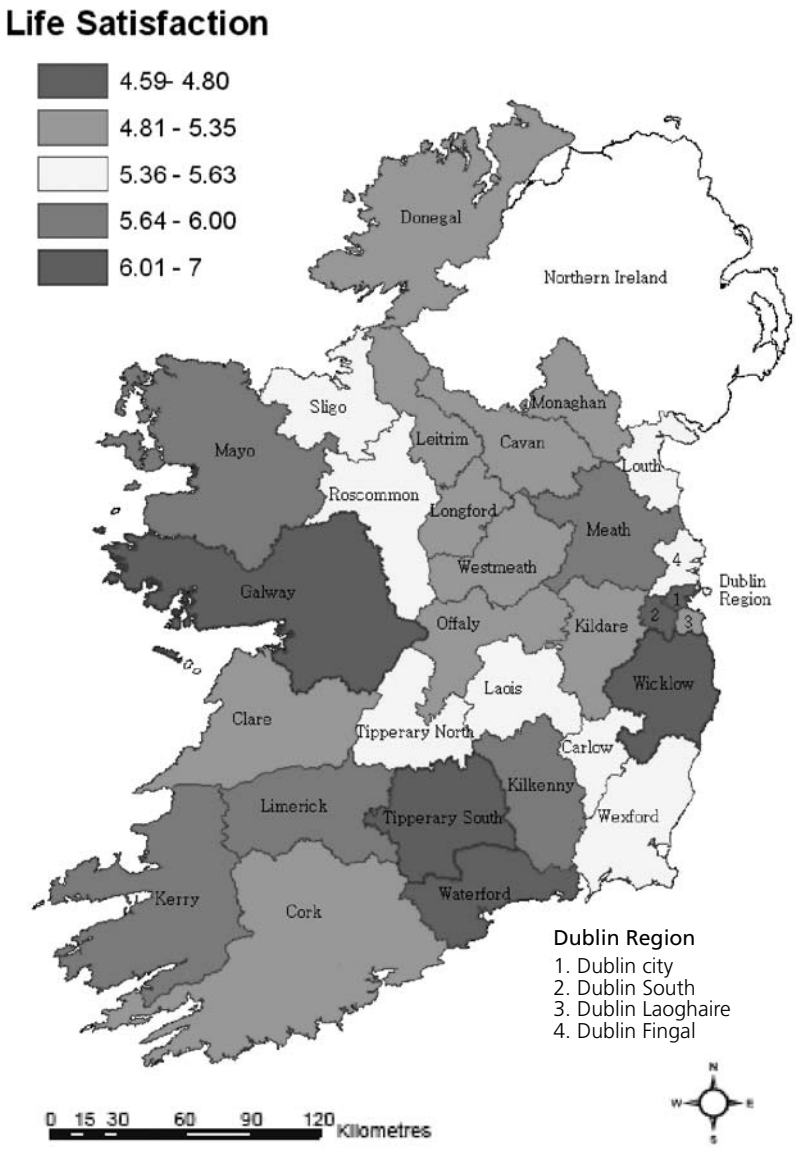
Subjective well-being, quality of life and happiness: empirical results for Ireland

The analysis of well-being in Ireland is interesting due to the record growth of the 'Celtic Tiger' economy and its ranking by the Economist Intelligence Unit (2004) as first in its quality of life league table for 2005. Work analysing the determinants of subjective well-being at UCD utilises data from a survey of a nationally representative sample of 1,500 men and women, aged 18 and over and living in Ireland, interviewed in 2001 combined with 'objective' environmental and other datasets. The well-being indicator (or proxy for individual utility) is based on the answers to a question (which was preceded by a range of questions regarding various aspects of the respondent's life) where respondents were asked to rate their life satisfaction on a seven-point scale (with seven being the highest). The survey found a high well-being in general in Ireland with an average of 5.5 on the seven-point scale.

Figure 4 shows variations in subjective well-being in Ireland. It illustrates that life satisfaction is above average in the local authority areas of Galway, Wicklow and Tipperary South, average in Mayo, Sligo and Meath and below average in the local authority areas of Dublin City, and Dublin South (see Figure 4 for a complete comparison). An obvious question arising from these simple comparisons of means is what are the factors explaining these variations in well-being? For example, why, with a higher average income per capita, would respondents in the Greater Dublin Area report lower well-being compared to peripheral regions?

In order to answer such questions, it is necessary to use regression analysis. This statistical method allows us to understand the extent to which a particular factor (e.g. age) 'explains' the level of happiness of an individual independent of all other factors (e.g. income) or, in other words, everything else being equal.

Figure 4: Average Well-being by Local Authority Area (seven point scale, 1 – 7)



Source of blank base map: Ordnance Survey Ireland (license pending)

To date, our work has focused on the influence of the following important life domains and policy areas:

- Economic/Financial
- Social
- Environmental

Economic/Financial

Income is significantly related to life satisfaction – but only to a point. An increase in gross household income of €47,600 would be required to increase life satisfaction by one category out of seven. We also find a threshold level of income (a gross household income of €57,900), after which returns to well-being from higher income rapidly diminish.

Employment status is another domain that has a significant influence on life satisfaction. In well-being terms the self-employed are happiest, along with the retired and students, then the full-time employed. Unemployment substantially reduces well-being, as does involuntary disconnection from the labour force. In a full-employment economy, it seems that being long-term unemployed, when everyone else appears to have a job, makes people considerably less happy. Also, part-time employment appears to be a considerable source of unhappiness for males in particular. This result is consistent with the international literature.

Owning your home outright is associated with higher life satisfaction compared to living in a dwelling owned with a mortgage or renting. However, living in social housing is associated with the lowest life satisfaction of the tenures examines, other things being equal.

At the macro level, the international literature shows that happiness moves systematically with changes in the unemployment rate and the inflation rate (Di Tella *et al.,* 2001).

Social

Our results show that satisfaction with life has an inverted U-shape association with age suggesting that the young and old are least satisfied with their lives, with a turning point at 55 years. Also, males are less satisfied with life than females.

Being separated or divorced is negatively associated with life satisfaction compared to being single. However, we find no difference between married and single respondents, contrary to the bulk of published literature. A possible explanation is Ireland's low divorce rate. Stack and Eshleman (1998) suggest that in such circumstances, more couples may be 'trapped' in unhappy marriages.

With regard to children, having three or more is associated with less contentment, compared to having none. In terms of education, individuals with middle or higher education are more satisfied with life than those with a lower education level. Examining health, we look at both objective (number of times the respondent has visited their doctor in the past year) and subjective measures (self reported health). We find an inverse relationship between number of doctor visits and life satisfaction, but that self-reported health and life satisfaction are highly (positively) correlated.

Other interesting results include that when comparing the well-being of married males and married females, gender emerges significant only for married males, indicating that they are less satisfied with life than are their married female counterparts and, indeed, less happy than single males!

We find that being a single parent is negatively associated with life satisfaction. Everything else being equal, being in this position reduces life satisfaction by over one third of a category on the seven point scale. However, this large negative effect of being a single parent on life satisfaction is present only in households in which there are no other adults. The lone parent group in our sample consists entirely of females.

Environmental

The results above highlight the role of socio-economic and demographic variables as important determinants of well-being. This section considers the influence of amenities such as climate, environmental and urban conditions as factors affecting subjective well-being. Our results show that factors such as population density, proximity to coast and access to and quality of facilities and services are important determinants of well-being.

The analysis was then extended beyond what has been carried out to date in the international literature. Geographic Information Systems (GIS) techniques were utilised to link individuals spatially to the amenities/disamenities in their area at a high level of accuracy, such that a coherent analysis of the extent to which individuals, their surroundings and well-being are interrelated, could be carried out. We find waste facilities in an individual's area to be a disamenity. The type, and distance from, the waste facility, matters however. The presence of a landfill site in operation in the respondent's electoral division emerges as negatively related to well-being, compared to respondents whose electoral divisions are more than ten kilometres away. There is evidence suggesting that noise, smell and other negative externalities from waste facilities of this kind may impact negatively on well-being or quality of life (DG Environment, 2000). The intermediate distances of three and five kilometres from the facility emerge insignificant. Interestingly, proximity to a hazardous waste facility does not seem to have an influence in terms of life satisfaction.

Coast emerges as positively related to well-being, but the distance from the coast is important, with those living two kilometres or less from the coast more satisfied with their lives by over three-quarters of a category (on a seven point scale), compared to those living more than five kilometres from the coast. Those living between two and five kilometres from the coast are also more satisfied, but the effect is reduced, to one third of a category. Interestingly, proximity to beach emerges insignificant in the regression. It may be that, given Ireland's climate, the amenity value of coastal areas lies not in their traditional sunbathing use!

We find access to transport emerges as both an amenity and disamenity, depending on the type, and distance from, the particular amenity. Life satisfaction is highest for those living more than thirty, but less than sixty kilometres from both an international and national airport. It may be that those less than thirty kilometres away are affected by the noise disamenity, while those more than sixty kilometres lack access. In relation to regional airports, the amenity value lies at less than thirty kilometres. This result is not unexpected as these are small airports and only deal with smaller, less noisy aircraft and would have significantly fewer arrivals and departures than do the larger airports. Close proximity to a major road (less than five kilometres) emerges as a disamenity. This may be capturing the noise affects of this transport route. Access to a seaport appears to have no direct effect on life satisfaction.

Environmental amenities emerge as having particular relevance in explaining the disparities between Dublin and the other regions of the Country as shown in Figure 4 above. The analysis shows that when environmental amenities are included in a regression explaining subjective well-being in Ireland, they go a long way to explaining the differences in happiness observed between Dublin and the regions. It appears that issues such as overcrowding, congestion, and the disamenity effect caused by close proximity to major transport routes, are major causes of unhappiness in the Dublin region.

Towards an evidence-base for policymaking

Any policy should be based on a sound scientific basis. A long-term research programme has an important role in providing for evidence-based policymaking. It supports policy development, implementation and evaluation; and provides evidence to inform and support ministerial decisions. The basing of policy decisions on sound research promotes better government by:

- Enhancing decision making
- Promoting more consistent policymaking
- Replacing short-term views with long-term planning
- Reducing the influence of vested interests
- Minimising criticism of policy by independent analysts
- Enhancing the political acceptability of government decisions

In the UK, HM Treasury has promoted the development of evidence-based policymaking. Each government department has a budget line for research to, *inter alia*, enhance decision making and to enable a case to be made for funding from the Exchequer. The UK Government is currently investing in research into alternative measures to traditional monetary measures including those set out in this paper. The UK Prime Minister, Tony Blair, has commissioned research into the determinants of well-being and David Cameron is rumoured to be concentrating his policies on those factors that most influence individual happiness. DEFRA is taking the lead in the UK as seeing one of its primary roles as a making people happier and all local authorities are charged with this mission.

While Ireland's GDP and GNP have risen dramatically, research shows that money is only one factor that influences the well-being of society. Moreover, monetary measures at the macro level give no indication of the sustainability of an economy. It is essential, therefore, that the Irish Government invests in research that provides an evidence-base that allows more sophisticated policymaking in comparison to the reliance on such traditional monetary measures.

Current attempts within the Central Statistics Office Ireland (CSO) to account for environmental pressures involve the publication of environmental indicators starting in the 1990s mainly on waste, air quality and transport (see http://www.cso.ie/statistics/EnvironmentalAccounts.htm). The Environmental Protection Agency (EPA) also collects data on physical environmental performance. Much additional work, however, is needed to integrate them into the national accounting systems. Most fundamentally, an economic valuation of the impacts currently measured in physical units, is needed. As opposed to the

general indicators published by the World Bank, indicators constructed specifically for Ireland can benefit from a broader set of data sources and thus are expected to be more accurate. In addition, a bottom line adjusted savings tailored for Ireland should be a better indicator of Irish sustainability than the World Bank measures since additional adjustments most relevant to Ireland could be incorporated. For example, these adjustments could include: a valuation of the status of stocks and changes of stocks over time, such as human capital and environmental stocks such as fisheries and forestry; indicators of quality of air and water quality, change in land use, noise pollution and traffic congestion and their monetary valuation. The derivation of accurate and reliable comprehensive genuine savings accounts for Ireland is essential to ensure that Ireland's rapid growth is sustainable.

Overall, the principal goal of public policy should be to improve the well-being of individuals and society. How can you do this if you do not know the most important factors that influence the well-being of Irish people? How do you set priorities for public policy? This paper has set out a methodology for providing the evidence required to advance the sophistication of policymaking substantially.

As examples, our results show that:

- the negative effects of unemployment, over and above any fall in income, suggest that in terms of macroeconomic policy, in concurrence with the existing international commentary on the subject (Oswald, 1997), the maintenance of full-employment is more important than maximising incomes in a rapidly growing and rich economy
- low inflation should be a priority in terms of economic policy
- there is a target level of income for households beyond which changes in absolute income do not significantly increase happiness but how people rate themselves compared to their peers is important
- as expected, better health makes people happier
- men are less happy than women and, while marriage is beneficial for females, there is something unusual in Ireland in that married men are not happier than single men
- single parents are substantially less happy, everything else being equal, but only when they live alone, i.e. this is not driven by any stigma but rather by lack of adult support in the household
- investment in education increases happiness in addition to contributing to a knowledge-based economy
- access to facilities and services directly increases life satisfaction
- residing in social housing, independent of income, makes people unhappy
- those who drink more than the recommended weekly limit of alcohol are less happy with life
- environmental amenities as very important determinants of well-being. These directly affect life satisfaction. Tracking changes in environmental quality and how this impacts on well-being is thus crucial. It is imperative that policy makers are equipped with the evidence that allows them to assess if changes in environmental resources, as economic development takes place, are really to the benefit of society
- Dubliners are significantly less happy and this is driven by environmental factors

Future research can answer the following policy questions:

- Are the determinants of well-being dynamic or static over time? This will have implications for setting priorities for government policy – economic, social, or environmental.
- In which direction does the causation between variables such as marital status and employment status and well-being run? Do people drink because they are unhappy or are they unhappy because they drink?
- Why, in contrast to the international literature, do Irish married couples report no higher life satisfaction than their single counterparts? This has implications for social policy.
- What are the factors driving the particularly low well-being of lone single parents – financial, social etc.?
- How do the determinants of quality of life differ between the genders? This will have implications for gender policy as already seen above in the case of part-time employment.
- Why, when it is associated with such a negative life satisfaction outcome, do individuals become disconnected from the work force? This will have implications for labour policy.
- Why does satisfaction with life in Ireland have an inverted U-shape association with age, suggesting that the young and old are least satisfied with their lives? This is in contrast to the international literature.
- Are there regional disparities in quality of life which must be addressed and how do we address these?
- How can we improve social capital, i.e. more cohesive networks of supports, and what is most important for improving well-being?
- How important is family functioning for improving the happiness of people in later life?
- Do people differ at a regional level in terms of how various attributes influence their well-being?
- What is the value of having amenities such as parks, beaches and sports facilities?
- Does proximity to an incinerator really reduce people's life satisfaction?
- How important is a good transport network for improving the quality of life of people?
- Does traffic congestion negatively affect people's well-being?
- Does proximity to a hospital improve life satisfaction?
- What are the implicit prices of environmental amenities that do not command a market price? For example, this methodology allows researchers to price what individual would be willing to pay for an improvement in clean air and these figures could be used to tax polluters. This would have influence over the setting of environmental taxes, general economic policy and in terms of compensation, especially in relation to the location of land fills.

Research on the determinants of well-being can make an important contribution to developing an evidence base for planning, economic, environmental, and social policy. However, there are a number of problems with the current data:

The results on the determinants of happiness that we have presented are based on cross-section data (at one point in time). This does not allow the dynamics of happiness to be assessed, neither does it allow the direction of causation between the dependent and independent variables in question to be established, i.e. does marriage cause happiness or do happy people get married, does unemployment cause unhappiness or are unhappy people more likely to be unemployed.

Recent literature on the economics of happiness (Easterlin, 2006) has presented evidence that happiness is a dynamic process, changing throughout the life course, in response to changes in socio-economic and demographic conditions in the individual's life. Additionally, commentators in the psychology literature, such as Nobel Laureate Daniel Kahneman, have called for national well-being indicators to be developed to track well-being across regions, across time and across cohorts. These well-being measures would complement the traditional economic indicators to give a more holistic picture of how social indicators, economic indicators, environmental amenities and subjective well-being inter-relate. To facilitate these objectives in an Irish context would require the collection of data sets over time (panel data) where surveys are carried out year on year. Longitudinal cohort studies, where the same individuals are tracked over time and changes in SWB can be monitored and assessed and causation determined, are urgently required to further our understanding of happiness. The cost of a 5-year study would be in the region of €1 to 2 million. This is small change when compared with what we would learn about how to improve people's lives and how this can be used to set policy. The Government should, as a matter of urgency, invest in furthering this research so as to improve the evidence-base for policymaking.

New research in the literature is examining how individuals feel in the course of daily events. This new approach to examining subjective well-being, called the Day Reconstruction Method (Kahneman *et al.,* 2004), asks individuals how they feel as they engage in different activities throughout the day. The results assess the influences of the different life domains, including family life, employment, leisure, religion and social interaction. Findings include that people feel happiest in the company of others, and least happy commuting to work. Research of this standard is required in an Irish context to answer questions relating to how individuals feel throughout the normal day and are regional (urban/rural) differences present. Combined with the existing research, this could be used to assess how day-to-day living affects life as a whole.

Our analysis shows that environmental amenities directly affect well-being including drinking water quality, access to green space, and location of waste facilities. Tracking the dynamics of the environment and environmental concern would facilitate analysis of how these trends develop over time and across regions. In practice however, it is difficult to compile a comprehensive set of environmental indicators according to which regions can be compared. Moreover, some of the spatial factors which have an impact on life satisfaction operate at a small scale. Even within the same city different individuals may experience very different environmental and urban amenities. The use of Geographic Information Systems (GIS) offers great potential to overcome these difficulties and is currently being used for this purpose by these authors. Nevertheless, the reliability and richness of the results relies heavily on the quality of data available. Data on most aspects of environmental performance in Ireland are rather poor. There is a need for a significant investment in improving data collection and dissemination in this regard.

Conclusion

In practice, governments aim to advance quality of life by providing services such as employment, health and security that can be measured with objective indices. However, a principal tenet of free market economies is that quality of life can be also achieved by providing people with "capabilities", e.g. the ability to find remunerative employment (through a thriving economy, free choice and adequate education). However, problems arise with public goods, such as the environment and social capital. For these, governments need convincing of their worth in the absence of an obvious return on investment and so we need to understand what we are doing to our environment and whether any destruction of environmental assets is being offset by investments in other forms of capital. The Genuine Savings Approach provides an important performance measure in this regard. Likewise, the Irish government is currently concerned with maintaining social capital, although there is uncertainty over its relationship with quality of life and over what social infrastructure requires most investment. The subjective well-being approach that we have presented provides a methodology for setting priorities for economic, environmental and social policy.

Nevertheless, the prevailing culture of individual choice means that investment in environmental or social capital may provide less obvious political reward. Ultimately, though, growing inequalities, diminishing of social capital and/or natural resources, or the "paradox of affluence", may *force* governments to explore alternative means of advancing quality of life. It would be far preferable if the Irish Government acted now on investing in the development of these measures rather than being forced to do so in the future.

References

Ahmad, Y. J. , S. El Serafy , E. Lutz (editors), 1989. *Environmental Accounting for Sustainable Development*, World Bank, Washington, DC.

Alesina, Alberto; Di Tella, Rafael and MacCulloch, Robert. "Inequality and Happiness: Are Europeans and Americans Different?" *Journal of Public Economics*, 2004, 88, pp. 2009-2042.

Argyle, M. *The Psychology of Happiness*, Routledge, London, 1987

Bell, David and Blanchflower, David G. "The Scots May be Brave but they are neither Healthy nor Happy." Scotecon, 2004.

Blanchflower, David G. and Oswald, Andrew. J. (2004*a*). "Well-being Over Time in Britain and the USA." *Journal of Public Economics*, 88, pp. 1359-1386.

Blanchflower, David G. and Oswald, Andrew (2004*b*). "Money, Sex and Happiness: An Empirical Study." *Scandinavian Journal of Economics*, 106 (3), pp. 393-415

Boulding, K. E., (1949-1950). "Income or Welfare." *Review of Economic Studies*, 17: 77-86.

Brereton, F., Ferreira, S. and Clinch, P. (2006a). 'Environmental amenities and subjective well-being: testing the validity of hedonic pricing', Planning and Environmental Policy Research Series (PEP) Working Paper 06/03, Department of Planning and Environmental Policy, University College Dublin.

Brereton, F., Ferreira, S. and Clinch, P. (2006b). "A Spatial Econometric Analysis of Well-being using a Geographical Information Systems Approach", Planning and Environmental Policy Research Series (PEP) Working Paper 06/04, Department of Planning and Environmental Policy, University College Dublin.

Carr A (2004) *Positive Psychology: The Science of Happiness and Human Strengths*. Brunner-Routledge

Clark, A.E. and Oswald, A.J. (1994). "Unhappiness and unemployment", *Economic Journal*, vol. 104(424), pp. 648-659.

Collison Black, R.D. (1998) "Utility", in Eatwell, John, Milgate, Murray and Newman, Peter, (eds.), *The New Palgrave: A Dictionary of Economics*, 4 (Q – Z), Macmillan Reference Ltd., pp. 776-778.

Costanza, R., R. d'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R. V. O'Neill, J. Paruelo, R. G. Raskin, P. Sutton and M. van de Belt (1997). The Value of the World's Ecosystem Services and Natural Capital. Nature 387: 253-260.

Daly, H. E. and Cobb, C. (1989). For the Common Good: Redirecting the Economy toward Community, the Environment and a Sustainable Future. Beacon Press, Boston.

Daly, H. E. (1990). "Toward Some Operational Principles of Sustainable Development", *Ecological Economics*, vol. 2, pp. 1-6.

Diener, E. (1984). 'Subjective well-being', *Psychological Bulletin*, vol. 95(3), pp. 542-575.

Diener, Ed., Suh, E. M., Lucas, Richard E. and Smith, H.L. "Subjective Well-being: Three Decades of Progress." *Psychological Bulletin*, 1999, 125, pp. 276-302.

Di Tella, R., MacCulloch, R. and Oswald, A. (2001). 'Preferences over inflation and unemployment: evidence from surveys of happiness', *American Economic Review*, vol. 91(1), pp. 335-341.

Easterlin, R. (1974). 'Does economic growth improve the human lot? Some empirical evidence', in (P.A. David and M.W. Reder, eds.), *Nations and Households in Economic Growth: Essays in Honour of Moses Abramovitz*, pp. 89-125, New York, London: Academic Press.

Easterlin, R. (1995), 'Will Raising the Incomes of All Increase the Happiness of All?', *Journal of Economic Behaviour and Organization*, vol. 27, pp. 35-48.

Easterlin, R. (2001). 'Income and happiness: towards a unified theory', Economic Journal, 111: 465-484.

Ekins, P. (2000). *Economic Growth and Environmental Sustainability: the prospects for green growth*, London and New York: Routledge.

Ferrer-i-Carbonell, A. and Frijters, P. "How Important Is Methodology for the Estimates of the Determinants of Happiness?" *Economic Journal*, 2004, 114 (497) pp. 641-659.

Frank, R. H. (1997). 'The frame of reference as a public good', Economic Journal, vol. 107(445): 1832-47.

Frank, R. H (2003). "Are Positional Externalities Different from Other Externalities?" Paper Presented at Why Inequality Matters: Lessons for Policy from the Economics of Happiness, The Brookings Institution, Washington D.C., June 4th – 5th.

Frey, B. S. and Stutzer, A. (2000). "Happiness, Economy and Institutions." *Economic Journal*, 110, pp. 918-938.

Frey, B. S. and Stutzer, A. (2002). *Happiness and Economics*. Princeton University Press, Princeton.

Frey, B. S. and Stutzer, A. (2004) "Stress that Doesn't Pay: The Commuting Paradox." IZA Discussion Paper No 1278, 2004.

Frijters, Paul, Shields, Michael A., and John P. Haisken-DeNew. (2004) "Money does Matter! Evidence from Increasing Real Incomes in East Germany Following Reunification." *American Economic Review*, 94(3), pp. 730-741.

Fuà, G., (1993). *Crescita economica. Le insidie delle cifre*. Il Mulino, Bologna.

Galbraith, K. E. (1958). *The Affluent Society*. Houghton Mifflin, Boston.

Gardner, Jonathan and Oswald, Andrew J. (2001) Does Money Buy Happiness? A Longitudinal Study Using Data in Windfalls, mimeo.

Gardner, Jonathan and Oswald, Andrew J. "How is Mortality Affected by Money, Marriage and Stress?" *Journal of Health Economics*, 2004, 23, pp. 1181-1207.

Gerlach, Kunt and Stephan, Gesine (1996). "A Paper on Unhappiness and Unemployment in Germany." *Economic Letters*, 52, pp. 325-330.

Goldin, I. and Winters, A., (1995). "Economic Policies for Sustainable Development" in Goldin, I. and Winters, A. (eds.), *The Economics of Sustainable Development*, Cambridge: Cambridge University Press

Hamilton, Kirk, and Michael Clemens. (1999). "Genuine Savings Rates in Developing Countries." *World Bank Economic Review* 13 (February): 333-56

Hartwick, John M. (1977). "Intergenerational Equity and the Investing of Rents from Exhaustible Resources." *American Economic Review* 67 (December): 972-74

Hirsch, F. (1976), *Social limits to growth*, Harvard University Press, Cambridge.

Jansson, A. H., M. Folke, C. and Costanza, R., (1994). Investing In Natural Capital: The Ecological Economics Approach To Sustainability. Island Press, Washington D.C.

Kahneman, Daniel, Ed Diener and Norbert Schwarz (eds) (1999). *Well-Being: The Foundation of Hedonic Psychology*. New York: Russell Sage Foundation.

Landefeld, J. S. and C. S. Carson. (1994). "Integrated Economic and Environmental Satellite Accounts." *Survey of Current Business* 74(4): 33-49

Lange, G–M., (2003). *Fisheries accounting in Namibia*. In Perrings C., J. Vincent, Natural Resource Accounting and Economic Development – Theory and Practice, 2003, EE, Glos

Lange, G.,R. Hassan and K. Hamilton (2003), *Environmental Accounting in Action: Case Studies from Southern Africa*. Cheltenham, UK: Edward Elgar Publishers.

Layard, R. (2005) *Happiness: Lessons from a New Science*, Allen Lane, London.

Lecomber, R. (1975). *Economic Growth versus the Environment*, Macmillan, London.

Kapp, K. W., (1950). *The Social Costs of Private Enterprise*. Harvard University Press, Cambridge.

Maler, K. G., (1991). "National Accounts and Environmental Resources". *Environmental and Resource Economics*, 1: 1-15.

Martínez-Alier, J. (1995). "The Environment as a Luxury Good or 'Too Poor to be Green'?" *Ecological Economics* 13(1): 1-10

Meadows, D.H., Meadows, D. L., Randers, J. and Behrens III, W. W. (1972). *The Limits to Growth*. New York: University Books.

Mishan, E. (1977), *The Economic Growth Debate*, George Allen and Unwin, London.

Myers, David G. (1993) *The Pursuit of Happiness*, Aquarian, London.

Nordhaus, W. D. (2000). "New Directions in National Economic Accounting." *The American Economic Review*, 90(2): 259-63

Oswald, A. J. (1997). "Happiness and Economic Performance," *Economic Journal*, 107 (445), pp. 1815-1831

Pearce, David W., and Giles Atkinson. (1993). "Capital Theory and the Measurement of Sustainable Development." *Ecological Economics* 8 (October): 103-108

Pearce, David W., and Giles Atkinson 1995. "Measuring Sustainable Development," in Daniel W. Bromley, ed., *The Handbook of Environmental Economics*

Pearce, David W., Kirk Hamilton, and Giles Atkinson. (1996). "Measuring Sustainable Development: Progress on Indicators." *Environment and Development Economics* 1(1): 85-101.

Pearce, D., Markandya, A. and Barbier, E. (1989), *Blueprint for a Green Economy*, Earthscan Publications, London.

Pezzey, J. (1989), "Economic Analysis of Sustainable Growth and Sustainable Development," Environment Department, Working Paper 15, World Bank, Washington D.C.

Repetto, R, W., Mc Grath, M. Wells, C. Beerand, F. and Rossini (1989), *Wasting Assets: Natural Resources in the National Income Accounts*. World Resources Institute, Washington D.C.

Sen, A.K., (1999). "The possibility of social choice." *American Economic Review*, 89 (3): 349-378.

Serageldin I., Steer, A., (1994). "Epilogue: expanding the capital stock." In I. Serageldin and A. Steer (editors). *Making Development Sustainable: from concepts to action*. Environmentally Sustainable Development Occasional Pa*per se*ries No.2. Washington, WorldBank.

Solórzano, R., de Camino, R., Woodward, R. Tosi, J.,Watson, V., Vásquez, A., Villalobos, C.,Jiménez, J. Repetto, R. and Cruz, W. (1991). *Accounts Overdue: Natural Resource Depletion in Costa Rica*. Washington, DC: World Resources Institute

Solow, R. (1986). "On the intergenerational allocation of natural resources." *Scandinavian Journal of Economics*, Vol. 88, No. 1, pp.141-9.

Smith, A. (1776). "*An Inquiry into the Nature and Causes of the Wealth of Nations*," Oxford: The Clarendon Press 1976.

Stutzer, Alois. "The Role of Income Aspirations in Individual Happiness." *Journal of Economic Behaviour and Organization*, 2004, 54 (1), pp. 89 – 109.

Van Praag, B.M.S. and Baarsma, B.E. (2005). 'Using happiness surveys to value intangibles: the case of airport noise', *Economic Journal*, vol. 115(500), pp. 224-246.

Veenhoven, Ruut. "Advances in the Understanding of Happiness." *Revue Québécoise de Psychologie*, 1997, 18 (2), pp. 29-74

Welsch, H. (2006). 'Environment and happiness: valuation of air pollution using life satisfaction data', *Ecological Economics*, vol. 58(4), pp. 801-813.

Winkelmann, L. and Winkelmann, R. (1998). 'Why are the unemployed so unhappy? Evidence from panel data', *Economica*, vol. 65(257), pp. 1-15.

World Bank. 1997. *Expanding the Measure of Wealth*. Washington, D.C.: The World Bank.

World Bank (2006). *Where is the wealth of nations*, Washington, D.C., World Bank.

World Development Indicators (WDI), 2006, available at http://publications.worldbank.org/WDI/

Economic, social and environmental performance of industry and how to influence it

Comhar Briefing Paper[1]

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1 This briefing paper has been prepared to inform the proceedings of the Comhar Conference "Towards Sustainability in the National Development Plan 2007-2013" – 4th to 6th October 2006. Opinions expressed are not necessarily those of Comhar but are intended to encourage debate and greater understanding of sustainability issues.

1. Policy Framework for Irish Industry

The objective of this paper is to review the economic, social and environmental performance of both indigenous Irish industry and multi-national subsidiaries based in Ireland since the implementation of the 2000-2006 National Development Plan (NDP). Progress towards sustainable development in the industrial sector will be assessed as a result of the current policy mix, with particular focus on policy initiatives introduced since 2000. Potential policy instruments, which are likely to help Irish industry move along a more sustainable trajectory, will be suggested.

The policy framework for sustainable development in Ireland is the 1997 *Report Sustainable Development: A Strategy for Ireland*, which explicitly addresses the need to integrate environmental and economic objectives in both national and regional planning and sectoral policy-making and aims (DoELG, 2002a, p25; 38):

> *"to ensure that economy and society in Ireland can develop to their full potential within a well-protected environment, without compromising the quality of that environment, and with responsibility towards present and future generations and the wider international community."*

It includes specific objectives and measures for a number of strategic sectors including industrial development and aims to promote a strong, internationally competitive enterprise sector, comprising both indigenous and non-national companies, which will make the maximum contribution to self-sustaining employment growth (DoELG, 1997, pp4-11; 86). Policy measures for industry outlined in the strategy include (DoELG, 1997, pp3-9):

1. Imposing a condition of compliance with environmental regulatory requirements for grant assistance for industrial development,
2. Promoting the EU Eco-Management and Audit Scheme (EMAS),
3. Developing suitable market-based policy instruments to improve internalisation of externalities such as resource pricing, green taxation measures and emissions trading,
4. Development of a materials and energy balance for industry to determine the full extent of industry's impacts in order to provide targets for eco-efficiency and
5. Support and assistance for environmental technology.

The need to achieve a more balanced regional development through infrastructural investment was recognised in the 1994-1999 National Development Plan (NDP) and later promulgated in the 1999 Report *Programme for Prosperity and Fairness* (PPF) (Department of the Taoiseach, 2000, p53). It may be argued that the stock and quality of public and physical infrastructure is one of the key determinants of the long-term growth rate of an economy as the capacity of infrastructure to support and sustain a given level of economic activity has a major bearing on the competitiveness of industry as well as being a significant factor in attracting foreign direct investment (FDI). The physical distribution of infrastructure

also has a bearing on the spatial pattern of development, the economic and social regional balance and quality of life (DoELG, 1999, p5).

The objectives and policy goals of the PPF for industry include (Department of the Taoiseach, 2000, pp59-75):

1. Promoting diversification of markets in respect of indigenous enterprise,
2. Optimising linkages between indigenous enterprise and FDI,
3. Achieving a better regional distribution of manufacturing and internationally traded services employment,
4. Increasing the quality of employment,
5. Embedding foreign-owned companies in Ireland and
6. Maintaining a high quality environment as a source of competitive advantage by supporting food and tourism industries and developing first-mover advantage in environmental technologies.

The need for infrastructural development and investment was also recognised in the 2000-2006 NDP, the Economic and Social Research Institute (ESRI) Report *National Investment Priorities for the Period 2000-2006* (Fitzgerald *et al.,* 1999) and the National Economic and Social Council (NESC) Report *Opportunities, Challenges and Capacities for Choice* (DoELG, 1999, p12). Objectives of the 2000-2006 NDP include (DoELG, 1999, p1):

1. Maintaining sustainable national economic and employment growth,
2. Consolidating and improving Ireland's international competitiveness,
3. Fostering balanced regional development and
4. Promoting social inclusion.

The development agenda for the macro-economy and industry in Ireland is framed by the 2000-2010 European Union (EU) Lisbon Strategy, which is based on the Schumpeterian concept of innovation as a motor of economic change and environmentally and socially sustainable growth. This Strategy targets a GDP growth rate of 3% for the EU (CEC, 2003a, p6) and aims to transform the EU into the (NESC, 2002, pvi):

> *"most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion."*

Sustainable development was specifically addressed as part of the Lisbon Strategy by the European Council in Gothenburg in June 2001 with the adoption of *A Sustainable Europe for a Better World: A European Strategy for Sustainable Development*, commonly referred to as the Sustainable Development Strategy (SDS). External policies and the implications of globalisation for sustainable development were added in 2002 by the European Council in Barcelona in *Towards a Global Partnership for Sustainable Development* (CEC, 2005, p3).

Both the Lisbon Strategy and SDS recognise that economic, social and environmental objectives are reinforcing and should be integrated. The integration of environmental concerns into sectoral policy-making was a recommendation of the Cardiff Integration Process (CEC, 2003a, p5; 22). Both strategies aim to support the necessary structural changes, which enable Member States' economies to deal with the challenges of globalisation by creating a level playing field in which dynamism, innovation and creative entrepreneurship can flourish whilst ensuring social equity and a healthy environment (CEU, 2006, p6).

Guiding principles of the SDS include protection of fundamental rights, intra-generational solidarity, inter-generational equity and capital bequests, an open and democratic society, citizen participation, stakeholder involvement, policy integration and the precautionary and polluter pays principles (CEU, 2005, pp29-30). It aims to promote sustainable production and consumption by maintaining social and economic development within the carrying capacity of ecosystems, decoupling economic growth from environmental degradation, increasing green public procurement (GPP) and global market share of environmental technologies and eco-innovation through effective implementation of the Environmental Technologies Action Plan (ETAP) (CEU, 2006, p12).

The 6th EU Environmental Action Programme (2002-2012) sets out priorities for Community environmental policy, covering a number of thematic strategies including climate change, nature and biodiversity, environment and health and resource efficiency and waste management (DoELG, 2002a, p65). The EAP emphasises the need to (CEC, 2003a, pp6-9):

1. Decouple economic growth from environmental impact,
2. Achieve sustainable use of natural resources,
3. Increase resource efficiency or productivity,
4. Reduce energy or material intensity,
5. Prevent waste generation and
6. Implement an integrated product policy (IPP).

The 2002 Report *Making Ireland's Development Sustainable: Review, Assessment and Future Action* supports the principles enshrined in the 1997 national strategy and sets out policies to maintain economic competitiveness and prosperity and achieve greater social inclusion and quality of life whilst protecting the environment (DoELG, 2002a, p92). It argues that industry must adopt eco-efficiency as a guiding principle and achieve a progressive decoupling of economic activity from environmental degradation. A number of policy initiatives for industry are proposed including cleaner technologies, integration of life cycle and holistic thinking into environmental management through greening of supply chains, corporate environmental reporting, product eco-design and re-valorisation of by-products (DoELG, 2002a, p93).

The 2002 National Spatial Strategy (NSS) is designed as a planning framework to deliver more balanced social, economic and physical development between regions. It aims to improve overall quality of life by developing the critical mass of strategically located hubs and gateway centres as well as redressing economic and social stagnation in peripheral rural areas in order to provide a viable alternative to the primacy of the Greater Dublin Area (GDA) (DoELG, 2002b, pp5-10).

It is argued that the contribution of the 2007-2013 NDP to delivering balanced regional development is its most important horizontal contribution and that investment should take a proactive approach in all regions, thereby 'stimulating business development as the vehicle for social and economic development in all parts of Ireland' (IBEC, 2006, p10). Priorities outlined in the proposed NDP include the development of an Atlantic corridor between Limerick and Galway, continued roll-out of broadband, support for tourism, investment in road infrastructure, third level education in gateway centres and electricity and gas networks and deployment of integrated investment plans to regenerate disadvantaged areas in major urban centres (IBEC, 2006, pp11-12).

Industry sector priorities proposed for the 2007-2013 NDP include food and drink, clothing and textiles, information and communications technologies (ICT), industrial products manufacturing (including plastics, wood products and building materials), mining and exploration, medical devices, software and the pharmaceutical industry (IBEC, 2006, pp38-49). It is concluded that without balanced regional development, Ireland will not properly address social exclusion (IBEC, 2006, p10) and, thus, the NDP must achieve synergy and alignment with the NSS (IBEC, 2006, p51).

2. Economic and Social Performance 2000-2006

Since the early 1990s the Irish economy has experienced a remarkable transformation and is now one of the world's most dynamic and globalised, with extensive external trade and investment links and annual growth rates over the averages for the developed world (Enterprise Ireland, 2005, p11). Between 1990 and 2000 there was a 98% increase in GDP output as well as full convergence with EU average GDP per capita in 1997 and close to full convergence of GNP per capita by 2000 (DoELG, 2002a, p12).

Growth slowed down following the international slowdown of 2001/2002 but still averaged 6.1% between 2000 and 2004, compared with the Eurozone average of 1.7% and the OECD average of 2.5% (Enterprise Ireland, 2005, p2). Irish GDP per capita increased by 4.9% per annum between 1999-2004 and GNP per capita increased by 4% in the same period (Forfás, 2005a, p13). GDP and GNP grew by 5.5% and 5.4%, respectively, in 2005, largely due to domestic consumption (ESRI, 2006). It should be noted, however, that there is a significant difference between the GDP measure of national output and the GNP measure of national income in Ireland due to the presence of substantial foreign-owned industry (Enterprise Ireland, 2005, p2).

A number of reasons are purported for this period of growth including (Allen, 2000; O'Hearn, 2000; Goodbody, 2001a; DoELG, 2002a; Kennelly and Bradley, 2005; Enterprise Ireland, 2005):

1. EU membership, which has provided munificent structural fund transfers for infrastructural investment,
2. Economic liberalism dogma,
3. Substantial inflow of FDI, particularly in high value-added sectors, due to low corporate tax rates,
4. National investment in education, providing a highly skilled and flexible labour force,
5. Enhanced productivity due to falling unit labour costs and
6. The social partnership approach.

It has been shown that a positive correlation exists between a country's openness to international trade and investment and its productivity and economic growth (Forfás, 2005a, p21). Ireland is regarded as having a very globalised and open economy and its performance as a trading nation has been notable with exports of goods and services contributing to 82% of GDP and 98% of GNP in 2004 (DoELG, 2002a, p13; Forfás, 2005a, p50).

This status as an exporting economy has been driven by an expansion in the country's foreign-owned manufacturing base, an estimated 95% of whose output is exported. However, the export propensity of Irish-owned manufacturers is considerably lower, at an estimated 43% of sales, indicating a much greater reliance on the domestic market (Enterprise Ireland, 2005, p7). According to World Trade Organisation

(WTO) statistics for 2003, Ireland ranks as the 22nd largest exporter in the world and its per capita exports are seven times those of the USA and over four times those of the UK (Enterprise Ireland, 2005, p7).

This economic growth has occurred concomitantly with a structural transition in the Irish economic profile from traditional industries such as agriculture, food processing and textiles towards higher value-added industries such as pharmaceuticals and electronics. Indeed, production in the chemicals and electronics sectors increased by 250% and 150%, respectively, between 1995 and 2001 (DoELG, 2002a, p12) and, in April 2006, accounted for 37% and 25% of total production (CSO, 2006b, pp5-6). In addition, chemicals and related products (SITC Divisions 51-59) accounted for 46% of exports while telecommunications, office and electrical machinery (SITC Divisions 75-77, 87) accounted for 28% of exports in the period January-April 2006 (CSO, 2006a, pp4-5).

Multi-national companies now represent a considerable proportion of the Irish industrial base, particularly in the ICT, electronics and pharmaceutical sectors although, in recent years, there has been a considerable increase in the number of indigenous small and medium sized enterprises (SME) (DoELG, 2002a, p12). Ireland has been a significant beneficiary of FDI and in 2003 attracted 6% of US FDI (Forfás, 2005a, p53).

Indeed, the stock of inward FDI in Ireland in 2003 was equivalent to 130% of GDP (Forfás, 2005a, pp52-53), largely a result of favourable investment conditions, which have allowed Ireland to boost its relative factor endowment significantly and have had a direct impact on both productivity and the rate of potential growth (Goodbody, 2001a, p7). In order for Ireland to maintain FDI and global competitiveness and to meet the objectives of the Lisbon Strategy and contribute to the knowledge economy, it is imperative that there continues to be high levels of investment in research and development (R&D), both in terms of capital infrastructure and softer supports and programmes (Forfás, 2005a, p92).

In particular, investment is required in scientific and technological R&D, particularly in domestic enterprises and indigenous firms (Forfás, 2005a, p103). Gross expenditure on research and development (GERD) in Ireland did increase from €1,397.4m in 2000 (in 2005 constant prices) to €1,910.1m in 2005 (Forfás, 2005b, p8) while GERD as a percentage of GNP in Ireland increased from 1.32% in 2000 to 1.43% in 2004 (Forfás, 2005b, p9).

Between 1994 and 2004, employment increased by 50% due to strong growth in the working age population, high levels of immigration, returning Irish emigrants and the large rise of female participation in the labour force (particularly in the 18-35 age cohort) (Forfás, 2005a, p4). Total employment increased by 15% between 2000 and 2005, largely due to an increase in construction employment of 46%, which increased its share in employment from 9.9% in 2000 to 12.6% in 2005 (NESC, 2005, p18). As a result, the unemployment rate dropped from 14% in 1994 to 4.2% in 2005 (Forfás, 2005a, p4; Enterprise Ireland, 2005, p3) although long-term unemployment remains at 1.4% of the labour force (NESC, 2005, p18).

The European Employment Strategy (EES), which is a key component of the 2000 Lisbon Strategy, set targets for employment rates, defined as the share of population aged 15-64 in employment, with a target of 70% by 2010, whilst the Stockholm European Council (2001) added an interim target of 67% by 2005 (*Internet Reference 1*, last referenced August 2006). Ireland's employment rate rose from 52.2% in 1994 to 67.1% in the second quarter of 2005, thus achieving the interim target.

Whereas 49% of women between 15 and 64 were active in the Irish labour market in 1999 this was below the EU-15 average of 58% (Forfás, 2000, p6), although, by 2005, the female participation rate had increased and converged with the EU average, thus, meeting the Stockholm interim target for female employment of 57% by 2005. However, this was still short of the 2010 target of 60% (NESC, 2005, p18) and significantly less than that of Denmark (74.8%) and Switzerland (73.9%), primarily due to lower female participation rates in Ireland in the 40-60 age cohort (IDA, 2005, p25).

The 2005 *Annual Competitiveness Report (ACR)* estimated that labour productivity in Ireland averaged 5% per annum between 1994-2004 (Forfás, 2005a, p5) while total productivity growth averaged over 3% annually in the same period (Forfás, 2005a, p31). Productivity growth in manufacturing averaged 8% per annum (Enterprise Ireland, 2005, p6) although this was largely concentrated in a small number of capital-intensive industries dominated by multinational companies (MNC), such as chemicals, pharmaceuticals and electronics.

However, there is weaker productivity growth in more traditional manufacturing sectors, and in those sectors of the Irish economy less exposed to international competition, such as utilities, construction, retailing and agriculture (Forfás, 2005a, p5). Indeed, productivity of Irish-owned firms is only 45% of the national average while productivity of foreign firms is 60% higher than the national average (Forfás, 2000, p14).

While a decline in output in parts of manufacturing is an inevitable result of long-run structural changes, the widespread declines are also indicative of strong competitiveness pressures on manufacturing (NESC, 2005, p13). On the other hand, Ireland's share of world services trade has grown from 0.5% in 1998 to 2% in 2004, overtaking its share of world merchandise trade, which has fluctuated at 1.2% (Forfás, 2005a, p21).

Although production volume indices increased from 2000 to 2005, the per annum increase in manufacturing industries fell from 15.7% in 2000 to 3.1% in 2005. This compares with total industry production volume indices, where per annum increase fell from 15.3% in 2000 to 3.0% in 2005 (CSO, 2006b, p2). In addition, the number of industrial enterprises in Ireland fell from 4,846 in 2000 to 4,698 in 2004 (Appendices: Table 1) while the number of persons engaged in industry fell by 12.75% from 258,997 in 2000 to 225,969 in 2004 (Appendices: Table 2). The percentage contribution of manufacturing to total employment in 2004 was 16.4%, compared with 18.5% in 1999 (O'Malley and McCarthy, 2006, p47).

Gross value-added (GVA) economic output, however, increased by 17.7% from €35,504m in 2000 to €41,791m in 2004 (Appendices: Table 3) showing the trend towards higher value-added, lower labour-intensive industry and GVA per employee in the manufacturing sector increased from €105,900 in 2000 to €126,000 in 2004 (O'Malley and McCarthy, 2006, pp45-49).

Social inclusion involves full participation in society and citizenship rights, which (NESC, 1999, p9):

> *"encompass not only the core civil and political rights and obligations but also social, economic and cultural rights and obligations, which are embedded in our political culture and which underpin quality of opportunity and policies on access to education, employment, health, housing and social services."*

Policies to tackle social exclusion include (Goodbody, 2001b, p5; DoELG, 2002a, p15; NESC, 2002, pp15-18; NESC, 2005, p82):

1. Improvement in the work environment through enterprise-level partnership,
2. The 1997 National Anti-Poverty Strategy *Sharing in Progress*, which set targets for reduction of consistent poverty from 15% in 1997 to 4% by 2004,
3. The 2000 National Minimum Wage Act,
4. *National Action Plan against Poverty and Social Exclusion 2003-2005*, which aims to improve the poverty proofing of policy initiatives,
5. Successfully adapting to continuing change and renewing partnership by creating a framework to facilitate lifelong learning and
6. Open access to the labour market and creating conditions where people can achieve economic independence.

It is argued that the social partnership model, which promotes consensus and shared understanding, has helped deliver industrial peace through the reduction of industrial disputes and moderate pay settlements, which have improved competitiveness and contributed to strong economic growth (NESC, 1999, pp20-21). For example, in 2000, 97,046 days were lost as a result of industrial disputes whereas in 2005 this had dropped to 26,665 days (CSO, 2006c, p3). However, although it has managed to provide a more stable industrial relations climate in a period of sustained economic growth, quality of life and disparity have not improved accordingly (O'Donnell, 2001, p3). Indeed, Ireland is regarded as being in an unfavourable position with regards to income inequality, as measured by the Gini coefficient, with the richest 20% earning 12 times as much as the poorest 20% in 2005 (NESF, 2006, pix).

It has also been argued that a more balanced progress needs to be maintained in order to ensure a more equitable regional distribution of wealth (NESC, 2002, p61). The 2006 NESF Report *Creating a More Inclusive Labour Market* identified urban and peripheral rural areas, which have not benefited from recent economic growth and where job losses in manufacturing and agriculture have not been compensated by job creation in other sectors, resulting in economic stagnation, out-migration and loss of critical mass (NESF, 2006, px).

Thus, the long-term viability of the social partnership model, which provides a framework for developing a shared understanding of the forces and trade-offs driving economic and social transformation, is dependant on its capacity to evolve in line with the transformation of the economy and demands a need for wage moderation, institutional reform, greater competition and efficiency, thus fostering a genuine sense of social cohesion (Forfás, 2000, p4) while O'Donnell (2001, pii-iv) argues that supply-side constraints on economic and social development must be removed and the macroeconomic, distributional, structural and supply-side policies need to be revised, including wage bargaining, public sector pay determination and infrastructural issues such as transport and waste management.

The *Social Partnership Agreement 2006-2015* provides a 10-year framework for strategic planning and partnership in Ireland and aims to facilitate the complementary relationship between social policy and economic prosperity, develop a vibrant and knowledge-based economy, reposition Ireland's social policies, achieve integration of an all-Ireland economy, deepen capabilities, achieve higher participation rates and successfully handle diversity, including immigration (Department of the Taoiseach, 2006, pp5-10).

The Agreement outlines a number of policy initiatives for manufacturing, including (Department of the Taoiseach, 2006, p20):

1. Managing change to sustain competitiveness through upskilling and assistance to SMEs,
2. Enhancing the contribution of research, development and innovation,
3. Improving the environment for manufacturing through good quality regulation,
4. Encouraging greater links between MNCs and indigenous manufacturers and
5. Developing sales in export markets.

3. Business as Usual Trajectory 2007-2013

Medium-term economic forecasts for Ireland remain generally positive and the Irish economy is predicted to maintain its annual growth rate of 5% for the 2005-2010 period with a slower grower rate of 3.3% forecast for the 2000-2015 period while employment and labour force continue to grow at average rates of 3% (NESC, 2005, p25; NESF, 2006, p11; IBEC, 2006, p2). With a reasonably favourable international environment, Irish exports should recover from the static performance in 2005 and are expected to grow by 6.2% in both 2006 and 2007 (Barrett *et al.,* 2006).

This medium-term economic growth, however, is expected to be driven by increases in government investment in public infrastructure, personal consumption, investment in the property market and divestiture of maturing Special Savings Incentive Accounts (SSIA), rather than through success in export markets (Forfás, 2005a, p6; Barrett *et al.,* 2006). In 2006, the volume of consumption is expected to rise by 6.8% while it is forecast to increase by a further 7.4% in 2007. Investment demand will also remain strong with growth rate forecasts of 8.3% in 2006 and 6.5% in 2007 (Barrett *et al.,* 2006).

However, potential risk factors include domestic cost escalation, continued sluggishness in the leading eurozone economies, loss of manufacturing competitiveness, higher oil prices and rising energy costs, significant reduction in housing output with an associated reduction in employment, reduction in the overall level in house prices and effects on consumer confidence, high level of personal debt and vulnerability to exogenous shocks or bifurcations in global markets (Enterprise Ireland, 2005, p3; NESC, 2005, p26; NESF, 2006, p11).

The structural transition from agriculture and manufacturing to services and construction, which is a common trend for advanced industrial economies (Schettkat and Yocarini, 2003), may result in the weakening of major internationally traded activities and loss of employment productivity growth as services and construction are too dependent on temporarily favourable domestic demand conditions (O'Malley and McCarthy, 2006, p36). Thus, the successful development of an internationally-traded Irish-owned services sector will be crucial to Ireland maintaining high growth rates as manufacturing production at the lower end of the value-added spectrum slows down (Lane and Ruane, 2006, p70).

Although Ireland has successfully embraced economic globalisation, it is also vulnerable to increased international competition for footloose capital, knowledge and skilled labour. As the English language becomes the *lingua franca* and countries with economies in transition adopt lower tax-regimes and pro-FDI strategies, the priority will be to ensure that Ireland retains its status as a desirable investment location and positions itself as a knowledge economy. Indeed, it has been argued that Ireland is at an inflection point in terms of its growth profile due to external pressures on our competitive position (Lane, 2004, p2), particularly from accession countries in the EU competing for FDI (Lane, 2004, p2, 24).

Initially, the policy aim was to attract FDI in order to create employment. As this is no longer the sole priority, more emphasis needs to be placed on productivity, developing higher value-added industry, investment in high-level R&D and balanced regional development (Forfás, 2000, p15). As countries develop economically, and their cost base increases, productivity gains through innovation and research acquire an added importance. Although Ireland's expenditures on R&D as a proportion of GDP are still well below the EU and US averages, Ireland did start from a low level of research intensity and increased its expenditure substantially by 12.3% per annum in the period 1997-2002.

As an integral part of the Lisbon Strategy, the European Council set a target that 3% of the EU GDP would be invested in R&D by 2010, while the *Irish Action Plan for Promoting Investment in R&D* set a target of 2.5% of GDP expenditure on R&D by 2010 (Forfás, 2005b, p99). Currently R&D expenditures are 1.4% of GDP and it is estimated that indigenous industry and the public sector accounts for only 30% of total R&D spending (Goodbody, 2001b, p10; Enterprise Ireland, 2005, p10). Thus, Ireland will only be able to approach the Lisbon target of 3% if industry assumes a greater share of the cost burden, as is the case in most developed economies (Enterprise Ireland, 2005, p10).

Although domestic expenditure on R&D is necessary, this should be complementary to MNC investment in R&D operations based in Ireland as the vulnerability to asymmetric shocks, which results from an over-reliance on foreign firms and a narrow diversification of exports, both sectorally and geographically, would be reduced if they become more embedded in the Irish economy (Forfás, 2000, p12, p15).

Given Ireland's reliance on FDI as the key driver of R&D, the economy is exposed to the risks of a reduction in either general multinational involvement or specific FDI-funded R&D activity unless more capacity is developed from self-sustaining indigenous industry (Goodbody, 2001a, p8). However, the Irish economy proved to be highly resilient during the global downturn of 2001/2002, particularly given its level of trade and investment integration with the world economy, and this relative immunity to international instability suggests that the many multinational operations based in Ireland have embedded themselves into, and become long-term components, of the Irish economy (Enterprise Ireland, 2005, p3).

4. Current and Future Environmental Legislation and Policy Instruments

Statutory instruments for environmental protection that are relevant for Irish industry include the Water Pollution Acts 1977-1990, which require licensing for discharge of water effluents, the 1987 Air Pollution Act and the 1996 Waste Management Act, which places an obligation on producers to take all such reasonable steps as necessary to prevent or minimise the production of waste arising from any agricultural, commercial or industrial activity. Amendments to the 1996 Waste Management Act include the 1997 Waste Management (Packaging) Regulations, i.e. SI No. 242, the 1998 Waste Management (Hazardous Waste) Regulations, i.e. SI No. 163, the 2000 Waste Management (Licensing) Regulations, i.e. SI No. 185 and the 2001 Waste Management (Collection Permit) Regulations, i.e. SI No. 402.

A number of policy documents relevant for waste management have also been prepared complementary to this regulatory framework, including (DoELG, 2002a, p97; DoELG, 2004, pp51-56):

1. *Changing Our Ways* (1998), which recognised the need for a reduction in reliance on landfill in favour of an integrated waste management policy, which prioritises prevention and minimisation, and set out indicative recycling/recovery targets,
2. *Prevention and Recycling Waste: Delivering Change* (2002), which emphasised the waste hierarchy and prevention, supported the modernisation of waste management infrastructure, and proposed the introduction of a landfill levy and Producer Responsibility Initiatives and
3. *Waste Management: Taking Stock and Moving Forward* (2004), which recommended the development of regional waste management plans, launched a National Waste Prevention Programme and proposed the National Biodegradable Waste Strategy.

Current regulatory instruments relevant for industry that have been transposed into Irish law from EU Directives are given in Appendix 2. Directive 94/62/EC on Packaging and Packaging Waste required Member States to recover at least 50% of packaging waste and to recycle at least 25% of packaging materials, with no material recycled at less than 15% by 2001 with Ireland being granted dispensation until 2005 to achieve these targets while a target of 25% by 2001 was set due to the contemporaneous economic situation (Perchards, 2004, p1). This Directive also required Member States to ensure, where appropriate, that materials recovered from recycled packaging waste were reused in the production of new packaging and other products (Perchards, 2004, p1).

The amending Directive (2004/12/EC) set further targets to be achieved between 2008 and 2015, with Ireland required to recover a minimum of 60% and recycle 55-80% of total packaging waste by 2011, while specific material recycling targets were set for glass (60%), paper (60%), metals (50%), plastics (22.5%) and wood (15%) (OJEU, 2004, p3).

Directive 96/61/EC on Integrated Prevention Pollution and Control (IPPC) aims to prevent pollution from industrial activities, including energy industries, production and processing of metals, minerals, chemicals, waste management activities, production of paper, pulp and board, slaughtering, rendering and food processing through permit conditions based on emission limit values (ELV). This Directive was amended by Directive 2003/35/EC to include public participation following the 1998 Aarhus Convention on access to environmental information, public participation in decision-making and access to justice in environmental matters.

The Solvents Directive (1999/13/EC), which was implemented in Ireland in 2002 through the Emissions of Volatile Organic Compounds from Organic Solvents Regulation (SI No. 543), provides the means for controlling the emissions of solvent vapours from specified activities, including printing, surface cleaning, vehicle coating and refinishing, when they exceed the relevant solvent consumption thresholds, which was set at between 10 and 15 tonnes per annum depending on the activity (EPA, 2005).

The Water Framework Directive (2000/60/EC), which was transposed into Irish legislation in December 2003, did not have a major impact on the regulation of industrial effluents but did provide for a consultative process for river basin management plans. It also required that controls be introduced for abstractions from both surface and groundwaters (Article 11c) and prohibited the direct discharge of pollutants into groundwater (Article 11j).

The Restriction of Hazardous Substances Directive (2002/95/EC) restricts the use of lead, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) in electronic and electrical equipment to 0.1% by weight of homogenous material and cadmium to 0.01% weight in accordance, with exemptions including mercury in fluorescent lamps and lead in cathode ray tubes (CRT) and solders (*Internet Reference 2*, last referenced August 2006).

The Waste from Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) requires manufacturers to design and produce electrical and electronic equipment, including household appliances, IT and telecommunications equipment, lighting equipment and consumer goods, in order to facilitate dismantling, recovery, reuse and recycling of components and materials (Article 4). It also proposes measures to minimise the disposal of WEEE as unsorted municipal waste and to achieve a high level of separate collection as well as allowing for take-back systems (Article 5).

Member States are required to ensure that producers achieve a recovery rate of 70-80%, depending on the product, and to ensure a rate of separate collection of 4kg per capita per annum by December 2006. The Directive, which was transposed into Irish legislation in August 2004, resulted in the introduction of two producer collective schemes in Ireland, that is WEEE Ireland Ltd. and European Recycling Platform (ERP) Ireland Ltd., and requires that collection systems be set up and producers be able to finance the collection, treatment, recovery and environmentally sound disposal of such waste. 2 million tonnes were collected and recycled between August 2005 and May 2006, which equates to 6.7 kg per capita, although this is still short of the 15-25 kg per capita WEEE produced annually.

The 2003 Registration, Evaluation and Authorisation of Chemicals (REACH) proposal aims to place responsibility for the safety of chemicals on manufacturers and requires that chemical producers and importers of more than 1 tonne per annum register with the proposed EU Chemicals Agency, submitting information on properties, uses and safe disposal, and develop benign alternatives, in accordance with the substitution principle. It is expected that this procedure will result in the proposed European Release and Transfer Register (ERTR), which will replace the European Pollutant Emission Register (EPER) in 2009.

A common position was agreed by the Commission in June 2006 with final adoption of the proposal expected by the end of 2006. Ireland represents 2.9% of total EU chemical production, whilst its speciality chemicals sector contributes 4% of all notifications under the New Substances and Existing Substances Regulations (ERM, 2005, p5). The benefits of REACH within the EU are estimated to be €4.8 billion annually by 2017 while total direct and indirect costs amount to €5 billion over the period 2006-2017 (Pedersen *et al.,* 2005).

Benefits to the Irish chemical sector include reduced risks to human health and the natural environment, stimulation of innovation and R&D due to need for chemical substitution, provision of consistent legislation rather than a fragmented regulatory framework, increased international competitive advantage, reduction of liability and reduced pollution control equipment costs and costs associated with hazardous waste management (ERM, 2005, p7, 12).

However, REACH is expected to impose significant costs on chemical manufacturers or upstream industries in Ireland in the form of chemical testing and administrative costs with the total cost estimated to be €180 million over an 11-year period (ERM, 2005, p5), while the cost to downstream chemical users over the same period is estimated to be €300 million (ERM, 2005, p6). The impact of REACH on the pharmaceutical industry is lessened because substances used only in human and veterinary medicinal products are exempt from most requirements while the ICT hardware industry and SMEs, as predominantly downstream users, are likely to feel the greatest impact, possibly resulting in job losses (ERM, 2005, p6, 12).

The 2005 KPMG report for the European Chemical Industry Federation (CEFIC), which analysed the potential effects along the supply chain and focused on the automotive, electronics, packaging and inorganic metals sectors, concluded that the REACH proposal would not have a significant effect on the competitiveness of large chemical manufacturers and SMEs or increase delocalisation. However, this study did not assess the impact of the proposal on the general macro-economic environment or potential impacts on GDP or employment (KPMG, 2005).

Liability and compensation schemes are likely to become significant in the future as a result of Council Framework Decision 2003/80/EC on the protection of the environment through criminal law and Directive 2004/35/EC on environmental liability (EEA, 2005a, p119). This Directive was implemented as a result of the 2000 *White Paper on Environmental Liability* (COM (2000) 66), which proposed to extend the polluter pays principle to cover both environmental pollution and damage to health and property and extended the liability regime to include areas and species covered by the NATURA 2000 Network.

Directive 2005/32/EC on Eco-design of Energy-using Products (EuP) is based on the Community Strategy on Integrated Product Policy (IPP) and aims to achieve energy efficiency during the product design phase of appliances such as heating equipment, electric motors, lighting, domestic appliances, office equipment, consumer electronics and heating, ventilation and air conditioning (HVAC) systems and reduce impact throughout product life cycle through self-regulation and voluntary agreements. It is envisaged that this Directive will increase synergies with the RoHS and WEEE Directives as well as the Energy Labelling Directive (92/75/EC).

Although regulation has a very important role in environmental management it is recognised that a broad mix of instruments may be optimal, particularly where these would achieve improvements effectively and more cost-efficiently, including the use of market-based instruments and voluntary agreements (DoELG, 1997, p8). Market-based instruments include emissions/effluent charges, product charges, resource use charges, user charges, deposit refunds, subsidies, tradable permits, non-compliance fees, performance bonds, grants, tax allowances and liability and compensation schemes (Clinch and Gooch, 2001, pp27-29; EEA, 2005a, p6; 2006, p5).

Market-based instruments have been deployed in Ireland, with varying measures of success, including tax incentives for the development of park and ride facilities, vehicle registration tax (VRT) differentials for smaller cars, tax relief on renewable energy, higher excise rates for sulphur diesel and levies on plastic shopping bags and the landfilling of waste (DoELG, 2002a, p61; EEA, 2005c, p26).

Since the ratification of the 1997 Kyoto Protocol and its subsequent entry into force, Ireland is obliged to reduce its greenhouse gas (GHG) emissions to 13% above 1990 levels by the commitment period 2008-2012. This is in accordance with the EU Burden-sharing Agreement (Council Decision 2002/358/EC), which aims to reduce EU emissions by 8% by the same period through its *European Climate Change Programme* (DoELG, 2006, pp12-13).

The 2000 *National Climate Change Strategy* (NCCS) provides a framework for achieving GHG reductions in a number of sectors and is based on maximisation of economic efficiency, including a preference for the use of 'no regret' and least-cost measures, and achievement of sectoral equity (DoELG, 2000, p3). The target set for industry was a reduction of 2Mt CO_2-equivalent per annum to be achieved through efficiency measures (1Mt CO_2-equivalent), process substitution for cement (0.5Mt CO_2-equivalent) and reduction of industrial gases (0.5Mt CO_2-equivalent) (DoELG, 2000, p5; 59) (DoELG, 2000, pp55-59).

Specific measures proposed in the Strategy to reduce industrial GHG include (DoELG, 2000, pp55-59; DoELG, 2002a, p39; ERM *et al.,* 1998, pp12-15, 46):

1. Regulation through IPPC licensing,
2. Cross-sectoral measures such as carbon taxation,
3. Negotiated agreements with the option for firms complying with agreements to reduce their tax burden,
4. Emissions trading,

5. Demand side management (DSM), that is increasing efficiency or reducing consumption,
6. Fuel switching to lower carbon fuels such as natural gas,
7. Sequestering,
8. Increased use of combined heat and power (CHP),
9. Process substitution to less energy-intensive methods and
10. Replacement of industrial gases with more benign substitutes.

Further policies and measures proposed for industry in the 2006 Review *Ireland's Pathway to Kyoto Compliance* include the Large Industry Energy Network, Energy Agreements Programme, Energy Management Action Programme (EMAP), Commercial Bioheat Scheme, regulation on fluorinated greenhouse gases (Directive 2006/842/EC), the mobile air conditioning directive (Directive 2006/40/EC), white certificate schemes and extension of demand-side energy efficiency programmes (DoELG, 2006, pp71-77).

Estimated average annual reduction from proposed measures across all sectors is 7.95 million tonnes of CO_2-equivalents in 2008-2012, using an Integrated Planning Model (IPM) and marginal abatement cost curves (MACC) based on an EU Emissions Allowance (EUA) of €15/tonne (ICF and Byrne O'Cleirigh, 2006, p4), including Common Agricultural Policy (CAP) reform (2.4Mt), afforestation (2.08Mt), the Renewable Energy Directive (2001/77EC) (1.3Mt), landfill gas power generation or flaring (0.7Mt), car manufacturers' voluntary agreement (0.48Mt), Building Regulations (0.3Mt), Dublin traffic measures (0.27Mt), biofuel excise relief (0.25Mt), implementation of Landfill Directive (1999/31/EC) (0.06Mt), modernisation of the natural gas network (0.06Mt) and motor taxation/fuel labelling (0.05Mt) (DoELG, 2006, p15).

However, projections show that Ireland will continue to face an average annual shortfall of 7.174 million tonnes of CO_2-equivalents in that period (ICF and Byrne O'Cleirigh, 2006, p3). Under the Draft EPA National Allocation Plan (NAP), which allocates allowances to individual installations, emissions trading in industry is expected to achieve a reduction of 3.02 million tonnes and the balance of the 'distance to target', that is 4.154 million tonnes is the responsibility of the rest of the economy (DoELG, 2006, p11).

The EU Emissions Trading Scheme (EUETS), as mandated by Directive 2003/87/EC, is a cap and trade system, which was introduced in January 2005 and requires Member States to develop a NAP for the first period of emissions trading up to 2008 covering power and heat generation, mineral oil refineries and coke ovens, production and processing of ferrous metals, production of cement clinker and porcelain smelters and production of pulp, paper and board (EEA, 2005a, p30; ICF and Byrne O'Cleirigh, 2006, p13).

A total of 67Mt of greenhouse gases were allocated to emissions trading in Ireland for the pilot phase under the NAP with allocations at installation level being issued annually on the basis of average historic emissions in 2002 and 2003 except where this is less than 90% of average 2000-2003 emissions (EPA, 2004, p5).The total quantity of allowances to be allocated to the trading sector in the period 2005-2007 is 22.32Mt per annum with 0.75% of these allowances being auctioned initially (EPA, 2004, p8). The total national greenhouse gas emissions in the period 2005-2007 are projected to be 68.71Mt per annum with existing measures and the allocation, therefore, represents 32.7% of projected national emissions over the period, with fines of €100 per tonne for companies exceeding their allocation (EPA, 2004, p8).

While regulation and market-based instruments have an important place in the environmental management of industry, complementary action can be taken voluntarily by industry to minimise its environmental impact and increase its efficiency. Thus, industry can also benefit from "first mover" advantage, building new opportunities in eco-industry and anticipating consumer environmental concerns, so as to lead rather than respond to competitive trends (DoELG, 1997, p91).

Progressive voluntary policies by business and industry can reduce the need for rigorous regulation and include participation in environmental management, eco-auditing and other voluntary schemes, green procurement and purchasing, environmental criteria for equipment and vehicles and waste prevention and energy saving (DoELG, 1997, p94). Advantages of voluntary agreements are that they are cost-effective, flexible, directly involve industry sectors rather than impose targets as a legal requirement, stimulate innovation, reduce compliance costs and reduce burdens on public authorities by self-monitoring. The main disadvantage is lack of credibility (ERM *et al.,* 1998, p84).

Examples of existing voluntary action in Ireland and extended producer responsibility (EPR) initiatives resulting from legislation include the 1997 REPAK initiative, which aims to help member companies meet their packaging waste management obligations, and the Irish Farms Films Producers Group, launched in 1997, which promotes the collection of farm plastic films and set a recovery rate of 50% due to rise to 55% by 2008 and to 60% thereafter (DoELG, 1997, p8, 95; 2002a p61; Forfás, 2006, p25).

The EU Eco-label scheme is part of a wider approach on Integrated Product Policy (IPP) and aims to stimulate the production of goods with the least impact on the environment. It includes individual product groups such as cleaning products, detergents, paints, appliances (dishwashers, personal computers, refrigerators, televisions, vacuum cleaners and washing machines), paper products, mattresses, furniture, clothing and textile products. Ecological criteria for each product are defined on the basis of life cycle considerations (LCC) taken from a "cradle to grave" view of the environmental impacts of a product group.

There is a small but growing demand for environmentally-superior products in the Irish market place but it is still a niche market and demand for environmental labelling is driven mainly by health concerns and food safety (Drury, 2003, pp18-19). Direct benefits of eco-labelling are that it reduces electricity consumption, air pollutants, GHG emissions, water use and effluents and production of hazardous substances. Indirect benefits include the use of Ecolabel criteria in public and private procurement calls for tender, use of criteria by companies as a benchmark for their own products or to improve their environmental performance and raising of stakeholder awareness (AEAT, 2004, ppiv-v).

The 2001 *Green Paper on Integrated Product Policy* (IPP) (COM (2001) 68) aims to stimulate consumer demand for greener products through eco-labelling, encourage business leadership in the supply of green products through the dissemination of life cycle information, devise eco-design guidelines and introduce price mechanisms such as differentiated taxation. Drivers for IPP include (Ernst and Young, 2000, p8):

1. Unsustainable patterns of production and consumption,
2. The need for more holistic impact assessment and greener supply chain management,

3. Strong consumer concerns and buying influence and
4. The need to decouple economic growth from resource use and promote resource efficiency.

IPP attempts to shift the locus away from what is necessary towards the question of what is possible and promotes self-regulation, policy integration, stakeholder involvement, extended producer responsibility, openness and transparency, polluter pays principle, life cycle or 'cradle to grave' perspective and innovation (CEC, 2003b, p5). It is a proactive approach to environmental policy, which has traditionally been *de facto* reactive, and emphasises the difference between environmental leaders and laggards, which has been obfuscated by minimum compliance with technologically specific criteria such as Best Available Technology (BAT) and framework objectives, for example the Kyoto Protocol.

The main objectives of IPP are to provide incentives for leadership firms to profit from being good performers, the dissemination of best practice, policy integration and 'joined up' thinking and its concomitant use with IPPC and EMAS. EMAS has been available for participation by the industrial sector since 1995 (Council Regulation No. 1836/93) and public and private sectors since 2001 (Council Regulation No. 761/2001) and is now promoted as the environmental management system required by ISO14001.

Benefits of EMAS include reduced input costs, risk minimisation, efficiency improvements, increased competitiveness, improved ability to comply with environmental legislation, employee morale and customer confidence. Costs include external costs and registration fees and internal costs for implementation and system maintenance. Firms and SMEs in Ireland can register for EMAS through the National Accreditation Board (NAB) and, as of July 2006, Ireland had 8 EMAS-registered organisations. Options to increase participation in EMAS that have been purported include fiscal and market-related institutional measures, better promotion and marketing of the scheme, embedding EMAS within other legislation, upgrading it to an internationally recognised scheme and making it mandatory.

Encouraging product innovation and environmentally-superior production can be a powerful means of achieving environmental performance improvement compared with the process and abatement changes typical of process-based regulation and provides opportunities for going beyond the optimisation of existing product systems (Ernst and Young, 2000, p25).

Sustainable production has been promulgated by the World Business Council for Sustainable Development (WBCSD) and considers emissions and environmental impact over the full life-cycle of a product. It is guided by the principle of extended producer responsibility (EPR), which places a responsibility on the producers of goods to prevent and minimise waste from production activities (DoELG, 1997, p92). Despite the plethora of current policy instruments that are available to policy-makers, there is scope for new policy instruments to provide incentives to promote more sustainable consumption of resources (ICSTI, 2004, p19), such as voluntary reporting of dematerialisation and decoupling, improving eco-efficiency, greening of supply chains and reduction of product or service footprints.

Eco-efficiency is an important element of sustainable production and is achieved by the (DoELG, 1997, p93; Verfaillie and Bidwell, 2000, p7):

> *"Delivery of competitively priced goods and services that satisfy human needs and bring quality of life while progressively reducing ecological impacts and resource intensity, through the life cycle, to a level in line with the Earth's carrying capacity"*

Eco-efficiency involves achieving more economic output from lower material and energy inputs and is measured by product or service value as a function of environmental influence in product or service creation (Verfaillie and Bidwell, 2000, p8). Indicators of eco-efficiency include direct material input (DMI), total material requirement (TMR) and material input per *s*ervice unit (MIPS) and these may be used to empirically measure progress towards absolute or relative dematerialisation (Cleveland and Ruth, 1999, p25).

Direct Material Input (DMI) comprises all materials, which have economic value and are directly used in production and consumption activities, and is the sum of domestic extraction (excavated raw material and harvested biomass) plus imports. Total Material Requirement (TMR) includes domestic used and unused extractions as well as imports and their indirect flows, that is quantities of ancillary and excavated or disturbed raw materials, which are translocated by the process of extraction, but not actually used in the production of goods and services and which do not directly enter the economic system.

The MIPS indicator is a measure of mass per total units of service delivered by a good over its entire life span. It is used for monitoring progress towards sustainability as well as for designing the optimal eco-efficiency of goods and infrastructures (Hinterberger and Schmidt-Bleek, 1997, p53) and may be used with life cycle assessment (LCA) to assess the ecological 'rucksack' or hidden flows associated with production.

The Factor X concept is qualitatively similar to the concepts of dematerialisation and eco-efficiency but includes quantitative reduction goals. The Factor 4 concept, as propagated by Von Weizsacker at al. (1995), which refers to a halving of resource use and doubling of wealth, has been validated for a number of specific case-studies, including energy, material and transport productivity and is technically feasible although it seems highly unlikely that this is a pragmatic policy goal on a macro level, given the current increasing levels of resource throughput and consumption (Giljum *et al.,* 2004, p47).

Potential biophysical indicators, which may be used to measure progress towards sustainability, include environmental space, carrying capacity and ecological footprinting. The ecological footprint measures human demand on nature by assessing how much biologically productive land and sea area is necessary to maintain a given consumption pattern. This may then be compared with available biocapacity to assess ecological surplus or deficit (Wiedmann *et al.,* 2006, p29) and may be used to indicate whether the average per capita consumption is sustainable and equitable compared with the global average available biocapacity (Lewan and Simmons, 2001, p4).

The ecological footprint may be used as a corporate sustainability metric by measuring the area of land required to support a company or industry in terms of resource extraction and material consumption, assimilative capacity of wastes generated and sequestration of emissions associated with production and consumption activities and transport patterns (Barrett and Scott, 2001, p316).

An emerging framework for environmental management is industrial ecology, which offers a conceptual model of the industrial system, analogous to the circular flows of ecosystems (Lowe and Evans, 1995, p48). It promotes proximity of similar industries in the form of eco-industrial parks, which seek to increase business competitiveness by reducing waste and pollution through information exchange, brokering and by-product or waste markets (Gibbs and Deutz, 2005, p452). The principle of industrial ecosystems is that all industrial operations are natural systems that must function within the constraints of their local ecosystems and biosphere and involves taking a holistic systemic view of production and transformation (Lowe and Evans, 1995, p48).

Eco-industrial parks may evolve in harmony with cluster development, which is a geographic concentration of interconnected companies, specialised suppliers, service providers and associated institutions in a particular field that are present in a nation or region (Forfás, 2005a, p93). Cluster development is perceived as being relatively well-developed in Ireland, for example electronics and computer software in Limerick, the medical device industry in Galway and the pharmaceuticals and food processing and beverages industries in Cork as well as a number of SME networks such as Supply Network Shannon (SNS).

Another pro-active approach to environmental management is corporate social responsibility (CSR) or 'responsible entrepreneurship', which has been defined as (European Commission, 2001, p8):

> *"A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis"*

The need for good corporate governance, social responsibility and community initiatives is imperative with the current drive towards socially responsible investing (SRI). The 2005 *Social Investment Forum Report* identified that $2.29 trillion or 9.4% of total assets under management in 2005 were invested under socially responsible strategies, including social and environmental screening, shareholder advocacy and community investing, almost doubling from the 1997 figure of $1.18 trillion (SIF, 2006, p1).

At the moment there is no legislation in Ireland on corporate responsibility requiring social and environmental screening and reporting although this may be potentially imposed at the EU level. It is recommended that Irish companies and subsidiaries of multi-nationals take the initiative in adopting the Global Reporting Initiative (GRI) sustainability reporting guidelines, which assist organisations in presenting progress towards financial, environmental and social goals, promote comparability and facilitate stakeholder engagement, in order to maintain competitiveness (GRI, 2002, p8).

5. Environmental Performance 2000-2006

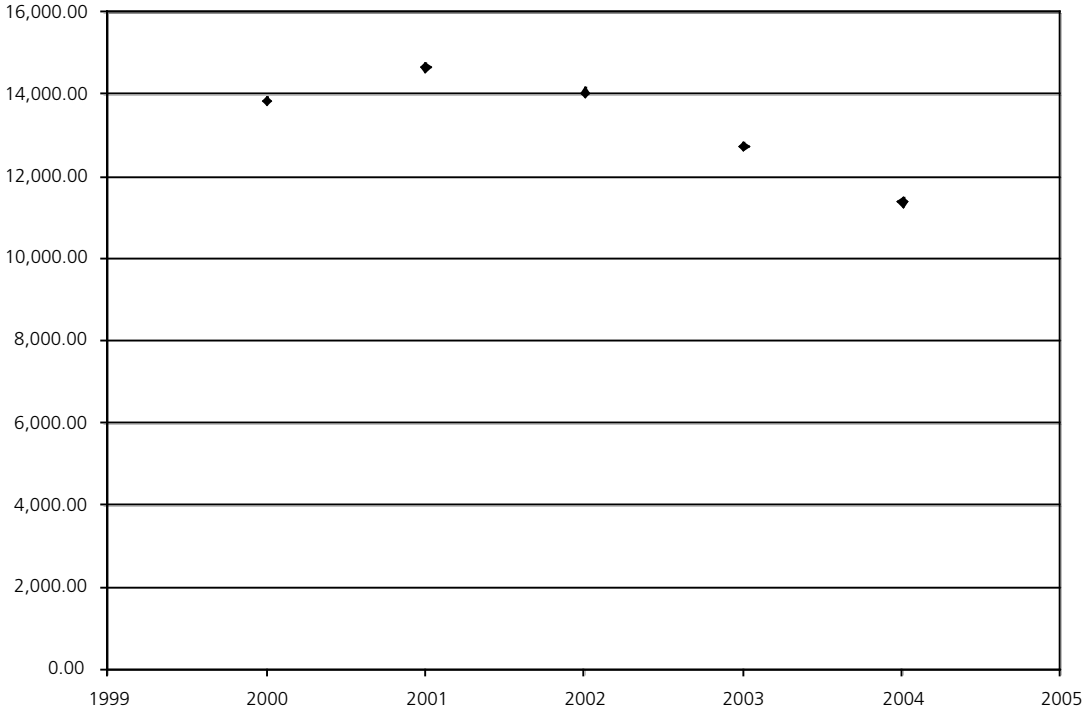
Industrial total primary energy requirement (TPER) increased by 1.2% per annum between 1990 and 2004 although its sectoral share fell from 27.2% in 1990 to 20.6% in 2004. In the period 2000-2004, however, TPER fell by 3.5% while the per annum change in 2004 was also 3.5% following a reduction of 7% in 2003 due to plant closures and continued improvement in electricity generation efficiency (Howley *et al.,* 2006, p12). This compares with an increase in Gross Value-added (GVA) from €35,504m in 2000 to €41,791m in 2004 (Appendices: Table 3), that is a 4.43% increase per annum, showing both absolute and relative decoupling of economic output and energy consumption. Industrial total final consumption (TFC) increased by 1.6% per annum between 1990 and 2004 (or 25% in absolute terms) although its sectoral share fell from 23.9% to 18.3%. In the period 2000-2004, however, it fell by 1.1% while the per annum change in 2004 was 1.5% (Howley *et al.,* 2006, pp15-16).

Electricity demand in industry fell by 3.2% between 2000 and 2004 and its share of electricity consumption fell from 38.5% in 1990 to 29.9% in 2004 (Howley *et al.,* 2006, pp21-22). Energy intensity fell by 32% between 1990 and 2004, or by 2.9% per annum, while electricity intensity fell by 18% in the same period and by 4.2% between 2001 and 2004 (Howley *et al.,* 2006, p16). This improvement in energy intensity is due to structural changes in the Irish economy with a shift towards lower energy-intensive, higher value-added sectors such as pharmaceuticals, electronics and services (Howley *et al.,* 2006, p17). It is anticipated that industry will experience an increase in energy demand by 49.6% between 2005 and 2020 and its share of total energy demand will fall from 18.3% in 2004 to 17.4% in 2020 (Howley *et al.,* 2006, p24).

Total industrial GHG emissions fell from 13,849,300 tonnes CO_2-equivalents in 2000 to 11,384,000 tonnes CO_2-equivalents in 2004, that is a 17.8% reduction or 4.45% reduction per annum (Appendices: Table 4; Figure 1). Industrial CO_2 emissions fell by 4.9% between 2000 and 2004 while emissions from electricity fell by 8.3% in the same period (Howley *et al.,* 2006, p50). Policy measures outlined in the 2000 NCCS included reduction of industrial gases and process substitution for cement by 0.5Mt CO_2-equivalent per annum. In the 2000-2002 period 61% of the required reduction was achieved. Cement production increased, however, from 1,700.9 kilotonnes CO_2-equivalent in 2000 to 2,290 kilotonnes CO_2-equivalent in 2004 (McGettigan, 2006, p40).

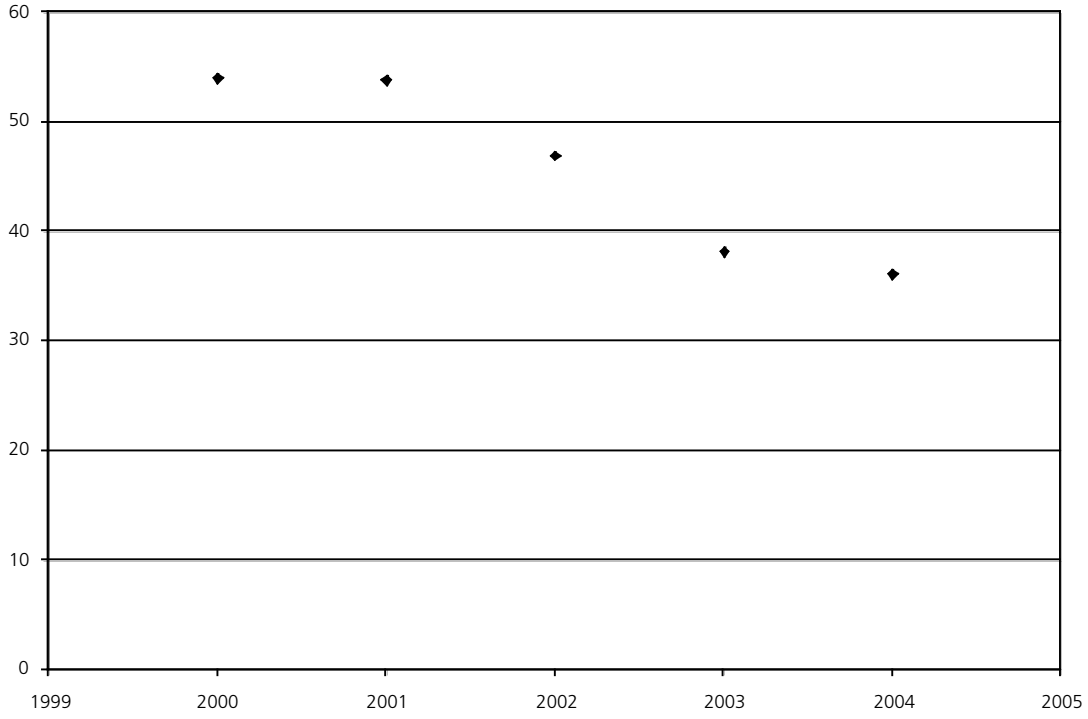
The biggest reductions were in chemicals and man-made fibres (67.3%), rubber and plastic products (40%), machinery and equipment (33.3%), transport equipment (26.4%) and textiles, textile products and leather (24.2%). The largest increase was in other non-metallic mineral products (30%). Thus, there was both absolute decoupling of industrial greenhouse gas emissions in the period 2000-2004 and relative decoupling compared with GDP output and GVA.

Figure 1: Industrial Greenhouse Gas Emissions ('000 tonne CO_2-Equivalents)



Total industrial acid rain precursor emissions, including sulphur dioxide, nitrogen oxides and ammonia fell from 54,000 SO_2-equivalents in 2000 to 36,100 SO_2-equivalents in 2004, that is a decrease of 33% (Appendices: Table 5; Figure 2), with all sectors showing a decrease except for mining and quarrying (NACE 10-14).

Figure 2: Industrial Acid Rain Precursor Emissions ('000 tonne SO_2-equivalents)



Projected industrial waste increased from 5,113,468 tonnes in 1998 to 5,300,957 tonnes in 2004 or a 3.67% increase (Appendices: Table 6). The largest increases were in manufacturing not elsewhere specified (NES) (95.9%), basic metals and fabricated manufactured products (89.6%), optical and electrical equipment (45.7%) and pulp and paper products (31.26%) (Appendices: Table 6). The largest reductions were in leather (85.5%), other non-metallic mineral products (51.64%) and textiles and textiles products (50%) (Appendices: Table 6). Manufacturing waste per employee in Ireland was estimated to be 23.8 tonnes per employee, which places Ireland 3rd with regards to other benchmarked countries (Forfás, 2006, p10).

Projected hazardous industrial waste increased from 237,061 tonnes in 1998 to 256,714 tonnes in 2004, that is an increase of 8.3% or 1.4% per annum (Appendices: Table 7). The overall recovery rate of industrial waste increased from 51.4% in 1998 to 53.3% in 2004, that is by 0.32% per annum (Appendices: Table 8). The highest recovery rates in 2004 were wood and wood products (98.18%), food products, beverages and tobacco (87.1%) and basic metals and fabricated manufactured products (82.34%) (Table 7). Thus, although total industrial waste has increased slightly from 1998 to 2004, there has been a relative decoupling compared with GDP.

Ireland has the highest reported packaging waste generation per capita in the EU-15. In 2001, a total of 214kg per capita were generated in Ireland, compared with the EU average of 172kg per capita. However, differences in estimation may lead to over-estimation and incomparability of results (EEA, 2005b, p45). In 1998, the national recovery rate of packaging waste was estimated to be 14.8% (Crowe *et al.,* 2000, p87), increasing to 25.3% in 2001 (Meaney *et al.,* 2003, p42), which meant the interim target figure, as mandated by Directive 94/62/EC, was achieved. However, it was still somewhat short of the EU-15 average recovery rate in 2001 of 60% (EEA, 2005b, p45).

The recovery rates in 2002 and 2003 were 33% and 41.7%, respectively. In 2004, 56.4% of packaging waste was recovered, exceeding the 2005 target of 50%. Thus, packaging waste recovery has increased by 7% per annum between 1998 and 2004. Although local differences exist, which could influence company decisions, the number of 'free riders' has reduced by 30% between 2001 and 2004, while the number of self-compliers has increased by a factor of 7 in the same period, i.e. from 17 in 2001 to 121 in 2004 (EEA, 2005b, p40, 43).

The objective of Directive 94/62/EC and its amending Directive 2004/12/EC was to promote packaging prevention and source reduction while minimising weight and volume to the amount necessary for functional purposes under the Essential Requirements of the Directive (Perchards, 2004, p10). Table 9 shows that, although total packaging waste in Ireland increased from 682,688 tonnes in 1998 to 872,917 tonnes in 2001, it has reduced to 850,911 tonnes in 2004 (Appendices: Table 9). In 2004, the specific material recovery targets set out in Directive 2004/12/EC were met only for wood and ferrous metals (Appendices: Table 10).

6. Environmental Policy and Irish Industrial Competitiveness

The introduction of environmental policies in industrial economies has been hindered by concerns that their impact on industrial output and on the competitiveness of firms is negative, where competitiveness may be defined as (OECD, 1992, p237):

> *"the degree to which a country can, under free and fair market conditions, produce goods and services, which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its people over the longer term."*

Reasons for lack of acceptability for environmental policy include (Convery, 2001, pp5-16; EEA, 2006, p8, 16):

1. The perceived lack of need for tax reform, that is current fiscal policy favours labour productivity over resource productivity,
2. The perception that taxes need to be high to be effective,
3. Concerns about inequitable burdens on lower-income groups, that is the 'regressive effect' on income distribution,
4. Concerns about impacts on competitiveness,
5. Compliance costs redirect firms' resources away from other profitable opportunities, which can potentially lead to a rise in costs and prices and
6. The degree of structural dependency, for example with carbon taxes and fossil fuels.

Environmental policy can have an impact on competitiveness if it imposes costs on some firms that are not imposed on their competitors, particularly on the global market (OECD, 1993; Goodbody, 2001a, p22). However, across manufacturing industries, environmental compliance costs amount to less than 1% of the value of gross output and the cost of complying with regulation is only a fraction of the total firm costs and sufficiently small enough to be overridden by differences in labour costs, exchange rate variations and other factors (OECD, 1993).

Indeed, it is argued that environmental policies can encourage long-term economic growth, innovation and competitiveness in win-win scenarios (Goodbody, 2001a, p19). Porter (1990) argues that environmental policy may be good for competitiveness because the costs of complying with policies may be more than offset by innovations, which may produce competitive benefits in themselves and/or allow firms to gain a first mover advantage in the growing green products or technologies markets. He also argues that innovation is stimulated because environmental policies highlight resource inefficiencies in firms, as they become more informed about the discharges throughout their production process (Goodbody, 2001, p23).

The Porter hypothesis of competitive advantage for environmental policy argues that (Porter, 1990, pp647-649):

> *"stringent standards for product performance, product safety, and environmental impact contribute to creating and upgrading competitive advantage as they pressure firms to upgrade quality, upgrade technology and provide features in areas of important customer (and social) concern, giving a nation's firms a head start in developing products and services that will be valued elsewhere."*

Although a 'pollution haven hypothesis' has been propagated, which argues that stringent environmental policy may result in competitively-vulnerable industries moving production abroad (Leonard 1988, Repetto 1995), studies into 'industrial flight' due to stringent environmental policies have largely been inconclusive and have failed to find a significant relation between environmental regulations and trade performance. Indeed, there are often conflicting explanations for changes in trade patterns and it is difficult to conclude that the migration of 'dirty industries' is due to environmental policy (Leonard 1988).

The 2000 Report *The Competitiveness and Environmental Impact of Energy Taxation on Irish Industry* examined the effect of a number of energy taxes on competitively-vulnerable sectors, which have energy cost to output ratios in excess of 2% and it was found that, even with tax revenues being fully recycled to industry in the form of a wage and salary subsidy, these sectors, which include production and distribution of electricity and manufacture of cement, lime and plaster, basic precious and non-ferrous metals, bricks, tiles and iron and steel, would still suffer significant net losses and the overall impact on GHG emissions would be insignificant (Farrell Grant Sparks, 2000; Boyle, 2000; Bergin *et al.,* 2001).

Direct impacts of the EU ETS on industry result from the costs of operating within an overall GHG emissions constraint and are incurred by industry as they either invest in abatement options or purchase allowances to meet the imposed emissions target. Indirect impacts result from the increase in the costs of goods produced by the sectors included in the Scheme as they pass the costs of compliance onto customers as well as a possible loss of competitiveness for inward investment in high-tech sectors compared with developed but lower cost-economies competing for mobile investment in pharmaceutical, healthcare and ICT sectors (ICF and Byrne O'Cleirigh, 2004, p74). It is concluded that alumina, food and drink, semiconductors and p*aper se*ctors would be most affected by competition under the EU ETS as these sectors operate in highly competitive, export-oriented commodity markets, where marginal increases in energy prices would likely affect their production-cost landscape (ICF and Byrne O'Cleirigh, 2006, p74).

The costs of waste disposal vary considerably in Ireland and it is estimated that cumulative increases between 2000 and 2004 varied from 9% in Kildare to 380% in Cork, which has serious implications for business competitiveness and for the attraction of FDI and companies' choice of location. In addition, the 2004 IBEC business costs survey found that waste collection/treatment ranked third in terms of business priorities, highlighting the fact that sufficient investment in waste management infrastructure is of paramount importance (Forfás, 2006, p6).

7. Conclusions

Ireland has achieved remarkable economic growth in the last 10 years to position itself as a dynamic, innovative player in the global economy and this growth is expected to continue in the short to medium term with the expansion of the services and financial sector, increased personal consumption and investment in property and general infrastructure. As a result of inevitable structural transformations inherent in economic development, Ireland has moved from an agricultural economy and pastoral cultural landscape to a post-industrial knowledge economy (Kennelly and Bradley, 2005, p91) and continues to steer its economic base away from high labour-input industries towards higher value-added lower energy-intensive industries such as electronics, ICT, pharmaceuticals and chemicals aimed for export on global markets (Goodbody, 2001b, p9).

However, despite this economic growth and the social partnership approach, inequality and disparity remain entrenched in a polarised Irish society, resulting in the Galbraithian classification of a 'contented majority and a 'functional underclass' (Allen, 2000, pp39-40). Quality of life has not improved for all sectors of society, although it is hoped that continued economic growth will function as a 'rising tide, which lifts all boats' to paraphrase that oft-quoted aphorism. It may also be argued that economic growth in Ireland has had a negative impact on the natural environment (Kennelly and Bradley, 2005, p92). Indeed, it is possible that following the current business as usual (BAU) trajectory will lead to "significant economic crises and social tensions as well as serious impairment to environmental endowments and life support systems" (ICSTI, 2004, p9).

Environmental protection, economic growth and industrial competitiveness are mutual complementary goals as a healthy environment is paramount to maintaining the competitiveness of Ireland's food, agriculture and tourism industries, whilst also maintaining the viability of knowledge-based service industries (ICSTI, 2004, p16) and, therefore, a paradigm shift towards natural capitalism and industrial metabolism is requisite, where industry is encouraged to increase metabolic efficiency, increase recycling and reduce throughput in a more circular flow epistemological model.

In terms of eco-efficiency, Irish industry has succeeded in achieving absolute decoupling in the case of greenhouse gas emissions and relative decoupling in the case of projected industrial waste as well as maintaining progress towards commercial and packaging waste targets. However, it is imperative that Irish business steers the transition from reactive, ex-post environmental management and compliance with regulation transposed from EU legislation and moves towards innovative, preemptive practices. Although no one policy instrument may be used as a panacea, the optimal policy mix will consist of a mix of command and control, market-based instruments, voluntary agreements and behavioural change.

However, the argument that industry is sustainable is contestable and value-laden. Although process-oriented production in Ireland is arguably becoming more sustainable and decoupling is being achieved, this is based on the concept of territorial or geographical responsibility rather than consumer responsibility.

If one adopts the approach of producer or consumer responsibility through input-output analysis, embodied energy, material input per service unit (MIPS), life cycle assessment (LCA) and ecological footprinting rather than accounting for territorial responsibility, it may be argued that consumption is becoming increasingly unsustainable due to increasing levels of material imports, which increases the global environmental burden through increasing freight transportation, intensive agriculture and relocation of heavy manufacturing industries to developing countries with less stringent environmental standards.

In terms of Irish performance, however, industry and enterprise are in a position to become more sustainable by participating in eco-industrial networks, voluntary corporate sustainability reporting (CSR) and initiatives such as Business in the Community Ireland, the 2004 STEM (Sustainable Together through Environmental Management) Project, the Sustainable Energy Ireland (SEI) Large Industry Energy Network and Energy Agreements Programmes, the EPA Cleaner Greener Production Programme (CGPP) and Environmental Technologies Programme and Enterprise Ireland's Ei4 Business Initiative as well as adhering to the new Irish Energy Management Standard IS 393 and the proposed British standard on sustainability management BS 8900, which links formal standards such as ISO14000 and private standards such as the GRI and AA1000.

Finally, it is hoped that the proposed NDP for 2007-2013 will facilitate sustainable industrial development through balanced regional development, north-south collaboration and forward planning in infrastructural provision in order to maintain international competitiveness (IBEC, 2006, pp3-4). It is argued that capital infrastructural investment will accrue benefits for existing firms through transport cost reduction, improve environment for new business development and induce labour market benefits through reducing commuting times, increasing labour productivity and improving participation by enabling remote working as a result of full broadband roll-out (IBEC, 2006, p6).

Measures recommended for the NDP that are particularly relevant for industry include (IBEC, 2006, pp. 14-20):

1. Infrastructural development for the energy sector in order to improve competitiveness of energy costs, including capital investment in the electricity grid, gas network, East-West interconnection and R&D in renewable energy resources,
2. Infrastructural development and investment of €1 billion in the waste sector, including privatisation of waste management, regional waste management plans, integrated facilities and grant aid for waste management infrastructure for all market players and
3. Investment in R&D of 2.5% of GNP by 2013 in science, technology and innovation.

References

1. AEAT, 2004. The *Direct and Indirect Benefits of the European Ecolabel* – Final Report, DG Environment
2. Allen, K., 2000. *The Celtic Tiger: The Myth of Social Partnership in Ireland*, Manchester University Press
3. Barker & Kohler, 1996. *Environmental Policy and Competitiveness*, Environmental Policy Research Briefs, No. 6
4. Barrett, J., Scott, A., 2001. The Ecological Footprint: A Metric for Corporate Sustainability. In: *Corporate Environmental Strategy*, Volume 8, No.4
5. Barrett, A., Kearney, I., McCarthy, Y., 2006. *Quarterly Economic Commentary: Summer 2006*, Economic and Social Research Institute (ESRI)
6. Bergin, A., FitzGerald, J., Kearney, I., 2001. *The Macro-economic Effects of Using Fiscal Instruments to Reduce Greenhouse Gas Emissions*, Environmental Protection Agency (EPA)
7. Boyle, G., 2000. *The Competitiveness and Environmental Impact of Energy Taxation on Irish Industry*, Irish Business and Employers Confederation (IBEC)
8. Central Statistics Office (CSO), 2003. *Central of Industrial Production 2001*, CSO
9. Central Statistics Office (CSO). 2004. *Census of Industrial Production 2002*, CSO
10. Central Statistics Office (CSO), 2005. *Census of Industrial Production 2004*, CSO
11. Central Statistics Office (CSO), 2006a. *External Trade: April 2006*, CSO
12. Central Statistics Office (CSO), 2006b. *Industrial Production and Turnover: April 2006*, CSO
13. Central Statistics Office (CSO), 2006c. *Industrial Disputes: Quarter 1 2006*, CSO
14. Central Statistics Office (CSO), 2006d. *Environmental Accounts for Ireland 1997-2004*, CSO
15. Cleveland, C.J., Ruth, M., 1999. Indicators of Dematerialisation and the Materials Intensity of Use. In: *Journal of Industrial Ecology*, Volume 2, No. 3
16. Clinch, J.P., 2001. *Reconciling Rapid Economic Growth and Environmental Sustainability in Ireland*, Environmental Studies Research Series Working Papers, University College Dublin (UCD)
17. Clinch, J.P., Gooch, M., 2001. *An Inquiry into the Use of Economic Instruments in Environmental Policy*, Environmental Studies Research Series Working Papers, University College Dublin (UCD)
18. Collins, C., Le Bolloch, O., Meaney, B., 2005. *National Waste Report 2004*, Environmental Protection Agency (EPA)
19. Commission of the European Communities (CEC), 2003a. *Towards a Thematic Strategy on the Sustainable Use of Natural Resources*, Brussels, COM (2003) 572
20. Commission of the European Communities (CEC), 2003b. *Communication on Integrated Product Policy: Building on Environmental Life Cycle Thinking*, Brussels, COM (2003) 302
21. Commission of the European Communities (CEC), 2005. *On the Review of the Sustainable Development Strategy – A Platform for Action*, Brussels, COM (2005) 68

22. Convery, F.J., 1998. *The Types and Roles of Market Mechanisms in Environmental Regulation*, Paper Presented at the Conference Board Europe Brussels Forum, Brussels, January
23. Convery, F.J., 2001. *Acceptability and Implementation Problems for Environmental Policy, Environmental Studies Research Series Working Papers*, University College Dublin (UCD)
24. Council of the European Union (CEU), 2005. *European Council Presidency Conclusions*, Brussels
25. Council of the European Union (CEU), 2006. *Review of the EU Sustainable Development Strategy* (SDS), Brussels
26. Crowe, M., Fanning, A., Nolan, K., Carty, G., Howley, D., 2000. *National Waste Database Report 1998*, Environmental Protection Agency (EPA)
27. Daly, H., Cobb, J., 1989. *For the Common Good*, Beacon Press, Boston
28. Department of the Environment and Local Government (DoELG), 1997. *Sustainable Development – A Strategy for Ireland*, Government Publications
29. Department of the Environment and Local Government (DoELG), 1999. *Ireland National Development Plan 2000-2006*, Government Publications
30. Department of the Environment and Local Government (DoELG), 2000. *National Climate Change Strategy (NCCS)*, Government Publications
31. Department of the Environment and Local Government (DoELG), 2002a. *Making Ireland's Development Sustainable: Review, Assessment and Future Action*, Government Publications
32. Department of the Environment and Local Government (DoELG), 2002b. *National Spatial Strategy for Ireland 2002-2020: People, Places and Potential*, Government Publications
33. Department of the Environment and Local Government (DoELG), 2004. *Waste Management: Taking Stock and Moving Forward*, Government Publications
34. Department of the Environment and Local Government (DoELG), 2006a. *Ireland's Pathway to Kyoto Compliance: Review of the National Climate Change Strategy*, Government Publications
35. Department of the Environment and Local Government (DoELG), 2006b. *Ireland's National Roadmap for the Implementation of the Environmental Technologies Action Plan (ETAP)*, Government Publications
36. Department of the Taoiseach, 2000. *Programme for Prosperity and Fairness*, Government Publications
37. Department of the Taoiseach, 2006. *Towards 2016: Ten-year Framework Social Partnership Agreement 2006-2015*, Government Publications
38. Drury Communications, 2003. Final *Report on Promotion of the EU Eco-label in Ireland*, Certification Europe Ltd.
39. Enterprise Ireland, 2005. *Economic Profile Ireland 2005*
40. Ernst & Young, 2000. *Developing the Foundation for Integrated Product Policy in the EU*, DG Environment
41. ERM, Byrne O'Cleirigh, ESRI, 1998. *Limitation and Reduction of CO_2 and Other Greenhouse Gas Emissions in Ireland*, Department of Public Enterprise

42. Environmental Resources Management (ERM) Ltd., 2005. *An Impact Assessment of the Proposed EU Chemical Policy (REACH) on Irish Industry – Final Report*, Forfás
43. Environmental Protection Agency (EPA), 2004. *Ireland's Draft National Allocation Plan 2005-2007: Public Consultation*, EPA
44. Environmental Protection Agency (EPA), 2005. *Report on the Implementation of Directive 1999/13/EC on the Limitation of Emissions of Volatile Organic Compounds due to the Use of Organic Solvents in Certain Activities and Installations in Ireland*, EPA
45. European Commission, 2001. *Promoting a European Framework for Corporate Social Responsibility: A Green Paper*, Directorate-General for Employment and Social Affairs
46. European Environment Agency (EEA), 2005a. *Market-based Instruments for Environmental Policy in Europe*, EEA, Copenhagen
47. European Environment Agency (EEA), 2005b. *Effectiveness of Packaging Waste Management Systems in Selected Countries: An EEA Pilot Study*, EEA Report No. 3
48. European Environment Agency (EEA), 2005c. *Using the Market for Cost-effective Environmental Policy*, EEA, Copenhagen
49. Farrell Grant Sparks, 2000. *The Competitiveness and Environmental Impact of Energy Taxation on Irish Industry*, Irish Business and Employers Confederation (IBEC)
50. Fitzgerald, J., Kearney, I., Morgenroth, E., 1999. *National Investment Priorities for the Period 2000-2006*, Economic and Social Research Institute (ESRI)
51. Forfás, 2000. *Annual Competitiveness Report 2000*, National Competitiveness Council
52. Forfás, 2005a. *Annual Competitiveness Report 2005*, National Competitiveness Council
53. Forfás, 2005b. *Research and Development in Ireland, 2005*, National Competitiveness Council
54. Forfás, 2006. *Waste Management Benchmarking Study – A Baseline Assessment*, National Competitiveness Council
55. Gibbs, D., Deutz, P., 2005. Implementing Industrial Ecology? Planning for Eco-industrial Parks in the USA. In: *Geoforum*, Volume 36
56. Giljum, S., Hammer, M., Hinterberger, F., 2004. *Resource Use Scenarios for Europe in 2020*, Sustainable Europe Research Institute (SERI)
57. Global Reporting Initiative (GRI), 2002. *Sustainability Reporting Guidelines*, GRI
58. Goodbody, 2001a. *Sustainability of Development – A Discussion Paper*, Prepared for the National Competitiveness Council
59. Goodbody, 2001b, *Review of the National Anti-Poverty Strategy*, Department of the Taoiseach
60. Healy, J., 2001. *Energy in Ireland: Economics and Policy Issues*, Environmental Studies Research Series Working Papers, University College Dublin (UCD)
61. Hinterberger, F., Schmidt-Bleek, F., 1999. Dematerialisation, MIPS and Factor 10: Physical Sustainability Indicators as a Social Device. In: *Ecological Economics*, Volume 29
62. Howley, M., O'Leary, F., O'Gallachoir, B., 2006. *Energy in Ireland 1990-2004: Trends, Issues, Forecasts and Indicators*, Sustainable Energy Ireland (SEI) Publications

63. ICF, Byrne O'Cleirigh, 2006. *Determining the Share of National Greenhouse Gas Emissions for Emissions Trading in Ireland in the Period 2008-2012*, Department of the Environment and Local Government (DoELG)
64. Indecon, 2002. *Competitiveness of the Enterprise Sector and the Use of Taxation and Negotiated Agreements for Reducing Greenhouse Gas Emissions in Ireland*, Forfás
65. Industrial Development Authority (IDA), 2005. *Annual Report 2005*, IDA Ireland
66. Industrial Development Authority (IDA), 2006. *Ireland Vital Statistics*, IDA Ireland
67. Irish Business and Employers Confederation (IBEC), 2006. *National Development Plan 2007-2013: A New Approach to Balanced Regional Development*, IBEC Submission to Department of Finance
68. Irish Council for Science, Technology and Innovation (ICSTI), 2004. *Sustainable Development in Ireland: The Role of Science and Technology*, Forfás
69. Kennelly, J.J., Bradley, F., 2005. Ireland in the New Century: An Opportunity to Foster an Ethic of Sustainable Enterprise. In: *Sustainable Development*, Volume 13
70. KPMG, 2005. *REACH – Further Work on Impact Assessment: Executive Summary*, KPMG Business Advisory Services
71. Lane, P.R., 2004. *Assessing Ireland's Price and Wage Competitiveness*, Institute for International Integration Studies (IIIS)
72. Lane, P.R., Ruane, F., 2006. *Globalisation and the Irish Economy*, Institute for International Integration Studies (IIIS) Occasional Paper No. 01
73. Lehane, M. (ed.), 1999. *Environment in Focus: A Discussion Document on Key National Environmental Indicators*, Environmental Protection Agency (EPA), Wexford
74. Lewan, L., Simmons, C., 2001. *The Use of Ecological Footprint and Biocapacity Analyses as Sustainability Indicators for Sub-national Geographical Areas: A Recommended Way Forward*, Final Report from Oslo Workshop, August 2001
75. Leonard, H.J., 1988. *Pollution and the Struggle for the World Product: Multi-national Corporations, Environment and International Comparative Advantage*, Cambridge University Press, Cambridge
76. Lowe, E.A., Evans, L.K., 1995. Industrial Ecology and Industrial Ecosystems. In: *Journal of Cleaner Production*, Volume 3, No. 1-2
77. McGettigan, M., Duffy, P., Connolly, N., O'Brien, P., 2006. *Ireland National Inventory Report 2006*, Environmental Protection Agency (EPA)
78. Meaney, B., Collins, C., Nolan, K., Cahill, E., Delaney, J., Murray, B., Healy, J., Carty, G., 2003. *National Waste Database Report 2001*, Environmental Protection Agency (EPA)
79. National Economic and Social Council (NESC), 1999. *Opportunities, Challenges and Capacities for Choice*, Government Publications
80. National Economic and Social Council (NESC), 2002. *Benchmarking the Programme for Prosperity and Fairness*, Government Publications
81. National Economic and Social Council (NESC), 2005. *NESC Strategy 2006: People, Productivity and Purpose*, Government Publications

82. National Economic and Social Forum (NESF), 2006. *Creating a More Inclusive Labour Market*, National Economic and Social Development Office (NESDO): Report 33
83. O'Donnell, R., 2001. *The Future of Social Partnership in Ireland: A Discussion Paper*, National Competitiveness Council
84. Official Journal of the European Union (OJEU), 2004. *Directive 2004/12/EC of the European Parliament amending Directive 94/62/EC on Packaging and Packaging Waste*
85. O'Hearn, D., 2000. Globalisation, 'New Tigers' and the End of the Developmental State? The Case of the Celtic Tiger. In: *Politics and Society*, Volume 28, Issue 1
86. O'Malley, E., McCarthy, Y., 2006. *New Drivers of Growth? Sectoral Contributions to the Irish Economy*, Economic and Social Research Institute (ESRI)
87. Organisation for Economic Co-operation and Development (OECD), 1992. *Technology and the Economy: The Key Relationships*, OECD Publications, Paris
88. Organisation for Economic Co-operation and Development (OECD), 1993. *Environmental Policies and Industrial Competitiveness*, OECD Publications, Paris
89. Pedersen, F., Samoe-Petersen, L., Gustavson, K., Hoglund, L., Koundouri, P., Pearce, D., 2005. *The Impact of REACH on the Environment and Human Health*, Report to DG Environment
90. Perchards, 2004. *Study on the Progress of the Implementation and Impact of Directive 94/62/EC on the Functioning of the Internal Market: Interim Report*
91. Porter, M., 1990. *The Competitive Advantage of Nations*, Free Press, MacMillan London
92. Repetto, R., 1995. Jobs, *Competitiveness and Environmental Regulation: What are the Real Issues?* World Resources Institute (WRI), Washington DC
93. Schettkat, R., Yocarini, L., 2003. *The Shift to Services: A Review of the Literature*, IZA Discussion Paper No. 964
94. Schumpeter, J.A., 1934. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*, Cambridge, Mass.: Harvard University Press
95. Social Investment Forum (SIF), 2006. *Report on Socially Responsible Investing Trends in the United States: 10-year Review*, SIF Industry Research Programme
96. Verfaillie, H., Bidwell, R., 2000. *Measuring Eco-efficiency: A Guide to Reporting Company Performance*, World Business Council for Sustainable Development (WBCSD)
97. Von Weizsacker, E.U., Lovins, A., Lovins, H., 1995. *Factor 4 – Halving Resource Use*, Doubling Wealth, Club of Rome
98. Wiedmann, T., Minx, J., Barrett, J., Wackernagel, M., 2006. Allocating Ecological Footprints to Final Consumption Categories with Input-Output Analysis. In: *Ecological Economics*, Volume 56

Internet References:

1. http://ec.europa.eu/employment_social/employment_strategy/index_en.htm
2. http://www.rohs.gov.uk/

Appendices 1

	2000	2001	2003	2004
Mining and Quarrying (NACE 10-14)	82	86	91	96
Food Products, Beverages and Tobacco (NACE 15-16)	684	686	677	628
Textiles and Textiles Products (NACE 17-18)	302	283	273	236
Leather (NACE 19)	29	26	24	19
Wood and Wood Products (NACE 20)	288	290	307	296
Pulp and Paper Products (NACE 21-22)	609	619	669	623
Chemicals and Man-made Fibres (NACE 24)	210	211	205	197
Rubber and Plastic Products (NACE 25)	280	270	275	280
Other Non-metallic Mineral Products (NACE 26)	279	275	307	303
Basic Metals and Fabricated Manufactured Products (NACE 27-28)	660	643	689	675
Machinery and Equipment (NACE 29)	367	355	317	307
Optical and Electrical Equipment (NACE 30-33)	451	448	419	381
Transport Equipment (NACE 34-35)	110	116	120	104
Manufacturing NES (NACE 36)	495	508	571	553
Total	**4,846**	**4,816**	**4,944**	**4,698**

Table 1: Number of Enterprises (CSO, 2003, 2-8; 2005, 2-8)

	2000	2001	2003	2004
Mining and Quarrying (NACE 10-14)	5,292	5,973	5,578	5,535
Food Products, Beverages and Tobacco (NACE 15-16)	48,981	51,295	50,176	45,845
Textiles and Textiles Products (NACE 17-18)	11,298	10,178	6,737	5,503
Leather (NACE 19)	763	712	522	404
Wood and Wood Products (NACE 20)	6,201	6,006	6,738	6,363
Pulp and Paper Products (NACE 21-22)	22,989	24,089	22,298	20,336
Chemicals and Man-made Fibres (NACE 24)	23,127	24,189	23,641	23,465
Rubber and Plastic Products (NACE 25)	10,834	9,619	9,723	9,776
Other Non-metallic Mineral Products (NACE 26)	11,062	10,816	10,631	10,640
Basic Metals and Fabricated Manufactured Products (NACE 27-28)	16,983	16,166	14,930	15,105
Machinery and Equipment (NACE 29)	14,389	14,041	12,100	11,752
Optical and Electrical Equipment (NACE 30-33)	68,032	65,493	53,132	53,845
Transport Equipment (NACE 34-35)	7,896	8,287	7,927	7,305
Manufacturing NES (NACE 36)	11,150	11,056	10,255	10,095
Total	**258,997**	**257,920**	**234,388**	**225,969**

Table 2: Persons Engaged (CSO, 2003, pp2-8; 2005, pp2-8)

	2000	2001	2003	2004
Mining and Quarrying (NACE 10-14)	439	501	463	565
Food Products, Beverages and Tobacco (NACE 15-16)	5,944	6,890	9,111	8,264
Textiles and Textiles Products (NACE 17-18)	338	324	232	260
Leather (NACE 19)	22	16	17	13
Wood and Wood Products (NACE 20)	246	248	334	348
Pulp and Paper Products (NACE 21-22)	3,910	4,434	4,227	5,394
Chemicals and Man-made Fibres (NACE 24)	12,337	14,042	15,988	16,813
Rubber and Plastic Products (NACE 25)	487	496	461	584
Other Non-metallic Mineral Products (NACE 26)	771	639	794	773
Basic Metals and Fabricated Manufactured Products (NACE 27-28)	751	714	670	824
Machinery and Equipment (NACE 29)	705	696	713	721
Optical and Electrical Equipment (NACE 30-33)	8,409	8,624	6,677	6,119
Transport Equipment (NACE 34-35)	436	395	420	426
Manufacturing NES (NACE 36)	709	747	485	687
Total	**35,504**	**38,766**	**40,592**	**41,791**

Table 3: Gross Value-added (€Million) (CSO, 2003, pp2-8; 2005, pp2-8)

	2000	2001	2002	2003	2004	% Change 2000-2004
Mining and Quarrying (NACE 10-14)	1,030.6	1,124.9	1,179.2	1,724	1,061.3	3
Food Products, Beverages and Tobacco (NACE 15-16)	2,641.8	2,810.2	2,948.4	2,507.9	2,138.2	-19.06
Textiles, Textiles Products and Leather (NACE 17-19)	250.5	274.7	246.6	211.0	189.9	-24.2
Wood and Wood Products (NACE 20)	279.2	286.3	266.2	234.3	229.9	-17.66
Pulp and Paper Products (NACE 21-22)	259.9	269.9	250.3	218.8	209.7	-19.3
Chemicals and Man-made Fibres (NACE 24)	3,428.3	3,260.3	2,655.6	1,286.1	1,121.3	-67.3
Rubber and Plastic Products (NACE 25)	369.2	281.3	258.4	227.3	221.4	-40
Other Non-metallic Mineral Products (NACE 26)	3,149.1	3,799.7	3,766.3	3,951.8	4,085.1	29.72
Basic Metals and Fabricated Manufactured Products (NACE 27-28)	776.3	750.2	760.3	771.3	751.9	-3.14
Machinery and Equipment (NACE 29)	196.8	204.4	187.6	167.6	131.3	-33.3
Optical and Electrical Equipment (NACE 30-33)	911.5	1,092.1	1,014.8	911.6	799.6	-12.3
Transport Equipment (NACE 34-35)	102.4	101.2	93.5	81.7	75.4	-26.4
Manufacturing NES (NACE 36)	407.2	362.3	359.8	392.2	318.9	-21.7
Total Industry	**13,849.3**	**14,666.7**	**14,048.7**	**12,735.7**	**11,384**	**-17.8**

Table 4: Industrial Greenhouse Gas Emissions ('000 tonne CO_2-equivalents) (CSO, 2006d, p25).

	2000	2001	2002	2003	2004	% Change 2000-2004
Mining and Quarrying (NACE 10-14)	5.2	4.6	4.5	4.1	5.9	13.5
Food Products, Beverages and Tobacco (NACE 15-16)	13.1	13.2	11.7	9.2	7.1	-45.8
Textiles, Textiles Products and Leather (NACE 17-19)	1.4	1.4	1.2	0.9	0.8	-42.9
Wood and Wood Products (NACE 20)	1.8	1.8	1.4	1.1	1.0	-44.4
Pulp and Paper Products (NACE 21-22)	1.7	1.6	1.3	1.0	0.9	-47%
Chemicals and Man-made Fibres (NACE 24)	8.5	8.2	6.8	5.0	4.3	-49.4
Rubber and Plastic Products (NACE 25)	2.4	1.7	1.3	1.0	0.9	-62.5
Other Non-metallic Mineral Products (NACE 26)	4.9	6.2	5.7	4.9	4.5	-8.2
Basic Metals and Fabricated Manufactured Products (NACE 27-28)	5.6	5.4	5.1	5.2	4.9	-12.5
Machinery and Equipment (NACE 29)	1.2	1.1	0.9	0.7	0.6	-50
Optical and Electrical Equipment (NACE 30-33)	5.8	6.4	5.0	3.8	3.3	-43
Transport Equipment (NACE 34-35)	0.7	0.6	0.5	0.4	0.3	-57
Manufacturing NES (NACE 36-37, 23)	1.5	1.3	1.1	0.9	0.9	-40
Total Industry	**54.0**	**53.8**	**46.9**	**38.2**	**36.1**	**-33**

Table 5: Industrial Acid Rain Precursor Emissions ('000 tonne SO_2-equivalents) (CSO, 2006d, p29).

	1998	2001	2004	% Change 1998-2004
Mining (Excluding Quarrying) (NACE 10-14)	3,511,643	3,336,485	4,045,586	15.2
Food Products, Beverages and Tobacco (NACE 15-16)	2,358,671	2,583,099	2,952,824	25.2
Textiles and Textiles Products (NACE 17-18)	116,984	27,482	58,467	-50
Leather (NACE 19)	53,813	4,100	7,800	-85.5
Wood and Wood Products (NACE 20)	288,318	307,301	259,825	-9.88
Pulp and Paper Products (NACE 21-22)	165,374	487,489	217,064	31.26
Chemicals and Man-made Fibres (NACE 24)	1,532,998	416,861	321,686	-79
Rubber and Plastic Products (NACE 25)	26,025	44,916	13,640	-47.6
Other Non-metallic Mineral Products (NACE 26)	266,612	156,657	128,936	-51.64
Basic Metals and Fabricated Manufactured Products (NACE 27-28)	119,798	1,192,003	1,149,455	89.6
Machinery and Equipment (NACE 29)	42,093	45,038	42,331	0.56
Optical and Electrical Equipment (NACE 30-33)	52,876	60,712	77,033	45.7
Transport Equipment (NACE 34-35)	34,411	17,561	20,738	-39.7
Manufacturing NES	26,204	15,653	51,158	95.9
Sub-Total Manufacturing	**5,113,468**	**5,360,939**	**5,300,957**	**3.67**

Table 6: Projected Industrial Waste (Tonnes) (Crowe *et al.,* 2000, p35; Meaney *et al.,* 2003, p24; Collins *et al.,* 2005, p38)

	1998	2001	2004
Mining (Excluding Quarrying) (NACE 10-14)	865	2,444	1,076
Food Products, Beverages and Tobacco (NACE 15-16)	2,343	2,133	922
Textiles and Textiles Products (NACE 17-18)	932	894	69
Leather (NACE 19)	23	0	994
Wood and Wood Products (NACE 20)	1,061	318	1,203
Pulp and Paper Products (NACE 21-22)	1,107	1,337	5,608
Chemicals and Man-made Fibres (NACE 24)	208,592	182,329	185,834
Rubber and Plastic Products (NACE 25)	1,051	2,054	980
Other Non-metallic Mineral Products (NACE 26)	874	1,667	13,262
Basic Metals and Fabricated Manufactured Products (NACE 27-28)	5,497	32,117	18,930
Machinery and Equipment (NACE 29)	1,975	2,098	2,498
Optical and Electrical Equipment (NACE 30-33)	4,385	11,355	21,529
Transport Equipment (NACE 34-35)	2,183	3,540	3,534
Manufacturing NES	348	324	1,351
Sub-Total Manufacturing	**237,061**	**241,359**	**256,714**

Table 7: Projected Hazardous Waste (Tonnes) (Crowe *et al.,* 2000, p35; Meaney *et al.,* 2003, p24; Collins *et al.,* 2005, p38)

	1998	2001	2004
Mining (Excluding Quarrying) (NACE 10-14)	0.4	4.4	19.3
Food Products, Beverages and Tobacco (NACE 15-16)	88.5	81.8	87.1
Textiles and Textiles Products (NACE 17-18)	17.4	56.3	42.87
Leather (NACE 19)	64.6	0.0	45.54
Wood and Wood Products (NACE 20)	90.6	95.2	98.18
Pulp and Paper Products (NACE 21-22)	73.3	93.3	54.64
Chemicals and Man-made Fibres (NACE 24)	11.9	55.4	58.28
Rubber and Plastic Products (NACE 25)	46.0	51.4	54.1
Other Non-metallic Mineral Products (NACE 26)	4.0	55.3	11.44
Basic Metals and Fabricated Manufactured Products (NACE 27-28)	77.2	1.0	82.34
Machinery and Equipment (NACE 29)	66.5	66.6	49.32
Optical and Electrical Equipment (NACE 30-33)	37.2	48.0	58.71
Transport Equipment (NACE 34-35)	18.5	36.8	67.8
Manufacturing NES	63.8	54.1	26.2
Sub-Total Manufacturing	**51.4**	**47.8**	**53.3**

Table 8: Rate of Recovery of Industrial Waste per sector (%) (Crowe *et al.,* 2000, p38; Meaney *et al.,* 2003, p27; Collins *et al.,* 2005, p41)

	1998	2001	2004
Paper and Cardboard	300,174	380,209	310,641
Glass	111,417	105,273	116,911
Plastic	168,834	206,480	211,629
Ferrous	27,472	60,843	56,620
Aluminium	11,780	14,295	12,479
Other Metals	1,879	8,623	2,446
Textiles	4,568	2,486	555
Other	56,564	46,082	28,575
Wood	-	48,626	111,054
Total	**682,688**	**872,917**	**850,911**

Table 9: Quantities of Packaging Materials Arising in Total Waste Stream in Ireland (Tonnes) (Crowe *et al.,* 2000, p42; Meaney *et al.,* 2003, p42; Collins *et al.,* 2005, p29)

	1998	2001	2004
Paper and Cardboard	14.9	23.3	70.0
Glass	32.3	39.1	55.1
Plastic	2.6	9.9	22.3
Ferrous	4.1	46.2	69.6
Aluminium	4.1	6.7	11.2
Other Metals	82.4	0.3	14.9
Textiles	0	0	0.0
Other	22.5	1.5	3.5
Wood	-	84.8	97.6
Total	**14.8**	**25.3**	**56.4**

Table 10: Rate of Recovery for Packaging Materials in Total Waste Stream in Ireland (%) (Crowe *et al.,* 2000, p42; Meaney *et al.,* 2003, p42; Collins *et al.,* 2005, p29)

Appendices 2

1. Directive 94/62/EC on Packaging and Packaging Waste and its amendment Directive 2004/12/EC,
2. Directive 96/61/EC on Integrated Pollution Prevention and Control (IPPC),
3. Solvents Directive (1999/13/EC),
4. Landfill Directive (1999/31/EC),
5. End of Life Vehicles Directive (2000/53/EC),
6. Water Framework Directive (2000/60/EC),
7. Restriction of Hazardous Substances (RoHS) Directive (2002/95/EC),
8. Waste from Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) and its amendment Directive 2003/108/EC,
9. 2003 Commission Proposal on Registration, Evaluation and Authorisation of Chemicals (REACH), i.e. (COM (03) 644) and
10. Directive on the Eco-design of Energy-Using Products (EuP) (2005/32/EC).

Towards sustainability: the marine sector

Comhar Briefing Paper[1]

Prepared by Dr Ken Whelan
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"A healthy Marine Environment is a *sine qua non* to realising the full potential of the oceans. For this reason, preservation of this resource base is the key to improving the EU's competitiveness, long-term growth and employment." – EU Green Paper on Maritime Policy for the European Union 2006

1 This briefing paper has been prepared to inform the proceedings of the Comhar Conference "Towards Sustainability in the National Development Plan 2007-2013" – 4th to 6th October 2006. Opinions expressed are not necessarily those of Comhar but are intended to encourage debate and greater understanding of sustainability issues.

Introduction

To many, the Marine sector in Ireland is synonymous with fish and fisheries, often seen as a minor inconsequential player of little economic interest and even less economic potential. This mindset has persisted since the formation of the State and it is only in the past decade that we have begun to realise the breadth and scale of the Irish marine resource, its current value and its very real and tangible economic, social, environmental and scientific potential.

Surprisingly Ireland is truly a marine nation, for in addition to our modest land bank of 90,000 km^2 we claim stewardship over an additional 900,000 km^2 or 220 million acres of hidden marine territory. The majority of our population lies within 20km of our 7,500m long coastline and practically all of our exports and imports are carried by sea. The extensive sea area over which Ireland holds sovereign rights includes the increasingly important natural resources of the Continental Shelf, consisting of the mineral and other non-living resources of the sea bed and subsoil, together with living organisms belonging to sedentary species. The sea areas under Irish jurisdiction are not alone of vital national importance, but are of strategic, economic, environmental and scientific importance to the European Union and its member states, and provide Ireland with opportunities for transport, fishing, aquaculture, oil and gas production, renewable energy production, tourism and leisure, as well as a broad range of ancillary service industries. Although under-developed and a mere fledgling marine sector by international standards, the ocean economy in Ireland is currently valued at €3 billion and supports 44,000 jobs, both directly and indirectly and contributes just over 1% of Ireland's GNP – a much lower proportion than in most other maritime countries.

But with ownership of this extensive and unique resource goes responsibility for the protection and rational sustainable management and appropriate ocean governance of a unique sub-set of the world's oceans. Inherent in these broad and often conflicting areas of national responsibility lies protection of the sea's complex web of biodiversity. In this paper we will examine our performance over the past decade, our plans for future development of the marine sector in Ireland and how we can achieve significant economic growth and diversification while at the same time meet the challenge of ensuring environmental sustainability.

Economic Performance

> *"… The particular need for an all-enhancing maritime policy aimed at developing a thriving maritime economy, in an environmentally sustainable manner. Such a policy should be supported by excellence in marine scientific research, technology and innovation."* Strategic Objectives: European Commission 2005-2009.

Until the publication by the Marine Institute of "Ireland's Ocean Economy Resources", earlier this year (2006) there was no real economic baseline against which economic performance could be measured. Various sectoral reports had in the past provided valuable data on areas such as fisheries and aquaculture, but no other study had tackled the totality of the marine economy in Ireland and carried out an objective comparison with other economies worldwide. This paper and a previously published marine industries global market analysis, commissioned by the Marine Institute, have not alone contributed to planning in Ireland, but have also significantly contributed to the recently published EU Green Paper on an integrated European Maritime Policy.

Ireland's emerging ocean economy comprises a number of sectors such as marine services; marine resources; marine manufacturing and marine research, education and training. Although as mentioned previously we have historically equated our marine industry with the landing and processing of fish, our ocean economy is in fact primarily a services economy (Table 1).

Table 1: Value-added and Employment (Commercial Marine Sectors, 2003)*

	Turnover (€m)	Value-added i.e. Direct Contribution to GNP (€m)	Direct Employment (FTEs)	Direct & Indirect Contribution to GNP (€m)	Direct & Indirect Employment (FTEs)
Marine Services					
Shipping & Maritime Transport	1,275	216	6,047	601	12,496
Water-based Tourism (Domestic)	434	240	3,173	264	5,085
Water-based Tourism (Overseas)	132	66	2,098	134	3,104
International Cruise	66	37	0	40	484
Other Marine Services	121	51	779	102	3,435
SUBTOTAL MARINE SERVICES	2,028	610	12,097	1,141	24,064
Marine Resources					
Fish Processing	366	94	2,802	321	6,604
Fish Landings	210	118	4,000	235	5,960
Aquaculture	117	66	1,394	131	2,482
Hydrocarbon Exploration	22	16	250	81	1,527
Gas Production	115		189		
Offshore Renewable Energy	18	2	10		10
Seaweed	9	6	175	10	242
SUBTOTAL MARINE RESOURCES	857	302	8,820	778	16,825
Marine Manufacturing					
Marine Technology	69	25	478	36	609
Boat Building	20	9	137	17	604
Other Marine Manufacturing	27	11	292	23	1,288
SUBTOTAL MARINE MANUFACTURING	116	45	907	76	2,501
TOTAL	**3,001**	**957**	**21,824**	**1,995**	**43,930**

** From – Ireland's Ocean Economy & Resources, Marine Institute, Galway*

Combined industry turnover is estimated at €3 billion (2003), the value-added component is just under €1 billion, a figure that more accurately describes the contribution of Ireland's economy to the country's overall gross national product (GNP). Ireland's GNP in 2003 amounted to €112 billion, indicating that the marine sector accounted for nearly 0.9% of Ireland's GNP for 2003.

Nearly 22,000 people are employed directly in the marine sector – or 1.2% of total Irish employment. In addition for every job (and euro of turnover) directly supported by the marine sector, there is a second job (and euro of turnover) indirectly supported.

Ireland's ocean economy accounts directly for 1.2% of the country's employment but, more importantly, the employment and value created by the sector is widely distributed geographically, with a large proportion occurring outside the most developed regions. Hence, the sector makes a significant contribution to economic activity in Ireland's coastal regions, which are otherwise poorly developed compared with the national average. It is clear that if the challenging objectives laid out in the Government's National Spatial Strategy (2002) are to be met, the potential of each sector must be maximised for each region of the country. Given, that the current distribution of marine business resources is strong in less developed regions, it is clear that the development of the marine sector is of particular importance in achieving regional potential.

The authors of Ireland's Ocean Economy and Resources also point to increasing awareness of the importance of the ocean beyond the economic value of its resources. Due to the limitations surrounding current economic analyses it is not possible to fully quantify real and tangible benefits to society, such as:

Amenity:

This refers to leisure and tourism related activities for which no payment is made. Irish people enjoy many marine related amenity experiences, such as visits to the beach, coastal walks etc. Much of the overall tourism experience valued by visitors relates to coastal drives, spectacular scenery and cultural experiences linked to the sea.

Biodiversity and Ecosystems:

The sea hosts an enormous diversity of complex chemicals and biological resources. More than 75% of known living species are marine, this biodiversity and associated ecosystems require management and protection if benefits are to be enjoyed by future generations. In addition there may be potential future commercial value associated with these resources through the application of Biotechnology.

Environmental Quality:

High standards of environmental quality are vital to our ability to sell products and quality in services related to the sea e.g. seafood, tourism and energy, while it may be difficult to capture the value of good environmental quality in the price charged for goods and services, poor environmental quality on the other hand can eliminate markets overnight.

Climate Regulation:

The seas and oceans play a critical role in moderating climate; indeed it is the presence of the North Atlantic Drift (The Gulf Stream) that results in Ireland having a warmer and milder climate than countries at similar latitudes. This vitally important consideration is dealt with in more detail later in this paper.

Social and Environmental Performance:

The past two decades have seen major advances in our appreciation of the need to integrate our national environmental policies so as to ensure that in the future the Irish economy functions and grows on a sustainable basis. Underpinning national initiatives and national legislation in this area, is a raft of hard-hitting EU environmental legislation, geared towards the protection and conservation of the environment. The implementation of the EU Habitats Directive and the EU Water Framework Directive; and the inclusion of biodiversity objectives in various national and EU policy instruments are a clear signal that the welfare of the global environment is seen as fundamental to economic progress. In launching the recent Millennium Ecosystem Assessment, Kofi Annan stated; "we are spending the earth's natural capital and putting at risk the ability of ecosystems to sustain future generations, we can reverse the decline, but only with substantial changes in policy and practice".

The EU has made significant commitments in this regard, the EU Heads of State agreed in 2001, "to halt the decline of biodiversity by 2010", and to "restore habitats and natural systems". In 2002, they joined some 130 world leaders in agreeing to "significantly reduce the rate of biodiversity loss (globally), by 2010". Opinion poles show that these concerns for nature and biodiversity are strongly supported by EU citizens.

At Community level the policy framework to halt biodiversity loss in the EU is now largely in place, biodiversity objectives are, for example, integrated in the Sustainable Development Strategy (SDS) and the Lisbon Partnership for Growth and Jobs and in a wide range of environmental and sectoral policies. An EC Biodiversity Strategy was adopted in 1998 and related action plans in 2001; most member states have also or are developing such strategies and or action plans. Nationally, two important building blocks in implementing these Directives and a raft of additional environmental legislation, was the formation of two new science bodies, the Environmental Protection Agency and the Marine Institute. These two bodies have a strong legislative remit relating to the provision of high quality science services and detailed scientific advice relating to a wide range of environmental issues.

From a marine perspective two significant issues have been the issuing of the Galway Declaration and the recent publication of the EU Green Paper: *Towards a Future Maritime Policy for the Union: a European Vision for the Oceans and the Seas*. The Galway Declaration, endorsed by the 2004 EurOcean Conference, identified the contribution of marine industries towards achieving the Lisbon Agenda objectives, and the role of marine science and technology in the 7th EU Framework Programme for research and technological development (FP7), which aims to develop world class excellence in marine science and technology. The 2004 EurOcean Conference emphasised that alongside marine and maritime research there is an urgent need to support co-ordinated and sustained collection, archiving of and ready access to, comprehensive marine data sets.

Following on from the Galway Declaration, the publication of the recent EU discussion paper on an EU maritime policy is highly significant. It recognises for the first time, the economic potential of Europe's maritime dimension and states that between 3% and 5% of Europe's Gross Domestic Product is estimated to be generated by marine based industries and services, without including the value of raw materials such as oil, gas or fish. The European maritime regions account for over 40% of GDP.

In its strategic objectives for 2005-2009, the European Commission declared the particular need for an all-embracing maritime policy aimed at developing a thriving maritime economy in an environmentally sustainable manner. Such a policy should be supported by excellence in marine scientific research, technology and innovation. Principles of good governance suggest the need for a European maritime policy that embraces all aspects of the oceans and the seas; this policy should be integrated, inter-sectoral and multidisciplinary, and not a mere collection of vertical sectoral policies. It should look at the oceans and seas based on sound knowledge of how they work and how the sustainability of their environment and ecosystems may be preserved, it should aim to provide answers as to how decision making and the conciliation of competing interests in marine and coastal areas can result in a climate more conducive to investment and to the development of sustainable economic activities. To achieve this it is necessary to increase cooperation and to promote effective coordination, integration of ocean and sea related policies at all levels.

The Commission believes that in pursuing this vision our approach should rest firmly on twin pillars. First it should be anchored within the Lisbon Strategy, stimulating growth and more and better jobs within the Union. Continued investment in knowledge and skills are key factors for maintaining competitiveness and ensuring quality jobs.

The EU's integrated approach to industrial policy emphasises that Europe's future lies in bringing new high quality products and services to the world market for which customers are prepared to pay a premium.

Secondly, we must maintain and improve the status of the resource upon which all maritime activities are based: the ocean itself. To do this, ecosystem-based management, built on scientific knowledge, is essential. The EU Commission has laid the groundwork for this by putting forward its thematic strategy for the marine environment.

Climate Change

Underlying all of the above policy issues are serious concerns relating to the impacts of climate change on the environment. In April 2005 the Marine Institute published: *Climate Change: Implications for Ireland's Marine Environment and Resources*. This document provides a detailed insight into the likely consequences and predicted changes in the climate on the ocean surrounding Ireland. A summary of predicted marine impacts is provided in Table 2.

Table 2: Summary of predicted marine impacts of Climate Change

The main concerns relate to changes in shore topography and inundations, especially from storm surges, as well as alterations to recruitment, growth and replacement of renewable aquatic resources. Extreme events are likely to occur more frequently, there will be a gradual underlying trend of ecological change brought about by increasing seawater temperatures. The predicted rate of change is speculative but if current predictions are correct there will be significant increases in sea temperatures to the south and east of Ireland by the middle of the present century. Predictions of climate-induced impacts on Ireland's marine environment stem from the following assumptions:

- Atmospheric warming, driven primarily by emissions of carbon dioxide (CO_2) to the atmosphere, will continue;
- Temperatures on land by 2055 will show increases up to 1.5˚C in winter and 2.0˚C in summer;
- A conservative estimate of change in average rainfall by 2050 is for an increase of +10% in winter and –10% to –40% in summer (greatest decrease in the south-east);
- An increase in sea levels similar to the global mean prediction of 0.49 ± 0.08m by the end of the century; and
- An increase in the number of extreme events (e.g. more intense storms, hotter summers).

The effects of these changes on Ireland's marine and coastal areas are likely to include:

- Increased intensity of storms combined with changes in sea level leading to wave damage on soft shores, increased seasonal flooding and inundation of low-lying areas, interference with coastal developments and infrastructure and disruption of coastal habitats and fish nursery areas; increased storm intensity may also have implications for the design of aquaculture installations as well as for maritime transport, navigation and marine search and rescue operations;

- Reduced number of commercial fishing days in winter;

- An increase in mean seawater temperature leading to northerly shifts in the ranges of planktonic and other species, including migratory fish (e.g. pilchard, breams), enhanced recruitment of some native (e.g. mullet, bass) and non-native cultured species (e.g. Pacific oysters) and a decline in some wild populations (e.g. salmonids);

- In regard to biodiversity, species losses and new arrivals due to shifts in bio geographical range and greater incidence in non-native species;

- Increases in phytoplankton biomass throughout the year, changes in the timing and intensity of spring algal blooms and the structure of zooplankton communities with as yet unknown, but potentially substantive, consequences for the marine food chains;

- Elevated summer and winter temperatures in shallow bays and inlets with corresponding changes in the structure and stability of marine plant and animal communities; and

- Changes in near-shore salinities, sediment loading and distribution due to alterations in river discharges and increasing sea level with potentially negative consequences for near-shore seafood production (e.g. aquaculture, nursery areas, traditional shellfish beds);

Climate is fundamentally important for the stability and maintenance of populations and food chains. Changes in climate will result in altered physical conditions that will include water circulation, stratification and nutrient supply. These effects may result in permanent or temporal changes to existing and evolving niches such as nursery areas and will either exclude or encourage species on the fringe of their natural distributions.

In the main document the authors conclude the following:

The importance of marine climate:

- Ireland and Europe have become measurably warmer in the past two decades. This is confirmed by a large body of scientific data. The Intergovernmental Panel on Climate Change (IPCC) has concluded that this warming is mostly attributed to the build up of the greenhouse gases (principally CO_2) in the atmosphere due to burning of fossil fuels and changes in land use.

- Medium and long-term development and investment strategies must take into account predicted climate impacts. Innovative policies and approaches to marine resource management are needed, guided by sound scientific knowledge and advice.

- Global and regional climate models provide the most reliable basis for predicting future climate change scenarios. Predicted changes can then be assessed in order to develop appropriate strategies for managing adverse impacts. Models depend on time-series measurements of environmental conditions and, at present, gaps in the records at national and regional levels account for much of the uncertainty associated with model predictions. Nevertheless, the current generation of global and regional climate models provide remarkably accurate simulations of past climatic patterns and variations and are the best available tools for assessing likely future trends.

The driving forces:

- Predictions of climate-induced impacts on Ireland's marine environment stem from the following assumptions:
  - Global warming, driven primarily by emissions of carbon dioxide (CO_2) to the atmosphere will continue;
  - Temperatures on land by 2055 will show increases up to 1.5˚C in winter and 2.0˚C in summer;
  - A change in average rainfall by 2055 of +10% in winter and –10% to –40% in summer (greatest decrease in the south-east);
  - An increase in sea levels similar to the global mean production of 0.49 ± 0.08m by the end of the century; and
  - An increase in the number of extreme events (e.g. more intense storms, hotter summers).

The likely consequences:

- These assumptions, based on the IPCC's Medium-High (A2) Emissions Scenario, suggest that within a few decades Ireland's marine ecosystems are likely to undergo significant changes in response to increased seawater temperatures, changes in near-shore salinities, more intense storms and possibly increases in sea level due to thermal expansion of the oceans and/or melting of the polar ice-cap.

- Around the coasts, wetter winters leading to periodic flash floods, increased storm intensity and wave height combined with rising sea levels will accelerate erosion of soft shores and increase the incidence of flooding in low-lying areas.

- In warmer seas some native species currently at the southerly limit of their ranges will tend to move north while species inhabiting warmer areas to the south will be encouraged to extend their range into Irish waters. Biodiversity is certain to be affected, changes in community structure perhaps being more likely than changes in the number of species.

- The timing and/or intensity of the spring phytoplankton bloom (already evident) will change. Corresponding changes in reproductive cycles of invertebrate food species and shifts in species distribution have the potential to disrupt established food chains with negative effects on growth and recruitment of larger predatory species including fish and marine mammals.

- The changes may also open up possibilities for the development of new fisheries (e.g. tuna) and new species for aquaculture as well as increased growth rates and productivity of some native species.

- Increasing seawater temperature, in addition to salinity changes due to less summer rainfall and reduced river discharges, will further affect the distribution of species in estuarine and coastal waters including species that form part of the food supply for juvenile fish.

- The ability of marine organisms to adapt to changes in marine climate depends in part on how quickly the changes occur. In general, marine organisms have a high capacity to adjust to environmental changes that take place steadily over many generations, over centuries or millennia for example, but changes over several decades, as currently predicted, for most species would be difficult to accommodate.

But realising the exciting developmental potential of Ireland's Ocean Economy may well depend on our ability to predict the effects of global climate change. For Europe these changes will be primarily mediated by the Atlantic Ocean where significant temperature changes and shifts in the major oceans currents could result in catastrophic economic loss. Along the coasts of Western Europe it is the Gulf Stream or the North Atlantic Drift, which most influences our weather patterns. This great mass of water moves relentlessly north, feeding into the bays and estuaries of northern Europe a constant supply of warm surface waters, which keeps our winters mild and in summer guarantees a plentiful supply of rain and moisture. Climate models predict changes in the intensity and perhaps even the direction of this important component of the earth's marine circulation system. Experts disagree as to what these changes will mean; some predict a slow but erratic warming of the waters and the appearance, over time, of more warm water fish species and other related fauna, others warn of a catastrophic cooling but whatever the result we know now that change is happening and will continue to happen. Monitoring that change, and predicting the likely outcomes, is one of the greatest scientific challenges facing Europe in the 21st century. Research is urgently required to inform appropriate international mitigation policies and perhaps even more importantly improve the predictive nature of the current climate change models so as to facilitate the formulation of integrated multidisciplinary strategies to deal with the economic, social, political and environmental consequences of the predicted changes in the global climate.

The need for action
Although there can be no certainty regarding the precise nature and rate of changes to Ireland's marine environment due to alterations in climate, in the absence of policies and measures to prepare for and accommodate the changes, even the more moderate of the predicted scenarios would have major social and economic impacts.

Marine Fisheries Resources

> *"Our vision then, should be that of a Europe with a dynamic maritime economy in harmony with the marine environment, supported by sound marine scientific research and technology…"* (January 2005). Joe Borg, EU Commissioner, Fisheries and Maritime Affairs.

Perhaps one of the greatest challenges facing the marine sector is the sustainable management of our marine and aquaculture fisheries resources. Despite considerable investment over the past two decades Ireland's marine fisheries resources are under increasing pressure and urgently require a new management paradigm if they are to continue to provide sustainable employment. For example Ireland had fish landings of €210,000,000 in 2002. This was the second most valuable year on record (2001 landings: €254,000,000). However, these figures mask a long-term decline in volumes. The 245,000 tonnes landed in 2002 was the lowest in a decade, and considerably down from 1998's all-time record high of 320,000 tonnes. Irish coastal waters are amongst the richest fishing grounds in the world in terms of primary productivity. Future changes include the need to adopt an ecosystem-based approach to ensure the sustainable management of fish stocks.

In 2002 the EU became a signatory of the Johannesburg Declaration, which commits the EU to the rebuilding of all fish stocks, included within the Common Fisheries Policy, so that they can be fished at maximum sustainable yield but within the constraints of the ecosystem they inhabit. Amongst the management objective are:

- that management advice is based on consideration of the ecosystem as a whole, i.e. that separate components of the ecosystem are not manipulated in order to improve the yield of others
- that management advice is long-term, taking into account industry requirements and stability of employment
- that stakeholders and Regional Advisory Councils are fully involved in the decision making process
- that the socio-economic implications of management decisions are fully taken into account

The aquaculture industry, particularly the finfish aquaculture industry is also under increasing pressure. In 2002, total aquaculture production peaked at €125 million before decreasing to €102 million in 2003. This was as a result of problems experienced in the finfish industry, whose turnover dropped 31% in value to €60 million in 2003. Production in the finfish sector declined again in 2004 to €57 million. Whilst farmed salmon saw a drop in production in 2003, shellfish aquaculture production increased with a turnover of €42 million in 2003 and €44 million in 2004. The aquaculture industry employs 2,600 people, many of whom are part-time/casual workers. Finfish farms typically employ around 20 or 30 employees and are located on the west coast; shellfish operations are significantly smaller (average: 3 employees), and are typically family owned and more dependent on part-time/casual labour. More than half are based in Cork, Kerry, Donegal and Galway. At least 75% of aquaculture production is exported mainly to France, Germany and Spain.

In May 2004 the European Platform for Biodiversity Research Strategy (EPBRS) recommended specific priorities for the compilation of an action plan for marine fisheries and aquaculture. They recommended the following:

- Develop the ecosystem-based approach to the management of fisheries and aquaculture supported by appropriate sociological and socio-economic research.
- Improve the understanding of the population structure of commercial species using genetic and traditional approaches to optimise stock management.
- Improve understanding of the ecosystem effects on fishing activities and how they can be reduced in particular through fishing gear developments including selectivity.
- Pursue further research into the ecological impacts of aquaculture to facilitate informed and sustainable development and management.
- Investigate new and alternative approaches to ensure the future economic and environmental sustainability of the aquaculture sector.

Migratory Fish Stocks

While the management of wild marine fisheries is struggling and stocks are in steep decline, significant progress has been made with the management of the wild Atlantic salmon. I have recently argued (Whelan 2005) that the lessons learned from the management of salmon stocks, both internationally and nationally, could be applied to other marine stocks.

Within the fisheries area the management of anadromous stocks, such as salmon, sea trout, char and shad, which spend part of their lives in both fresh and saltwater, is considered particularly complex. Not alone are these species subject to the rigours of the ocean but they are also directly impacted upon by changes on land and in freshwater. The successful management of these stocks requires a seamless, co-operative management framework, which regulates not alone the international aspects of their lifecycle but also the areas of national and regional competence. NASCO, the North Atlantic Salmon Conservation Organisation was established in the early 1980s to tackle a single international fisheries management issue, but has found the need to continually re-invent itself in an effort to tackle the ever-increasing level of complexity involved in the conservation and management of Atlantic salmon stocks.

The precautionary approach to management of natural resources first came to prominence in the late 1980s and '90s. The basic tenets of the precautionary approach are, to a large extent, self-evident:

- consideration of the needs of future generations and avoidance of changes that are potentially irreversible;
- prior identification of undesirable outcomes and of measures that will avoid them or correct them;
- initiation of corrective measures without delay, and these should achieve their purpose promptly;

- priority to be given to conserving the productive capacity of the resource where the likely impact of resource use is uncertain;
- appropriate placement of the burden of proof by adhering to the above requirements.

These are now widely adopted by a wide range of conservation groups and administrations. The concept was particularly popular amongst fisheries regulatory bodies but to a very large extent has remained as a high ideal rather than a functional management system.

NASCO adopted a more proactive and pragmatic approach and established a Standing Committee on the Precautionary Approach (SCPA) to examine how the work of NASCO might be carried out on a precautionary basis and how best to formulate decision structures which would be fundamentally precautionary in nature. The SCPA looked at the application of a precautionary approach to: the management of North Atlantic salmon fisheries; habitat issues; the formulation of management advice and associated scientific research.

A prime objective, for NASCO and its contracting parties, in the management of salmon fisheries is to promote the diversity and abundance of salmon stocks. For this purpose, it was agreed that management measures, taking account of uncertainty, should be aimed at maintaining all salmon stocks in the NASCO convention area above their conservation limit (currently defined by NASCO as the spawning stock level that produces maximum sustainable yield), taking into account the best available information, and socio-economic factors including the interests of communities which are particularly dependent on salmon fisheries. In order to achieve this a precautionary approach was deemed to be suitable to the management of both the fisheries regulated by NASCO and those on home waters.

The application of the precautionary approach to salmon fishery management is an integrated process, which requires at least the following:

- that stocks be maintained above their conservation limits by the use of management targets;

- that conservation limits and management targets be set for each river and combined, as appropriate, for the management of different stock groupings defined by the managers;

- the prior identification of undesirable outcomes including the failure to achieve conservation limits, biological factors, instability in the catches and socio-economic factors;

- that account be taken at each stage of the risks of: not achieving the fisheries management objectives; not considering uncertainty regarding the current state of the stocks; not considering uncertainty regarding biological reference points and fishery management capabilities and not considering uncertainty regarding the formulation of pre-agreed management actions in the form of procedures to be applied over a range of stock conditions;

- assessment of the effectiveness of management actions in all salmon fisheries;

- stock rebuilding programmes (including as appropriate habitat improvement, stock enhancement and fishery management actions) be developed for stocks that are below their conservation limits.

Fundamental to the achievement of the ideals espoused in the PA is the availability of quantitative scientific advice. The form of the advice provided by International Council for the Exploration of the Seas (ICES) to NASCO, through the Advisory Committee on Fishery Management, was examined in detail by the SCPA. The committee recommended that ICES or other scientific advisors to NASCO should be requested *inter alia*, to:

- provide stock conservation limits and management targets for all river stocks;
- advise on the risks of not achieving the objectives in NASCO or its contracting parties;
- provide catch options or alternative management advice with associated risk assessment;
- advise on a stock rebuilding programme;
- identify the monitoring and data collection required;
- advise on the impacts on salmon stocks of existing and new fisheries for other species, and of salmon fisheries on non-target species.

The management of marine fisheries under ICES (International Council for the Exploration of the Seas) also operates under the precautionary approach. This involves the use of precautionary reference points that are set to take account of the uncertainty involved with marine stock assessment. Precautionary reference points relating to biomass and fishing mortality are used, which are broad enough to ensure that remedial action can be taken as required. However the problem with many of the marine stocks is that the status of the stock is uncertain making it difficult to formulate accurate management advice.

In line with international best practice the Irish Government and agencies have in recent years introduced a range of stringent scientifically based management measures to curb excessive exploitation and to rebuild wild salmon stocks. These decisions were made against a backdrop of poor stock status and declining marine survival. Another important driver was Ireland's obligations under the Habitats Directive (92/43/EEC), which states:

> *"If a species is included under this Directive, it requires measures to be taken by individual member states to maintain or restore them to favourable conservation status in their natural range"*.

From an Irish perspective, there are currently 32 Irish salmon rivers listed which fall specifically under the Directive. However, in applying the Directive the authorities were conscious that consideration must be given to all of the salmon populations and not just specifically to these 32 rivers. *The conservation status of a species* means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within its territory (also defined) and this *conservation status* will be taken as 'favourable' when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and

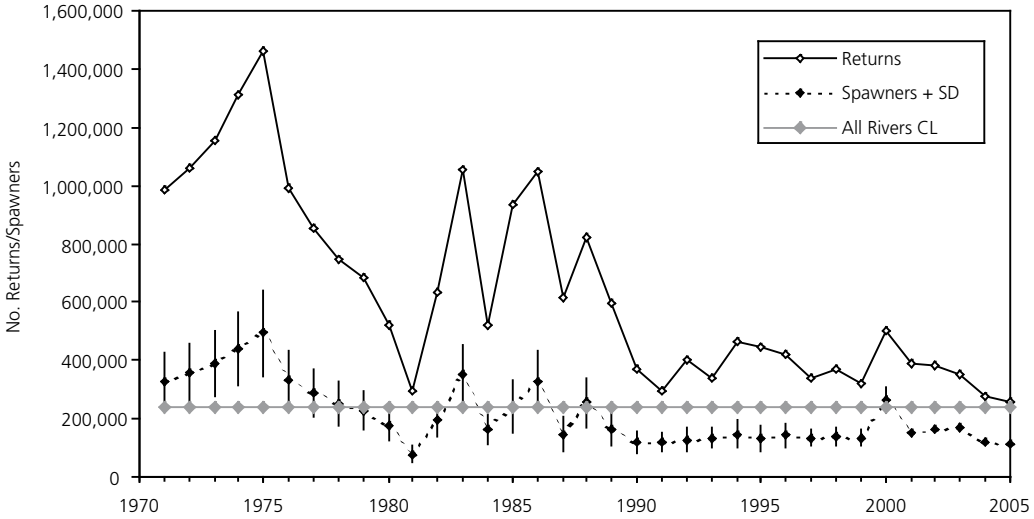
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and

- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis…

Stock Status

Wild salmon production nationally (i.e. returns to the coast) was highest from 1970 to 1975, peaking at approximately 1.8 million 1SW salmon in 1975 (Figure 1).

Figure 1: Estimated returns of salmon to the coast, spawning stock after fisheries and Conservation Limit for all individual rivers stocks combined.

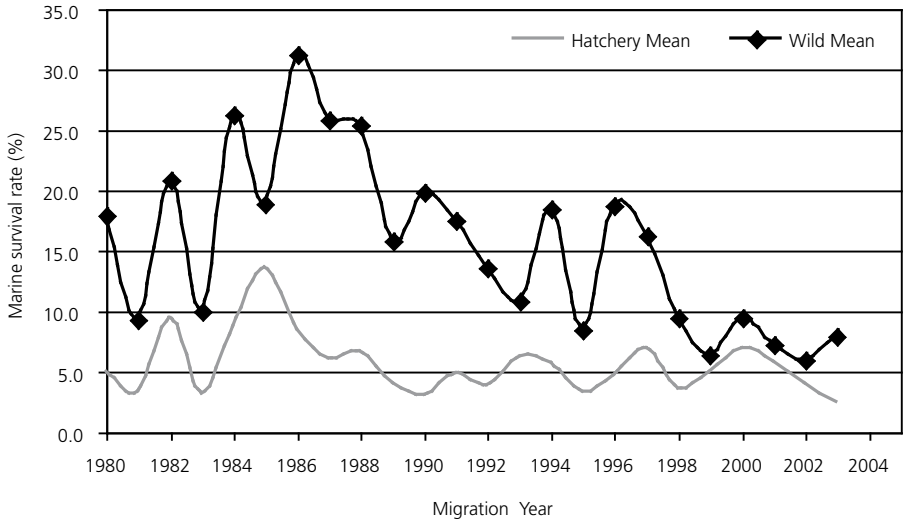


From 1975, salmon production decreased significantly, with some recovery during the 1980s. However, since 1990, the national production has been much lower with on average just over 400,000 salmon being produced. There is now less than a third of the fish returning to the coast compared to the 1970s and only 4 districts are meeting their Conservation Limits consistently (Cork, Kerry, Connemara, Ballinakill). A recent study has shown that at least 49 Irish salmon populations may actually be threatened with loss. It is also likely that this is an underestimate as no data are available for approximately 80 small rivers or where the rod catch was insufficient to carry out an assessment.

Marine Survival

The survival of salmon from smolt to adult return to the home-water coast (prior to the operation of home-water fisheries) has been estimated for a selection of Irish stocks and rivers. This marine survival is presently the lowest it has been since the assessment programme commenced in 1980 and probably since the 1970s also considering the information available for the Burrishoole River index site. Although there has been considerable fluctuation, estimates of marine survival prior to 1996 for wild stocks were generally higher compared to more recent years with survival rates in excess of 20% (i.e. 20 adult returns to the coast for every 100 smolts migrating, Figure 2).

Figure 2: Marine survival (from smolt release to return to the coast) for wild and hatchery salmon.



The current estimates suggest that less than 10% of the wild smolts that go to sea from Irish rivers are surviving (i.e. less than 10 adults returning for every 100 smolts migrating). Survival rates from hatchery fish are usually lower than for wild fish. A major international programme is planned by NASCO's, International Atlantic Salmon Research Board to investigate factors affecting marine survival of Atlantic salmon (www.salmonatsea.com)

Role of the National Salmon Commission

To advise on how best to tackle this seemingly intractable problem the National Salmon Commission (NSC) was established under the 1999 Fisheries (Amendment) Act, to assist and advise the DCMNR on conservation, management, protection and development and to recommend schemes including tagging of salmon, Total Allowable Catches (TACs) and quotas. The NSC is advised by its Standing Scientific Committee (SSC) also established under the 1999 Fisheries (Amendment) Act (No. 35, 55c) to "advise and assist the National Salmon Commission on all technical and scientific matters in relation to the performance of the Commissions functions". Since 2000, the SSC has provided catch advice on a national and district basis (Ó Maoiléidigh, *et al* 2004).

This inclusive model and has worked well. Its main strengths lie in the statutory structure whereby the scientific advice is formulated through the Standing Scientific Committee in advance of management action. The SSC comprises scientists from a range of State agencies both from Ireland and Northern Ireland. The scientific advice takes account of both national and international obligations and is solely concerned with the welfare of the salmon stocks. Once complete the advice is presented to a range of management groups who in turn comment on the advice taking into account a broad swathe of issues and they in turn offer their advice to the Department. Having taken all of the advice into account the Minister announces his decision.

This approach has worked well over the past five years and has been seen to be objective, driven by conservation objectives and based on well founded science has brought great clarity to the decision making process. The commercial fishery has been reduced from 212,000 fish in 2002 with TACs of 182,000 in 2003, 162,000 in 2004, and 139,900 in 2005. The SCC did not provide scientific advice on a maximum harvest for 2006 as the main thrust of their advice was to operate fisheries on single stocks above Conservation Limits in estuaries and rivers only. However, guidance on the precautionary catch in each District was provided and as a result a commercial TAC of 91,000 salmon was set for the 2006 season. The reductions in the district fisheries have as much as possible been aimed at those districts which were furthest below their conservation limit. In doing so the Minister reaffirmed the Government's commitment to fully align with the scientific advice provided by 2007.

International – Fisheries Commissions

"…Promote the sustainable use of the seas and conservation of marine ecosystems, including seabed's, estuarine and coastal areas, paying special attention to sites holding a high biodiversity value."
EU Marine Strategy-COM (2002)539

Currently there are in existence some 35 Intergovernmental Regional Marine Fisheries Bodies, 6 of which are under the auspices of FAO. It is ironic that, while all of these bodies are currently struggling to manage within the context of the PA, and to embrace the even more complex ecosystem approach, they carry out their business in isolation from one another.

NASCO is also finding that the role of the NGO is evolving and that intergovernmental bodies must find ways to utilise the skills, experience and expertise of NGOs while not compromising the *raison d'etre* for intergovernmental fisheries bodies and commissions. In the final analysis such bodies must be free to make tough choices and tough decisions but should also aspire to systems, which provide the greatest possible levels of transparency in their decision-making processes.

How then could these lessons be integrated into a new approach to marine fisheries management and what are the main elements of the ideal, modern Fisheries Commission? It should, I believe, have the following attributes:

- The decisions of the Fisheries Commission should be made on the basis of best interdisciplinary scientific advice but regularly reviewed as the science improves. However, the absence of such science should not be used as a reason for failing to take management action under a precautionary approach

- The FC should be responsive and proactive, willing to take on board all views and to put in place structures to canvas views and technical inputs from a wide range of stakeholders

- The decisions of the body should have real impact and the FCs should be established in such a manner as to strongly influence the decision making process in the participating countries or regions, and also the decisions taken by sister Commissions which may impact directly on the welfare of neighbouring or competing fisheries

- The work of the FC should at all times strive to achieve integration of interests and, where appropriate, should include a financial and environmental audit or balance sheet to accompany each major decision. This would require estimates of non market values, based on universally accepted socio-economic models, which could be integrated into the overall natural resources management decision structure.

- The FC should encourage the development of theoretical frameworks to broaden the effectiveness of its work and, as required, should engage in coordinating and supporting basic scientific research

- The FC should take a wider global view and, as far as possible, share knowledge with sister bodies. This is particularly important in the area of methodologies and the development of predictive risk based, scientific and management models. FCs should acknowledge the international dimensions and responsibilities involved in their decisions.

Challenges and opportunities facing the Marine Sector

> *"In 2020, the Irish marine sector will sell into specialised local and global markets in a dynamic, innovative and technologically driven manner, by means of strong industry research partnerships, a skilled workforce and a strategic capability that responds to markets and technology. It will be internationally recognised for its high quality marine environment and characterised by coherent policy and regulation."* Sea Change: A Marine Knowledge, Research and Innovation Strategy for Ireland (2007-2013).

Over the past fifteen years Ireland has bridged a considerable infrastructure deficit in the marine area. Investments under the NDP 2000-2006 have seen a major expansion of the infrastructure for marine research. This includes a new world-class state of the art facility to house the Marine Institute in Rinville, Co. Galway. There are also extensive facilities and activities under way at UCC, NUIG and also in other Universities and Institutes of Technology. There are two research vessels for inshore and offshore work, which are active both in research and providing services. The vessels are key to Ireland's participation in international research programmes. The Marine Institutes' facility located in Newport, Co. Mayo is a unique European research facility located adjacent to the Gulf Stream with freshwater/seawater facilities which monitors every salmon and eel migrating from freshwater to sea. Science and technology now lie at the very centre of Europe's development strategy and Ireland's much-improved marine research infrastructure leaves us well equipped to respond to both the Lisbon Agenda and Europe's Environmental Policies and Directives.

In March 2000, the EU Council of Ministers set the EU the goal of becoming "The most competitive and dynamic knowledge based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion." (Lisbon Agenda 2000). Following close on the Lisbon meeting the Gothenburg Council meeting 2001 emphasised the importance of "sustainable development" in the EU's Economic Development Strategy and called for urgent action to secure a "better quality of life" for future generations. More recently (October 2005), the EU Commission launched its strategy for the protection and conservation of the marine environment, the aim of which is to "promote sustainable use of the seas and conserve marine ecosystems". Within this strategy, which will form the basis of a new directive, a new approach to marine monitoring and assessment is envisaged. It will see future ocean governance based on the availability and use of marine science and data. As outlined previously in this paper these aspirations, particularly those relating to economic progress and harmony with the marine environment, underpin the recently published Green Paper: Towards a Future Marine Policy for the Union: A European Vision for the Oceans and Seas.

The Marine Institute is currently (2006) finalising a major research and innovation strategy for the period 2007-2013, with the objective of delivering an integrated research and innovation programme that will, through the use of research, knowledge and technology transform the sector to deliver sustainable, high growth, high value-added, market led opportunities. This strategy will be published in conjunction with the Government's announcement of the forthcoming National Development Plan (2007 – 2013).

The strategy is entitled Sea Change: A Marine Knowledge, Research and Innovation Strategy for Ireland (2007-2013) and is being built around measures to:

1. Strengthen the competitiveness of traditional marine industries and their progression to higher value-added activities.
2. Push the frontiers of knowledge and explore the interfaces between disciplines.
3. Deliver integrated scientific advice, policy and regulation to support environmental, social and economic advancement.

The strategy was developed utilising the outputs of a range of background reports and analyses, (a major National Marine Foresight Exercise, March-April 2005) and a wide-spread consultation process. The National Marine Foresight Exercise involved the convening of seven sector panels (Shipping and Maritime Transport; Ocean Energy and Offshore Resources; Aquaculture, Seaweed and Seafood; Sea Fisheries; Water-based Tourism and Leisure; Marine Environment and Sustainable Development; and Marine Technology) for four days. The panel brought together twenty-nine international experts and ninety Irish experts representing the public, academic and commercial sectors and were asked to:

- Examine the current status of the marine sector.
- Identify the opportunities and challenges to be faced.
- Identify future scenarios for 2020.
- Use these scenarios as the context for setting objectives for 2013.
- Identify the key research technology development and innovation that would be required to deliver on the objectives by 2013.
- Identify the major prerequisites for successful delivery of the 2013 objective.

The resultant detailed strategy has been submitted to the Interdepartmental Committee on Science, Technology and Innovation as the submission of the Department of Communications, Marine and Natural Resources in relation to the planning process for the forthcoming NDP (2007-2013). As outlined in the recently published Strategy for Science, Technology and Innovation (2007-2013) the strategy makes firm costed recommendations in relation to:

- The development of research discovery programmes in Marine Biotechnology; Marine Biodiscovery; Marine Technologies.

- Recommendations to establish Ireland as an internationally recognised centre for Ocean Renewable Research (ocean energy).

- Establish a Smart-Bay system for the observation, monitoring and management of coastal and ocean environments and the testing of new advanced technologies.

- Develop Ireland as a global monitoring centre for climate change assessment in the context of the North Atlantic Gulf Stream unique marine and other ecosystems and the Smart-Bay system.

- Use the data derived from the Irish Seabed Survey and the new INFOMAR programme to place Ireland in a position of competitive advantage in a range of areas including participation in international research programmes.

- Stimulate greater involvement by Irish seafood industry in marine related research, prioritise the development of marine health foods (functional foods), target a significant increase in FP7 participation and seek EU support for a climate change monitoring centre.

The overall objective of the strategy is to deliver an integrated research and innovation programme that will, through the use of research, knowledge and technology transform the sector to deliver sustainable, high growth, high value-added, market led opportunities.

The strategy comprises three measures:

1. Industry Support Measure: strengthening the competitiveness of traditional marine industries and their progression to higher value-added activities. Programmes include:

   - Shipping and transport.
   - Offshore energy (wave and tidal and oil and gas).
   - Marine food (seafood processing, fisheries, aquaculture and seaweed).
   - Water-based tourism and leisure.

   As an example, under the Marine Food measure significant development on the development of a functional seafood research programme is planned; this will focus on the potential use of marine products in the health area. It will build on significant institutional investment in functional foods, research to date and will support a number of dedicated Principal Investigator teams.

2. Discovery Measure: pushing the frontiers of knowledge and exploring the interfaces between disciplines. Programmes include: Marine Biotechnology; Marine Discovery; Marine Technology.

   An important dimension of this measure will be the development of a Smart-Bay incorporating a range of advanced and novel marine technology for the observation, monitoring and management of the coastal and oceanic environments and activities. This will be a unique development internationally with significant potential to stimulate both national and international scientific and industrial activity.

3. Policy Support Measure: delivering integrated scientific advice, policy and regulation to support best practice in the areas of environmental, social and economic advancement. Programmes include: Marine Environment, Seabed and Resource Mapping; Information and Knowledge Management; Socio-Economics, policy and legal.

Table 3: Marine Knowledge, Research & Innovation Strategy for Ireland (2007-2013)

INDUSTRY RESEARCH MEASURE	DISCOVERY RESEARCH MEASURE	POLICY SUPPORT RESEARCH MEASURE
• Research Programme 1: **Shipping & Maritime Transport** • Research Programme 2: **Seafood Processing** • Research Programme 3: **Finfish Aquaculture** • Research Programme 4: **Shellfish Aquaculture** • Research Programme 5: **Fisheries Resources** • Research Programme 6: **Seaweed** • Research Programme 7: **Offshore Oil & Gas**	• Research Programme 1: **Marine Biodiscovery/ Biotechnology** • Research Programme 2: **Marine Technology** • Research Programme 3: **Marine Functional Foods** • Research Programme 4: **Renewable Ocean Energy** • Research Programme 5: **Rapid Climate Change**	• Research Programme 1: **Marine Environment** • Research Programme 2: **Knowledge & Information Management** • Research Programme 3: **Socio-Economic & Legal Research**
INDUSTRY INNOVATION PROGRAMME	DISCOVERY INNOVATION PROGRAMME	POLICY SUPPORT INNOVATION PROGRAMME
MARINE RESEARCH INFRASTRUCTURE PROGRAMME • Seabed & Resource Mapping • High-End Computing Capacity (Access) • Coastal & Marine Observation & Monitoring Systems (Test & Demonstration Facilities for Monitoring Technologies and Deep Sea Observatory) • Extension of Ocean & Coastal Monitoring Network • Research Vessel – Ship Time • National Equipment Pool • Robotic Platforms • Test-bed Facility for Offshore Energy • Specialist Laboratories & Facilities		

The Marine Institute's new facilities in Oranmore and Newport coupled with the world-class research vessels, data buoy network and the ongoing oceanographic/biological environmental survey programmes, including the Newport based indicator programme monitoring salmon and eel migratory patterns, represent a unique asset. These together with integrated data and information management systems offer the opportunity to develop Ireland as a global monitoring centre for climate change assessments through the medium of marine and freshwater ecosystems. A key objective will be to raise the profile and international standing of Irish facilities and to raise substantial international funding for these unique facilities. This would represent a significant cross-government initiative involving partnerships amongst the departments (e.g. DCMNR and DELG); State Agencies (e.g. Marine Institute; EPA; Met Eireann) and the higher education sector. It would also afford Ireland a major opportunity to play a lead role at the hub of global environmental research.

Conclusions

Based on the material reviewed in this paper there is no doubt that the challenges surrounding sustainability will be to the fore in planning for the future. In Europe the Lisbon Agenda has highlighted the need to seriously address these issues and to integrate them into all aspects of economic and social planning. In the marine area it is now obvious that in harvesting the wild fish and shellfish resource technological developments have resulted in a situation where the annual stock surplus can be affectively harvested by a much smaller number of operators. The resultant social upheaval in small coastal communities must be urgently addressed in a realistic fashion. The challenge is to move quickly to objective science-driven assessment procedures, to define stock surpluses and live within these surpluses. We can no longer plan on the basis of increasing harvests but rather we must look towards optimising the value and quality of the sea's traditional resources. As outlined previously functioning models do exist for management of marine fisheries both at a national and an international scale.

Given that the supply of wild marine resources is limited but demand for seafood is constantly rising, there is no doubt that aquaculture and novel aquaculture products will fill the niche formally occupied by the traditional wild fish sector. But here too there are valuable lessons to be learned in terms of the sea's inability to support poorly planned aquaculture initiatives and the impacts aquaculture may have on neighbouring marine resources. Finfish aquaculture is moving inexorably towards organic processes and high-energy offshore sites. Work is underway to identify novel species to grow in these offshore sites and there is an increasing interest in utilising the productivity of the oceans, through ocean ranching of both shellfish and finfish. Here too, great care must be taken to ensure that that such innovation is conducted in a biologically sustainable manner and not solely based on economic and technological criteria. Novel genetic assignment techniques such the use of SNPs (Single Nucleotide Polymorphisms) holds out the prospect of fast reliable stock identification, which will greatly facilitate the management of wild and aquaculture fish stocks and the management of ranched stocks released into the wild to graze on the natural food base of the oceans.

The oceans are increasingly important as amenity areas and provide the opportunity for a range of sustainable developments, which not alone could provide access to a high quality environment but could as a by product of such designation, provide the opportunity to extend the areas of protected coasts into marine parks or extensive Marine Protected Areas. Such zones could rejuvenate the productivity of inshore fisheries, while simultaneously providing the basis for high quality sustainable tourism products relating to marine leisure activities such as bathing, diving, snorkling, nature tourism etc.

There are also exciting new possibilities for sustainable marine development, which are just emerging: energy production from the oceans and harvesting the seas untapped biological resources. Marine energy will derive from wind, tide and wave power. Ireland has many natural advantages in harnessing this limitless supply of sustainable energy but it will involve major and protracted investment to realise this potential. Similarly the development of blue (ocean based) biotechnology and biodiscovery industries could support the development of a marine based functional health food industry, while the discovery of, as yet, untapped biological organisms and deep-water chemical compounds, also holds major developmental potential in the area of health care.

References

Anon (2002) National Biodiversity Plan: Department of Arts, Heritage, Gaeltacht and the Islands. April 2002.

Anon (2002) National Spatial Strategy for Ireland 2002-2020. Department of the Environment and Local Government, 2002

Anon (2005) Recommendations on the Implementation and Review of the National Biodiversity Plan: COMHAR – The National Sustainable Development Partnership. May 2005.

Anon (2005) Interim Review of the Implementation of the National Biodiversity Plan 2002-2006: Department of Arts, Heritage, Gaeltacht and the Islands. November 2005.

Anon (2005) Status of Irish Aquaculture 2004, Marine Institute, Galway

Anon (2005) Marine Industries Global Market Analysis, Marine Foresight Series No.1. Douglas-Westwood Ltd.. Marine Institute, Galway.

Anon (2006) Sea Change: A Marine Knowledge, Research and Innovation Strategy for Ireland (2007-2013), Marine Institute, Galway (in press)

Anon (2006) Halting the loss of Biodiversity by 2010 – and beyond. Sustaining ecosystem services for human well-being: Commission of The European Communities, Brussels, 22.05.2006. Sec (2006) 216

Anon (2006) Halting the loss of Biodiversity by 2010 – and beyond. Sustaining ecosystem services for human well-being: Commission of The European Communities, Brussels, 22.05.2006. Sec (2006) 621 [Technical Annex]

Anon (2006) Green Paper: Towards a future Maritime Policy for the Union: A European vision for the oceans and seas: Commission of The European Communities, Brussels, 07.06.2006. COM (2006) 275

Anon (2006) Ireland's Ocean Economy & Resources: Marine Foresight Series No. 4. December 2005. Marine Institute, Galway

Anon (2006) Strategy for Science, Technology and Innovation 2006-2013. Department of Enterprise Trade and Employment, Dublin.

Bolens, R., Minchin, D. and O Sullivan, G., (2005) Climate Change – Implications for Ireland's Marine Environment and Resources: Marine Foresight Series No. 2. April 2005. Marine Institute, Galway. 40pp

Whelan, Ken (2005) International Atlantic Salmon Management – A Model for Marine Resource Strategy, Went memorial Lecture 2005, RDS, Dublin, 24pp

Sustainability of the Irish agricultural sector

Comhar Briefing Paper[1]

Prepared by Craig Bullock (Optimise) and David Styles (TCD)

1 This briefing paper has been prepared to inform the proceedings of the Comhar Conference "Towards Sustainability in the National Development Plan 2007-2013" – 4th to 6th October 2006. Opinions expressed are not necessarily those of Comhar but are intended to encourage debate and greater understanding of sustainability issues.

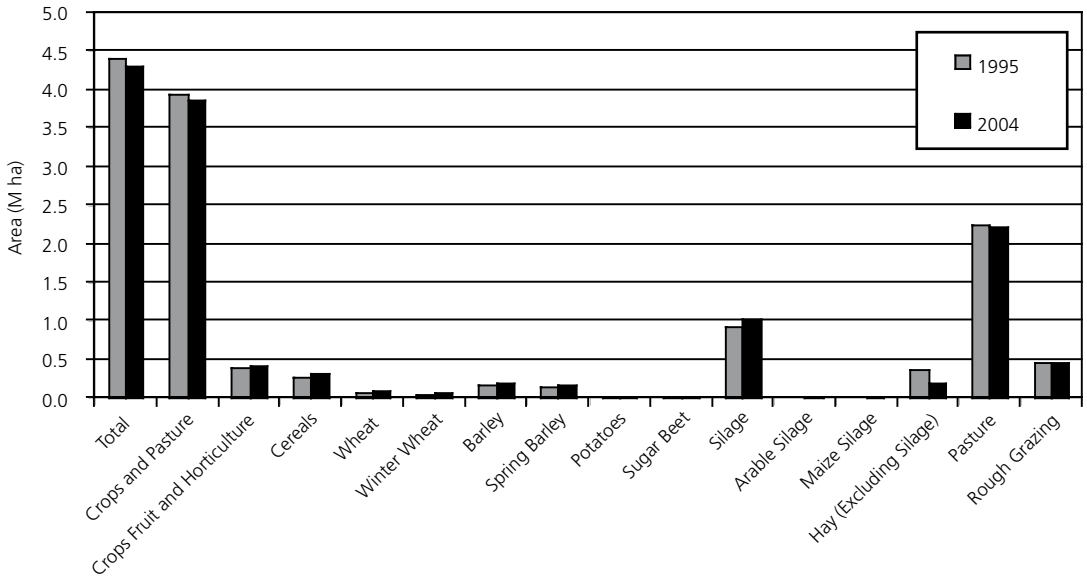
1. Background

Ministerial statements regularly describe agriculture as being an economic activity that has "special character", one that "contributes to the economic and social viability of rural areas" while, at the same time, maintaining an "attractive environment". One motivation for attributing this special character to agriculture is that some very large transfers of public money are required to maintain farming communities. With enlargement to include the New Member States, the EU has had to quash the appetite of a Common Agricultural Policy that has consumed such a large share of the budget for so long. It is also having to bow to international pressures to liberalise trade by removing tariffs, export subsidies and price supports. Furthermore, among some national governments, there is evidence of growing scepticism over the value of transferring such large sums to agriculture given the diminishing economic contribution of the sector and the demands of a more influential urban population.

Nevertheless, there is some justification to the "special character" argument. In many rural areas, agriculture is, indeed, the backbone to the local economy. Despite the policy importance being attached to rural development, many of the more peripheral rural areas currently have few significant economic alternatives to agriculture. Moreover, although earlier CAP productivity incentives certainly did cause many adverse changes to the countryside, much of the rural environment continues to be managed by farming that permits wildlife to survive in a landscape that is valued by society. Hence, the EU has acknowledged the need for a competitive farming sector, for the sustainable management of land for future generations, and for the need to maintain a living countryside.

In Ireland, farming and forestry occupy 70% of the land area. Fig. 1 displays a breakdown of the 4,305,000 ha dedicated to agriculture in Ireland, and highlights the dominance of grassland and animal production (which account for over 90% of agricultural area). There are areas where farming contributes significantly to distinct cultural landscapes or where agriculture sustains a human population that might otherwise have long migrated elsewhere. As farming is so prevalent, it has also contributed to many important semi-natural habitats such as bogs, fens, upland grasslands, maritime grasslands and karstic landscapes. Even aside from the more environmentally sensitive areas, there are intensively cultivated farms which nevertheless harbour small areas of woodland, miles of hedgerows and damp or rushy meadows. However, there are, of course, significant environmental problems too, such as the overloading of waterbodies with phosphates and nitrates. Agriculture is also responsible for a sizeable proportion of the Greenhouse Gasses that contribute to Global Warming. This briefing paper discusses the balance between these external benefits and costs and the prospects for a sustainable future.

Figure 1: Areas dedicated to agricultural land uses, in 1995 and 2004 (Source: CSO, 2006).



1.2. CAP reform

Support to the agricultural sector, be this in the form of national or cross-European measures, is made available under the Common Agricultural Policy. The principles of the CAP were set down in Article 39 of the Treaty of Rome in 1959. These aim to increase productivity, to ensure a fair standard of living for farmers, to stabilise markets, to guarantee food security, and to ensure reasonable prices for consumers. These objectives have largely been met. European farming has achieved a level of stability and efficiency. Although, it has done so at considerable cost in terms of the EU budget, consumer prices and, arguably, the food sectors of third countries.

Recent financial and international pressures have begun to force radical reform. Pressures for trade liberalisation have intensified at the same time as the EU has had to acknowledge a need to revise farm support structures so as to manage the budgetary implications of the entry of the New Member States. In addition, there have been parallel pressures arising from environmental concerns, changing consumer lifestyles and expectations, globalisation and concentration within the retail sector.

Strong pressure for a restructuring of agricultural support has been imposed by the negotiations of the World Trade Organisation (WTO) Uruguay round and by the current Doha round. Trading blocks are being urged to eliminate trade-distorting agricultural policies such as price support, import tariffs and export subsidies. Last year's agreement in Hong Kong on the phased elimination of export subsidies represented a first break-through measure that leaves market access and domestic support as the two outstanding issues to be agreed.

In any case, the EU has already accepted the need to control rising agricultural support in the context of the escalating cost of the CAP. A series of reforms have been made over the years, commencing in the present phase with the MacSharry reforms of 1992 and followed by Agenda 2000 and its Mid-Term Review (MTR) in 2003. Agenda 2000 was a threshold. Specifically, it sought to:

- Ensure the competitiveness of the agricultural sector;
- To promote ways of farming that would maintain and enhance the rural environment;
- Sustain the livelihood of farmers while promoting the economic development of the wider rural economy.

These aims were to be achieved by

- Further reducing guaranteed prices;
- Encouraging environmentally friendly farming practices;
- Promoting integrated rural development;
- Focusing on food quality and safety, animal welfare and environmental protection.

At the heart of these reforms has been a 'decoupling' of agricultural support from production. Decoupling was confirmed by the Luxembourg Agreement of 2003 and represents a fundamental structural change in the support regime. Previously, payments had been largely tied to output and livestock headage with the result that farmers were encouraged to increase output at the expense of the environment and the EU budget. Decoupling involves an extension of direct payments made on an 'area' basis rather than being linked to output. Payments are subject to minimum environmental, food safety and animal welfare standards (cross-compliance). As such, direct payments are considered to fall within the "Green Box" of supports that are non-distortionary from an international trade perspective.

Support to the agricultural sector has habitually been provided under the European Agricultural Guidance and Guarantee Fund (EAGGF). Under this system, the total sum of support made available to agriculture reached a peak in the late eighties. At this time, the Producer Support Estimate compiled by the OECD reached 39% of the value of production. Since Agenda 2000, increasing emphasis is being placed on income support as a component of regional and rural development policy. However, there has been little change in the level of support to agriculture, even though the price support share of the total has fallen from 87% in the late eighties. As of 2003, direct payments accounted for 50% of net-value-added in Irish agricultural sector (Dixon and Matthews, 2005). The European Commission hopes that this level of transfer will diminish. Indeed, one consequence of the switch to direct payments away from price and market supports, is that farmers and processors are being introduced to greater competition. For the more efficient units, this is a positive move which leaves them more able to respond to competition without the restrictions of headage or quota limits. However, the more competitive environment challenges the future of many other farms which had previously been insulated from the rigours of the market place.

The subsequent Mid-Term Review made the Single Farm Payment a central objective of CAP Reform. As well as competition, direct payments facilitate the integration of environmental requirements and incentives, and a decentralisation of the types of financial supports available to farmers. Farm support is now categorised as being either Pillar 1 or Pillar 2. The former represents more conventional agricultural support, including price supports and intervention buying. Pillar 2, on the other hand, is represented by the Rural Development Plan. This includes direct payments to farmers in Less Favoured Areas (LFA), as well as payments for agri-environmental measures, farm forestry, early retirement and diversification. The EAGGF also forms one of the three sources from which Structural Fund expenditure is drawn. Consequently, non-farm rural development expenditure, such as the Leader Programme, is also now being funded through the EAGGF which had traditionally been associated with agriculture.

Under Pillar 2, Member States have been given more flexibility to select specific measures that meet their rural development needs through so called "national envelopes". They also have the freedom to "modulate" payments by redistributing support towards the rural development measures of Pillar 2. To date, though, most Member States have been slow to adopt modulation. There has been some conflict over just how much support should be directed to rural development and how much of this should be represented by payments to agriculture as against support to other non-farm enterprises. In addition, only those farmers signed up to specific schemes are eligible to benefit from many of the rural development payments, in contrast to the support available under Pillar 1. Nevertheless, a progression to Pillar 2 payments is inevitable and gradual modulation has now become compulsory.

2. Ireland – Recent performance and future trajectory under 'business as usual'

2.1. Economic

Primary agriculture contributes 2.7% to Irish GDP, provides 6% of employment and 4.6% of the value of exports. The corresponding figures for the agri-food sector are 8.5% of GDP, 9% of employment and 8.3% of exports. There are, however, regional differences. For example, the farming and processing sectors are responsible for over 50% of jobs in some counties such as Roscommon. Indeed, although Ireland has experienced considerable economic growth in recent years fuelled by new investment in industrial and service sectors of the major cities, the economic contribution of agriculture is still higher than in 13 of the 15 pre-enlargement EU States. Consequently, CAP reforms will have a discernable impact on Ireland. Reforms to the beef sector will be particularly influential as 50% of EU beef export refunds have hitherto been received by Irish farmers, while Ireland's climate gives it a relative disadvantage for the cultivation of many cereal crops in a more competitive market. On the other hand, Ireland is well placed to benefit from the Single Farm Payment. Ireland has the highest area share of land of LFA status and also the highest uptake of early retirement payments. Given this position, Ireland is well positioned to benefit from the Rural Development Plan and is amongst those Member States with the most de-coupled support systems.

The FAPRI[2] Ireland model (Binfield *et al.,* 2003) foresees major changes within agriculture even without final agreement in the current round of WTP negotiations. Even in a baseline situation, they predict a 10% reduction in the value of Irish agricultural output to €4.5bn per annum by 2015 compared with 2004. This corresponds well with the 9.5% long term decrease in agricultural output, relative to 2003, forecast by Dixon and Matthews (2005) based on simulation with a general equilibrium model (IMAGE 2).

Fig. 2 displays trends in livestock numbers from 1995 to 2004, and FAPRI forecasts up to 2010. Fig. 3 displays FAPRI projections for the production-based gross margins of some major land uses from 2004 to 2012. The latter highlights the dramatic decline in production-related gross margins following decoupling in January 2005, and the collapse of the sugar-beet following reduction in EU price support for sugar. The FAPRI model predicts that expenditure on non-distortionary direct payments will need to rise to insulate farmers from value reductions. Farm incomes would therefore be supported through subsidy payments of €2.4bn., a rise of 9% on 2004 levels. Furthermore, it is predicted that farm incomes could benefit from the somewhat stronger market prices that should follow reduced production and the allocative efficiency of not having to keep excessive numbers of animals at a loss so as to qualify for livestock payments. On these estimates, FAPRI puts forwards low, mid and high scenarios for change following a WTO agreement, each of which predict a further reduction in the value of Irish farm output. Depending on which scenario is chosen, this would involve the phasing out of export subsidies over 10-15 years, a lowering of tariffs, reductions of 35-70% in price support and an extension of direct

2 Food and Agriculture Policy Research Institute.

payments. These changes would result in significant reductions in the value of Irish beef and a similarly large reduction in the value of sheep production. Volumes of these products would consequently fall. Likewise tillage crops would suffer a value reduction greater than in other Member States such that the area given over to wheat and barley would fall by up to 20% and 10% respectively.

Figure 2: Trends in agricultural livestock numbers from 1995 to 2004 (Source: CSO, 2006).

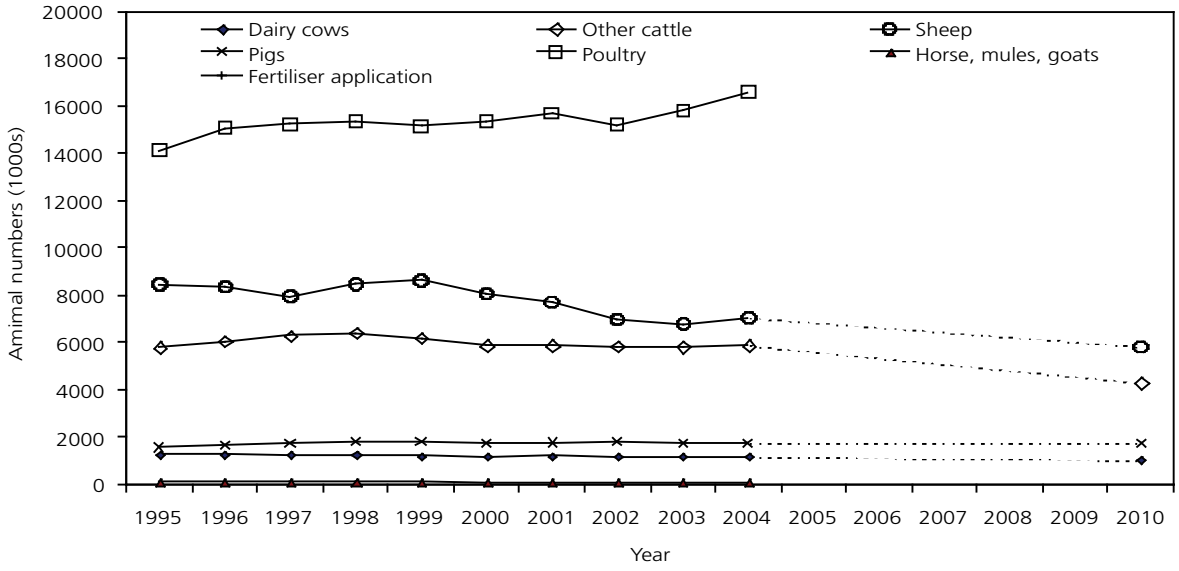
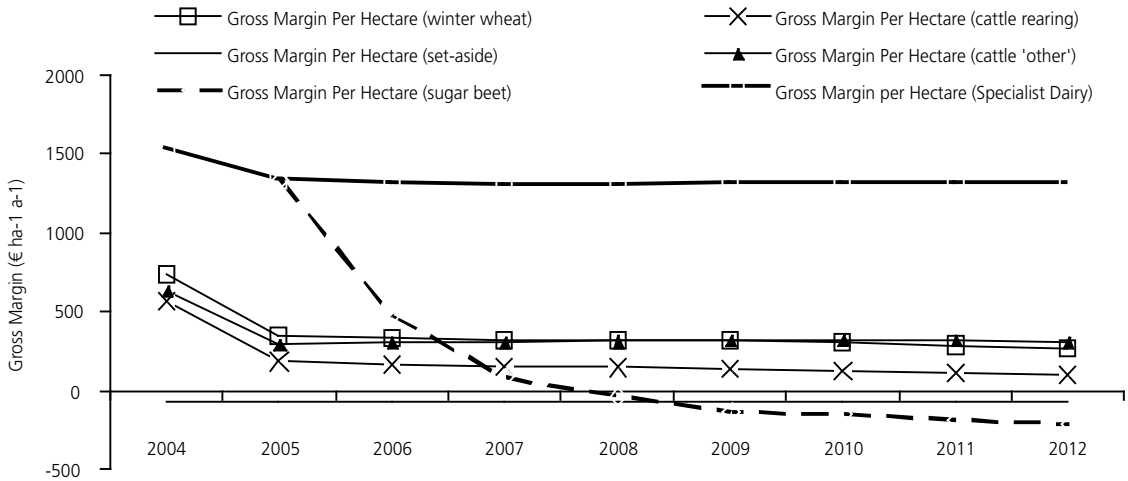


Figure 3: FAPRI-Ireland forecast production-based gross margins for a range of land uses (excludes area-based single-farm payments after 2005).



Dixon and Matthews (2005) used their computable general equilibrium model to explore the implications of the CAP Mid Term Review. They included the impact of decoupling on EU-wide market shares and Irish export values, as well as the impact of reduced price support for milk products and for large farmers. In the model, the result of ongoing reforms in terms of output, prices and farm incomes, becomes a consequence of the competition for resources amongst different agricultural sectors. By comparison with FAPRI, this model simulation predicts that the area under tillage and dairy will increase despite the reduction in the value of their output (i.e. 12.9% for Irish milk values in 2009, relative to 2003). The situation follows from a contraction of beef and sheep production forecast long term output-value decreases of 15.4% and 15.5%, where production was formerly heavily subsidised. Dixon and Matthews believe that beef and sheep prices would increase in response to this reduced output despite the lower return to land, but these activities would be replaced by more extensive dairy and tillage to ensure that land remains in the "good agricultural condition" required to qualify for transfer payments. The overall impact on the Irish economy is minimal. Despite the falling value of many outputs, Breen and Hennessy (2003) predict an income increase of between 25% and 50% for nearly half of all cattle farmers. In contrast, the income of dairy farmers would fall, but the viability of those that remain could be enhanced under the restructuring of quota made possible by the Luxembourg Agreement. In all cases, these outcomes pre-suppose a large degree of adjustment amongst farmers together with likely changes in farm size and ownership.

On the structural side, the underlying viability of farms will be exposed, forcing a reduction in the number of smaller, more marginal farms. Other small farms are likely to survive supported by direct payments, particularly in return for public amenity goods. Many of these, however, will be required to find sources of off-farm income such that over 40% of farms are predicted to become part-time by 2015. Overall, these changes should result in a large proportion of the agricultural sector being represented by farms operating more efficiently than before with a greater focus on consumer markets. Other farms will be contributing to the output of publicly valued goods, such as quality or organic produce, or environmentally sensitive farming. However, even with payments designed to contribute to farm transition, it is impossible to imagine that these changes will not occur without a certain degree of pain. Assumptions of part-time farming also depend on a buoyant economy and more substantial economic development in rural areas. Commercial farming is likely to become concentrated in the East, South-East and Mid-West. Elsewhere there will be an extensification or production as farmers become dependent on other sources of income, including payments in recognition of the public good output of agriculture, namely environment and recreation.

2.2. Environmental

Green House Gases

The National Inventory Report (McGettigan *et al.,* 2006) contains detailed information on Green House Gases (GHG) for Ireland. According to International Panel on Climate Change (IPCC) reporting procedures and emission factors (EF), GHG emissions from the agricultural sector amounted to 18.96 million tones of carbon-dioxide equivalent (Mt CO_2 eq.), or 27.7% of total recorded GHG emissions from Ireland, in 2004. These were dominated by methane (CH_4) which has a global warming potential (GWP) 21 times that of CO_2, and nitrous oxide (N_2O), with a GWP 310 times that of CO2 (IPCC, 1995). Livestock enteric fermentation accounted for 81% of agricultural CH_4 emissions (which in turn accounted for 91% of national CH_4 emissions), whilst manure management accounted for the remaining 19%.[3] Revised, Irish-specific EFs for 2006 indicate an 8% increase for dairy cattle (reflecting higher milk-yields) and a slight decrease for non-dairy cattle (reflecting younger slaughter age following BSE crisis), since 1993. Overall, enteric fermentation emissions declined by 335,580 t CO_2 eq. between 1995 and 2004, reflecting a 100,000 decrease in dairy cattle numbers over that period, although non-dairy cattle numbers increased by 82,000 (Fig.2).

Agricultural N_2O emissions of 7,410,950 t CO_2 eq. in 2004 represented 79% of national N_2O emissions, although the total is 10% less than in 1995 (Fig. 4). Almost 95% of N_2O emissions originated from the 'soils' category in Fig. 4, with the remainder from manure management. For 2004, the National Inventory Report divided 'soil' emissions into direct emissions from applied N (crop-residue, fertilizer and animal-waste), direct emissions of grazing-deposited N, and indirect emissions from volatilised and leached nitrate. These emissions amounted to 2,985,300 t CO_2 eq., 2,814,800 t CO_2 eq. a^{-1}, and 1,370,820 t CO_2 eq., respectively. Synthetic fertilizer application (Fig. 5) was responsible for 73% of direct soil N_2O emissions in 2004, with land-spreading and crop residues responsible for 22% and 5%, respectively. The IPCC default EF of 0.0125 used for soil-applied N may not be representative of Irish conditions[4], as N_2O emissions are known to vary considerably with local conditions, including soil characteristics such as organic carbon and moisture content. There is a need to more accurately assess soil emissions of this potent GHG.

Binfield *et al*. (2003) use FAPRI-Ireland modelling of financial returns and livestock numbers under full decoupling, to predict GHG emission changes by 2012. They estimate that total CH_4 emissions will decline to 9,147,600 t CO_2 eq. a^{-1}, and N_2O emissions to 4,743,000 t CO_2 eq. a^{-1}, representing decreases of 20% and 36%, respectively, relative to 2004.

3 Livestock enteric-fermentation CH_4 emissions of 11,397,960 t CO_2 per annum. Average emissions put at 108.5 kg CH_4 (2278.5 kg CO_2 eq) per head for dairy cattle, and 40 kg CH_4 (840 kg CO_2 eq.) per head for non-dairy cattle.

4 Leahy *et al*. (2004) measured N_2O emissions from an intensively grazed grassland site equivalent to 3.4% of fertilizer and slurry applied N (indicating an EF of almost 0.034).

Figure 4: Scale and sources of agricultural CH_4 and N_2O emissions, in 1995 and 2004 (Source: NIR, 2006).

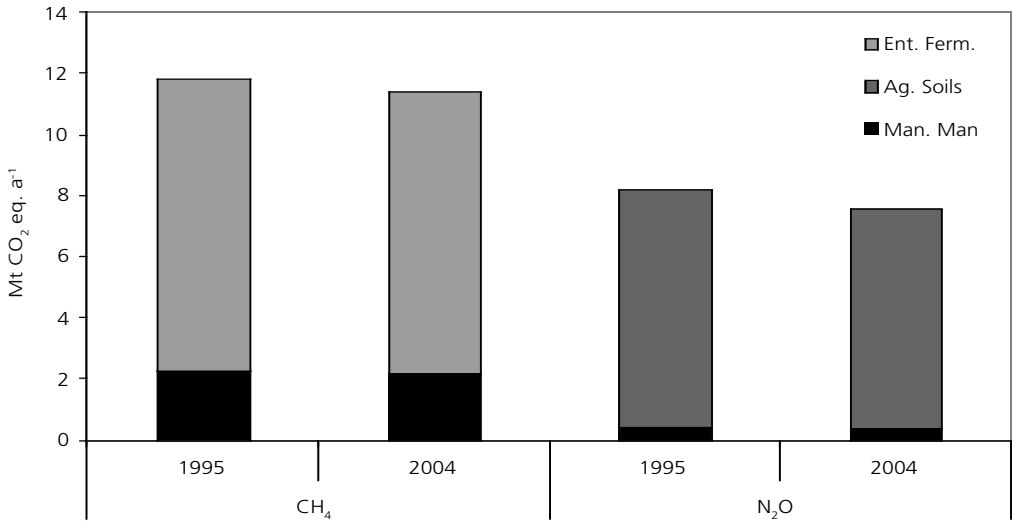
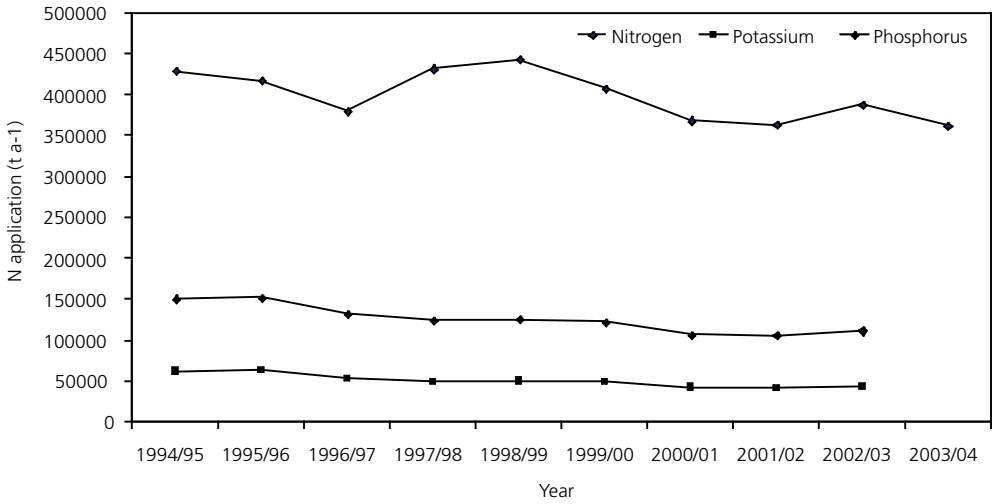


Figure 5: Trends in national fertilizer application from 1995 to 2004 (Source: CSO, 2006).

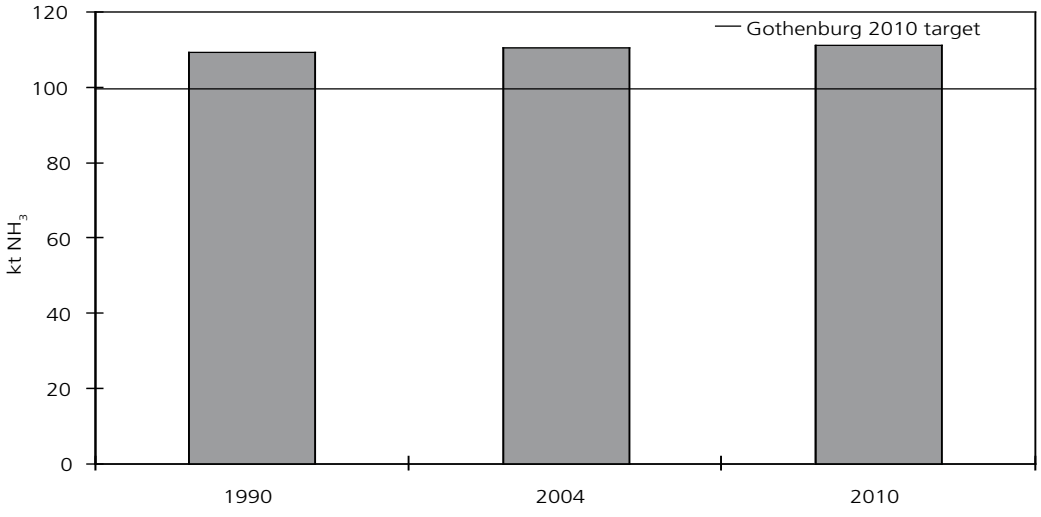
Acidifying gas emissions



Agriculture is responsible for virtually all of Ireland's ammonia (NH_3) emissions, an acidifiying gas of which 110,700 t were emitted in 2004 (CSO, 2006). Cattle farming accounts for more than 75% of these emissions, which mainly arise from animal-waste N (~85%) and synthetic fertilizer-N application (~15%) (EPA, 2004). Animal waste emissions are divided equally between housing and spreading (Hyde *et al.,* 2003). Fig. 6 displays a slight increase in emissions between 1990 and 2004 (1.4%) and from 2004 to projected 2010 emissions (0.7%). The 2010 projection (Hyde *et al.,* 2003) is based on extrapolation from FAPRI-Ireland modelling, assuming a 20% reduction in fertilizer-N application corresponding to a decrease in total cattle numbers to 6.89 million by 2010, counteracted by a 50% increase in both poultry and pig numbers (relative to 1990). Under the Gothenburg Protocol (UN Economic Commission for Europe; UNECE), Ireland is committed to 9% reduction in NH_3 emissions, relative to 1990, by 2010 (i.e. 99.45 kt NH_3 by 2010). The current forecast is 12% above that target.

Agriculture contributes only a minority (<10%) of national nitrogen oxide (NO_x) emissions, mainly from soil N application. Although the use of fossil fuels in farm machinery is ultimately unsustainable, from a national perspective, emissions of VOCs, SO_2 and CO_2 from machinery are relatively minor, and thus not a current priority for policy.

Figure 6: NH_3 emissions in 1990 and 2004 (from inventory data) and projected for 2010, compared against Ireland's Gothenburg Protocol target for 2010.



Water Quality

Increasing controls over point-source emissions to freshwaters in Ireland (improved sewage treatment and IPPC licensing) have left diffuse agricultural emissions of nitrate (NO_3^-) and phosphorus (P) as the dominant contaminants of freshwaters. According to EPA monitoring (EPA, 2004) approximately 30% of river channel length in Ireland is classified as slightly to moderately polluted, and half of this pollution is attributable to agriculture. Agricultural sources are estimated to account for 70% of the anthropogenic P loading to inland waters, 70-80% of which is estimated to come from diffuse soil losses, while the

remaining 20-30% arises from farmyard losses (increasingly controlled). Phosphorus is the key limiting nutrient for freshwater algal growth, and excessive P losses from soils to water are thought to be responsible for freshwater eutrophication (excessive algal growth which is unsightly, reduces plant and fish diversity). The average P content of agricultural soils, as measured by soil-test P (STP) has increased from 1 mg L^{-1} soil in 1950 to around 9 mg L^{-1} soil today, and the nature of P binding in the soil means that these concentrations could take decades to decline (Culleton *et al.,* 1999). While long-term beef trials found that grazed-grassland soil P concentrations of 6 mg L^{-1} were sufficient to maximise beef productivity (Culleton *et al.,* 1999), Coulter *et al*. (2002) found that 80% of Irish grazing soil samples contained more than this level. Elevated STP is a major risk factor for diffuse P losses from soils to water. Research has shown that P losses from agricultural soils in Ireland are around 0.9 to 5.2 kg P ha^{-1} per annum, a level which present s a high potential ecological risk to receiving waters. Revised Teagasc advice to farmers has contributed to a 20,000 t a^{-1} decline in fertilizer-P application since 1990 (saving farmers €20 M a^{-1} in the process), but the national accumulation of soil-P remains at 36,000 t a^{-1} (equal to around 8 kg ha^{-1} a^{-1}).[5]

Nitrate leaching is an issue in some areas, particularly on intensively farmed land in the south and east of the country, and in relation to EU water quality legislation (including drinking water quality guidelines and the Nitrates Directive). Based on the National Inventory Report (2006), nitrate leaching losses, at 10% of soil applied N, equated to 119,576 t N in 2004. However, there is considerable spatial and temporal variation in nitrate leaching, with thin or free-draining soils, and porous or karstified bedrock increasing the risk that soil-applied N is leached when soil water-holding capacity is exceeded and percolation occurs. Dentrification processes in heavier soils may reduce nitrate leaching, but result in higher soil N_2O emissions.

In addition to soil P increase, a major problem contributing to agricultural contamination of waters is poor management of animal wastes, in particular slurry. In part this arises from the sheer number of livestock reared in Ireland (Fig. 2) and the consequent quantity of waste produced during housing (Fig. 7), but it is also due to inadequate storage facilities and spreading capabilities, and inappropriate spreading practices. Cattle dominate waste production, accounting for 92% of total managed organic waste by weight (Fig. 7), including 30% from soiled dairy water, and in addition to the 55 Mt they deposit directly onto fields annually during grazing. Quantities of managed organic waste and the volume of required storage facilities are dependent on the duration of indoor cattle housing, which is in turn dependent on climate and soils. According to the Nitrates Action Plan (NAP), minimum storage requirements should increase from the south and east (16 weeks), through the west (18 weeks) and to the north (20-22 weeks) (Table A1 in Annex). Inadequate slurry storage capacity and spreading capability is thought to be a major factor for inappropriate slurry spreading on wet soils or prior to rainfall events when large quantities of slurry may be washed directly into water courses resulting in massive nutrient loading, oxygen depletion and fish kills (EPA, 2004). The spreading of slurry adjacent to water courses is forbidden under REPS, but is common practice on more intensively managed farms and significantly

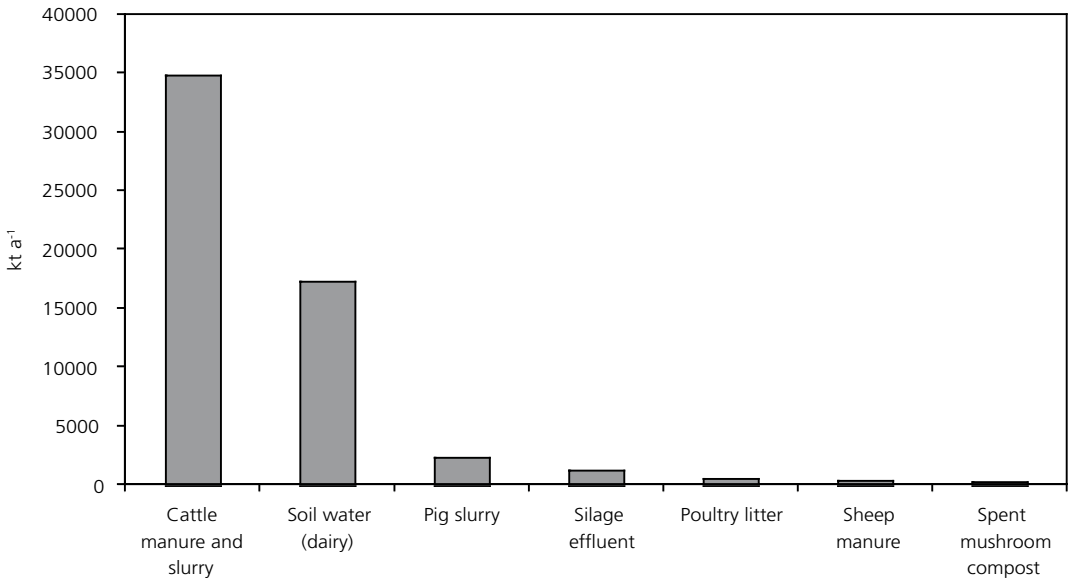
5 This is in excess of agronomic requirements when P inputs of 14,126 t a^{-1} from feedstuffs and 3,828 t a^{-1} from mineral supplements are considered (EPA, 2004).

elevates the risk of water pollution incidents. In addition, slurry and dirty water spreading has been associated with faecal contamination of aquifers (38% of aquifer samples exhibit such contamination: EPA, 2004) and drinking water supplies. This problem is of particular concern in the karstic regions of Clare and Galway, where there is little soil cover to 'filter' cattle waste. By comparison, the contribution of more noxious pig slurry to overall agricultural waste is small, but even small quantities of this slurry can be highly degrading to water courses. Slurry application also contributes to soil N and P over-loading, thus contributing to nitrate leaching and P losses to water. The forecast decline in cattle numbers should help to improve waste management and nutrient management planning, although soil P concentrations will take decades to reduce.

Habitats

It has been estimated that, of the 35 recognised land-based habitats, at least 26 occur on farmland (Fossitt, 2000). Many of these habitats are preserved through low input farm management and grazing. However, recent years have witnessed a contraction or degradation of this habitat due largely to an intensification of production or increasing specialisation on particular crops, notably grassland systems. Both policy and agri-business (food processors/buyers and chemical companies) have been influential in these trends. These, together with losses of traditional farming practices, have resulted has a general loss of biodiversity marked by the decline of many formerly common farmland bird species such as the grey partridge, yellowhammer, or corn bunting. Habitats are becoming increasingly fragmented and isolated within small pockets on individual farms (EPA, 2004). A continuation of these trends could cause extensive further biodiversity loss, including perhaps more than 80% of existing farm syrphid fauna (EPA, 2004).

Figure 7: Quantities of managed organic waste produced within the agricultural sector (1000 wet tonnes per annum). Source: EPA, 2004.



Overgrazing of upland areas and commonages leads to peatland desiccation, erosion, pollution of salmonoid streams and the replacement of heather and diverse vegetation mosaics with unproductive nardus dominated grassland. The EPA (2004) attribute this overgrazing of commonage areas to a huge increase in sheep numbers which, in the 1980s, rose from 3.2 to 8.9 million between 1980 and 1992. In addition, hay making has been replaced by silage production (Fig. 1) with adverse consequences for farm pollution (silage effluent) and biodiversity. Many grassland farms also previously received grants for farm drainage. This drainage affected more than 30% of the farmed area and destroyed many valuable wet grazing areas and small-scale habitats. Rarely were these transformed into productive land.

There is concern that price and productivity pressures, due to policy and consolidation within the agri-business sector, have encouraged excessive use of pharmaceuticals within the dairy sector and of pesticides and herbicides within horticulture. Nevertheless, the dominance of beef grazing in Irish agriculture means that herbicide and pesticide use, together with the associated biodiversity loss, has been less than in many other EU countries with more intensive agriculture. In fact, farming plays a crucial role in maintaining many important habitats in Ireland, largely through low-intensity management. Agriculture is also critical in the control of invasive species (a review of such invasive species is currently underway). However, within localised areas, especially in the South-East where cereals and sugar-beet have traditionally been cultivated, chemical applications and past removal of hedge-rows have substantially reduced biodiversity.

The relatively small area dedicated to tillage agriculture, and the wet maritime climate, subdue any significant wind erosion. However, cultivation on peatland soils contributes to erosion, subsidence and oxidation. Compaction and soil C oxidation is an issue for heavily cultivated soils, and there is evidence that overgrazing is compacting soils and contributing to subsequent elevated P losses (Kurz *et al.,* 2006). The contribution of agriculture to the eutrophication of fresh and coastal waters ultimately affects biodiversity within these systems, pushing them towards greater biological productivity but eliminating rarer species requiring pristine conditions (e.g. salmon and brown trout fish species). The biological indicator 'Q' rating system used by the EPA to assess ecological impact on freshwaters is based on the abundance of specific indicator species.

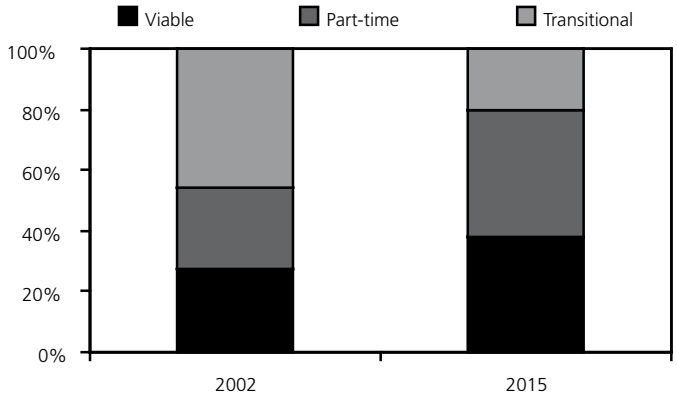
2.3. Social

Both the FAPRI and IMAGE2 models anticipate a continuation of substantial direct payment to agriculture. Under a scenario of a more radical WTO agreement, transfer payments would increase to 84% of the total value of agricultural production. For any other industry, such artificial support would be astounding. The problem, unfortunately, is founded in Engel's Law of economics which recognises that as incomes increase, demand for food rises less than proportionately. The terms of trade for conventional primary food products decline as incomes rise with the consequence that the producers find it more and more difficult to secure a standard of living comparable to other sectors of society. CSO data confirm a 22.5% reduction in the terms of trade index between 1995 and 2003.

Average farm incomes have followed a gradual downward trend over the years, allowing for variation between farm systems. The immediate result of direct payments has been an immediate increase in incomes of 22.7% in 2005 (CSO, 2006), especially for specialist cattle farmers. In the preceding year, average Family Farm Income (FFI) was €30,650 on full-time farms or €6,407 on part-time farms. The proportion of income that is derived from the market has fallen proportionately to the point where direct payments and subsidies in the non-poultry/pigs sectors now represent 90% of average family farm income and up to 180% in some cattle systems. Only around 20% of farms had costs which were less than 50% of gross output and less than 30% of farms have gross margins that exceed €1,000 per ha which is presumed to represent economic viability (Binfield *et al.,* 2003). To some extent, the overall financial position of farming is explained by the large number of farms that are fundamentally uneconomic and marginal. The tight margins under which smaller farms have been operating have led to a sharp reduction in the number of farms and an overall increase in average farm size to 31.4 ha in 2000 from 26 ha in 1991. During this period, the number of farms has fallen by over 18% to around 135,000. The number of farms under 20 ha has fallen by 46% since the early nineties.

In structural terms, this change has been characterised by a sharp reduction in the number of smaller dairy farms, particularly in the West and Borders. The promotion of the Early Retirement Scheme has contributed to the earlier transfer of landholdings to children, but has also been a factor in the reduction in farm numbers. To maintain incomes, many farmers with smaller landownings have turned to off-farm employment such that over 40% of farms have a non-farm income, which in one third of cases is earned by the farmer rather than his or her spouse. This trend is likely to accelerate with decoupling in that this reduces the marginal value of labour spent farming. The 2015 DAF Working Group predicts that the proportion of part-time farmers will reach 70%, with the shift to part-time farming being most apparent amongst those farms judged to have "good demography", i.e. a younger farmer. Older farmers will take early retirement and smaller farms will be amalgamated into larger enterprises. Overall, the number of farms will likely fall to 105,000 by 2015. The Agri-Vision 2015 report predicts a reduction in the number of viable farms to less than 30,000 with as little as 10,000 being full-time. The recent Foresight Perspectives report (2005) believes this to be too extreme, but still anticipates a substantial structural change. From the perspective of social sustainability, the positive scenario would be one in which a proportion of medium and some smaller farms survive. Indeed, it is hard to imagine that any alternative would be politically acceptable. Rural populations will also be maintained by the increasing numbers of people with non-farm incomes choosing to live in the countryside. Even now, 40% of the population live in rural areas, albeit often with urban jobs. The focus will therefore drift from agriculture to the sustainability of this urban generated migration, including planning issues such as settlement patterns, landscape impacts, pollution of aquifers and traffic. These impacts will need to be addressed even if rural development is successful in providing new jobs in rural areas. At present, this has been the exception rather than the rule.

Figure 8: Percentage of farms by viability class (Source: DAF 2015 Working Group).



Dixon and Matthews (2005) predict a 12.9% decline in long term agricultural labour in their IMAGE2 model, based on response to Mid Term Review. The consequences of reduced agricultural employment, and alternative options, vary considerably by region. Opportunities for non-farm employment are more restricted in peripheral areas of the West. A conflict exists between the need to cushion those farmers who might be disadvantaged by their farm viability under the recent reforms and the need to facilitate desirable adjustments through Rural Development schemes. Shucksmith *et al*. (2005) argue that, by directing payments to agriculture to support existing incomes, payments under Pillar 1 could work counter to the objectives of rural and regional development.

2.4. Key policies

There are many policies that relate to the sustainability of agriculture, some directed specifically at guiding agricultural activities, others more general policies with targets necessitating the cooperation of the agricultural sector. Some of the broader policy issues, such WTO reform, are discussed in Section 4 with regards to future direction. The Sixth Environmental Action Plan emphasises the need for greater integration between EU environmental and other policies. Of agriculture, the Baldock Report (2002), commissioned by the EU, proposed a dependence on the fundamental principles of polluter pays, more substantive use of cross-compliance and an adherence to environmental standards, notably those contained in the Water Framework Directive. As referred to throughout this paper, the CAP Mid Term Review is having a large impact on agriculture, although already the distinction between environmental and other payments introduced under the MacSharry reforms is becoming blurred as farm support is transferred to Pillar 2. Direct payments provide an opportunity to extend principles of environmental sustainability, including the requirement of cross-compliance under which farmers must satisfy minimum environmental standards to qualify for subsidy payments.

The principal agri-environmental scheme in Ireland is the Rural Environmental Protection Scheme (REPS) which represented an Accompanying Measure to the 1992 CAP Reform, but is now one the four components of the EU Rural Development Plan. Under REPS, direct payments are made to farmers in return for various obligatory measures including conformance to a waste management plan, grassland management, protection of watercourses, retention of wildlife habitat, maintenance of field boundaries, pollution control, protection of historical features and good visual appearance. In addition, supplementary payments are available for various measures in particular locations. Around 48,000 farms are currently participating in REPS (REPS 2 & 3), representing mostly smaller farms in the west of the country. A former REPS Supplementary Measure was supposed to deal with areas that had become degraded by overgrazing. However, both uptake and results were poor, in part because of the persistence of headage payments. The revised measure included a requirement for Commonage Framework Plans prepared with the assistance of a trained ecologist. Progress was slow, in part because of the difficulty of securing agreement between often large numbers of livestock owners in the frequent absence of accurate data on sheep numbers and ownership. Framework Plans now look likely to be superseded by the direct payments, but problems remain. For example, reduced overall grazing fails to replace earlier active shepherding systems in which grazing intensity needed to coincide with the natural carrying capacity of the land.

Other legislation with heavy implications for agriculture include the Nitrates Directive (91/676/EEC) and the Water Framework Directive (WFD: 2000/60/EC). The Nitrates Directive sets a maximum organic-N application limit of 170 kg N ha^{-1} a^{-1}, and requires monitoring to ensure agricultural practices do not cause excessive nitrate leaching. The WFD states that all freshwaters within EU member states should be of 'good' ecological status by 2015, and that high ecological status must be maintained where this currently exists. This ambitious target is subject to the definition of 'good' ecological status, which is based upon reference conditions established by competent authorities within member states. The Phosphorus Regulations (DEHLG, 1998) set a specific threshold limit of 30 µg L^{-1} P annual median concentration for freshwaters, and stipulate that there should be no deterioration of satisfactory rivers and lakes. Targets must be put in place to reduce P concentrations where they exceed the critical threshold concentration. According to the State of the Environment Report 2004 (EPA, 2004), only 61.8% of national river-monitoring stations comply with these regulations, while just 152 out of 238 lakes (for which recent data was available) were compliant.

Following ratification of the Kyoto Protocol, Ireland is legally bound to meet a target for GHG emissions which should not exceed 13% above 1990 levels over the 2008-2012 commitment period. Ireland is currently some way off meeting this target. Agriculture, being responsible for 28% of these emissions and most of Ireland's land area, is a key target sector for GHG emission reduction. The EU Biofuels Directive (2003/30/EC) set successive targets for national biofuel market penetration of 2% by 2005 and 5.75% by 2010. Ireland is currently lagging these targets in the absence of clear national policy on the issue. There are a number of other policies affecting the agricultural sector, such as the EU Habitats Directive (92/43/EEC), but the policies mentioned above are those with the greatest implications for the future of agriculture.

3. Key issues and challenges faced for the future, globally and locally

Although there have been agri-environmental policies for over ten years, much remains to be done in terms of redirecting fundamental farmer attitudes towards more environmentally sensitive farming and recognition of the amenity needs of wider society. The removal of output incentives provides an opportunity to achieve such a change, as does the increase in part-time farming. There is also the potential to provide more direct payments for proactive habitat management and creation. However, some insidious trends do need to be confronted. For instance, there is a need to address the continuing loss of biodiversity. The potential risks to biodiversity of genetically modified crops have still to be addressed. By contrast with the latter, the prospect of an extension of farm forestry, or of biomass or the production of other energy crops, has received a largely positive press. The manner in which such systems are managed will present important new issues for environmental sustainability.

In the medium term, further liberalisation of global trade in agricultural produce is likely, opening up the EU agricultural sector to competition with developing countries where many products can be produced at lower costs. There are many arguments in favour of trade liberalisation. While some of these arguments are based on arguments of economic efficiency, others are based more broadly on international equity and the sustainability of developing countries. Potentially, developing countries have much to gain from a removal of trade barriers. However, there is a risk of uncontrolled resource exploitation under the open-market conditions that prevail in most developing countries. Rapid and unregulated agricultural expansion in developing countries could pose a serious threat to the environment, on a local and global scale, through problems such as soil salinisation or deforestationsity, presenting risks to biodiversity, global warming and flood protection. There is the threat that multinational corporations could dominate agricultural sectors in developing countries in a manner that would prevent many of the potential economic and social benefits being realised. Therefore, one key challenge for the future will be to ensure that any process of trade liberalisation results in economic gains to developing countries, balanced with social equity and environmental protection. Minimum standards of environmental and social protection could be required as part of an international trade-liberalisation agreement.

The overall impact of market liberalisation on the Irish economy may be positive, but there are subgroups within agricultural that would be vulnerable to this policy change. Firstly, there will be major structural changes which have a social impact. These include the implications of reimbursement through direct payments, a reduction in the number of smaller farms and an increase in the number of part-time farmers. Secondly, the shift away from conventional products, such as beef and milk, to new products and production methods, such as farm forestry or energy crops, will require a full economic assessment of their financial, environmental and social consequences. New production methods will need to be assessed for their environmental impact, and direct payments allocated in manner that maximises the value of the agricultural sector from a sustainability perspective.

Specific challenges include the need to confront environmental degradation, especially water pollution and GHG emissions. There is a particular need to implement nutrient management planning in order to stop over-application of fertilizer which increases the risk of eutrophication in nearby water-bodies. Improving the timing and distribution of slurry application, to comply with the Nitrates Directive and good nutrient management planning, presents two challenges. The first is to finance increased slurry storage capacity, and the second is to avoid transferring pollution elsewhere. It will be important that the reduction of slurry application to soils where it is currently over-applied does not involve the transfer of these applications to sensitive areas.

Ireland is currently failing to comply with targets set out under the Kyoto agreement and EU Biofuels Directive. Energy crops could contribute towards current and future GHG reduction targets, through both a displacement of GHG-intensive livestock production and substitution of GHG-intensive fossil fuels. However, the economic case may be weak (Peters, 2006). It will also be important to choose the right crops, locations and cultivation techniques, to suit Irish conditions and to minimise environmental impacts. Cultivation of some biofuel crops such as oil-seed rape and sugar-beet involves intensive practices and it may not be desirable from a sustainability (or GHG emission) viewpoint to rapidly expand the cultivation of such crops. There are encouraging results elsewhere, in terms of yield and environmental performance, of energy crops such as willow and *Miscanthus* (Elephant grass) and, potentially, conversion techniques could be used to convert solid biomass from these crops into liquid fuels for use in transport. There is limited experience of cultivating such crops in Ireland (although significant areas of willow have been planted in N Ireland), and it will be important that a national strategy for energy crops is devised and supported through the dissemination of agronomic guidance to farmers. Coordinated management of energy crop cultivation could maximise environmental benefits while minimising environmental costs. Much work is required to achieve this.

Finally, the formulation of optimum and sustainable agricultural policies to deal with future challenges, is hugely dependent on forecast changes in multiple sectors. For example, changes in fuel prices or technological developments in fuel processing and energy-conversion, could transform the economics of bio-energy generation. Similarly, efficiency improvements in transport and manufacturing processes, or alternative fuel use, could substantially alter the impacts of transport and fertilizer manufacture in agricultural production and consumption. Agricultural policy needs to consider not just current, but probable near-future, technological developments in all relevant sectors.

4. Review of policy changes likely to make trajectory more sustainable

The decoupling of farm subsidies from production introduced by The Luxemburg Agreement, will act to reduce the intensity of agricultural production, in particular livestock numbers and fertilizer application. Livestock are particularly GHG intensive due to the release of GHGs from fertilizer manufacture and the application of slurry and fertilizers to soils. Therefore, the consequences of subsidy decoupling should help to improve environmental sustainability of the agricultural sector, albeit at the cost of continued financial transfers. The full impact of these changes will not be known for some time, but forecasts from FAPRI-Ireland modelling indicate substantial reductions in animal numbers which should reduce environmental pressures. However, the social and environmental consequences presented by the predicted expansion of extensive tillage or grazing systems in the West are unclear. Moreover, the environmental impact of continued intensification on productive farms in the East will surely need to be mitigated through environmental safeguards and agri-environmental initiatives.

WTO reform and trade liberalisation have further significant implications for the agricultural sector in Ireland. Matthews and Walsh (2005) analysed the possible economic and welfare consequences of the Doha round for Ireland, based on modelling a number of scenarios. They concluded that the overall impact of trade liberalisation was a slight gain for Irish agriculture due to allocative efficiency benefits. However, the net impact on the agricultural sector was forecast to be slightly negative due to the loss of EU transfers associated with export subsidies (despite decoupled payments). The scenario of agricultural trade liberalisation they analysed involved reductions the prices of nearly all agricultural commodities.

Based on such forecasts, and past experience, the overall influence of WTO reform on agricultural sustainability is difficult to gauge, from a national or international perspective. It has the potential to contribute positively, but this potential rests on many factors, especially the policy responses of individual countries. It may also be necessary for the EU to attempt to introduce greater regulatory safeguards regarding production processes for agricultural commodities sold in EU Member States, in an attempt to minimise the more environmentally and socially damaging consequences of unregulated agricultural expansion in developing countries.

At a national level, negative influences on income and employment within the Irish agricultural sector are likely to affect small farms in less prosperous parts of the country and present a challenge to rural development. Such an outlook makes it imperative that alternative sources of income are found for farmers, and there is an immediate need for further strategic research in this area; assessing the potential for alternative crops and ways in which the positive external benefits of agriculture can be both maximised and compensated. From a global social view point, agricultural food production will need to increase to supply a growing population. The production of non-food crops (e.g. energy crops) may also need to increase in order to displace unsustainable fossil-fuel use. In this context, Ireland has a large agricultural land area per capita and thus scope for alternative crops, including organic production, but

the optimum management of the forecast reductions in food production over the coming years may necessitate continued focus on production efficiency. Further Life Cycle Assessment work is needed, in an Irish context, to quantify this and identify the optimum sustainable solutions. Alternatively, if it is decided that global production will need to decline to secure true agricultural sustainability, then dietary changes (i.e. lower meat consumption) may be required.

A review of the Rural Development Plan commissioned by the Heritage Council (Jones *et al*. 2003) supports the extension of area-based payments and REPS, but is critical of the general ethos of the scheme which, as presently formulated, aims so as to protect the environment from the negative externalities of agriculture rather than encouraging the dynamic relationships of traditional farming practices. In the eyes of the farming community, "protection" frequently implies restrictive measures that run counter to efforts to increase efficiency. Yet many habitats are maintained by farming systems, particularly extensive grazing. The Heritage Council therefore argues for a lesser distinction between habitat and non-habitat on both extensive and more intensive farms and a recognition of the need to preserve semi-natural systems. It is also critical of the influence of prescriptive measures on the training of REPS planners and presents examples where former semi-natural systems have been limed or left ungrazed to meet overall REPS requirements for the farm. Along with other commentators, the Heritage Council recommends the use of incentive payments for the creation or maintenance of specific habitats on more intensive farms. To date, none of the more intensive diary or tillage farms in the east of the country have joined REPS due to the scheme's restrictions on fertilizer application or grazing intensity. The Mid-Term Evaluation of the Ireland's Rural Development Plan recommended that a positive habitat management measure be made available to more intensive farms (AfCon 2003).

As for GHGs, the prospect that global warming will ultimately move up the political agenda, means that there will be calls for more comprehensive and stringent accountability of emissions. In the short term, this will be administered through the second round of the EU Emissions Trading Scheme (EU ETS). In the longer term, the mechanism of enforcement is less clear, but ideally it should be as internationally and sectorally extensive as possible. Inclusion of the agricultural sector in such emissions trading is crucial, given the importance of the sector with regard to both current emissions and future mitigation potential. GHG accounting and trading within the agricultural sector will result in higher costs, but also opportunities. Practices such as careful manure management, nutrient management planning and conservation tillage would be encouraged, and there will be continued pressure to reduce livestock numbers. Ultimately, any increases in production costs, most notably for livestock, would be passed on to consumers, so the net impact on Irish farmers would depend on comparative production-related emissions in other countries and consumer response to prices. The potential for utilisation of agricultural land as a CO_2 sink, combined with the potential energy crop production, offers substantial opportunities to the agricultural sector within an ETS. Farmers could offset most of their farm emissions or turn their farms into net CO_2 sinks, and sell off allocated CO_2 permits. There may be potential for large GHG emitters to form alliances with farmers in order to sequester C and offset their CO_2 permit liabilities. In relation to C sequestration, there is a need for a detailed map of soils and soil characteristics (especially organic C fractions) in Ireland: action on which is being contemplated by the EPA.

There are numerous, more specific policy measures that could be used to ensure greater sustainability in the agricultural sector. Nutrient management planning, based on soil testing and nutrient budgeting, similar to what is practiced on REPS farms, could be incentivised or made compulsory. Currently, farmers pay to have their soils tested, and few farmers test their soils every three years as recommended. Therefore, a soil testing programme could be rolled out offering reduced rate or free soil tests to farmers. Given that many soils are above optimum P concentrations, such tests could reduce farm expenditure on unnecessary fertilizer purchase, and reduce the risk of nutrient losses from soils to water. Likewise, there is also the need to acknowledge the benefits, rather than just the costs, of the Nitrates Directive. The Directive would require nutrient accounting and management, and should prevent damage to water courses and drinking-water sources. There could be greater strategic management of agricultural land uses if the susceptibility of different soil types to nutrient losses to water could be quantified. Suitable areas could be farmed relatively intensively while areas vulnerable to nutrient losses could be farmed extensively, perhaps maintained as buffer strips of appropriate vegetation (including willow).

The manner in which animal wastes are spread also needs to be addressed. Alternative techniques of waste-management could reduce both atmospheric emissions of NH_3 through improved slurry spreading. Hyde *et al*. (2003) state that band-spreading and open-slot injection of slurry could reduce emissions by 30% and 60%, respectively, reducing total Irish NH_3 emissions by 10% and 17%. Such procedures may also reduce the occurrence and magnitude of huge nutrient losses to waters that have been documented when heavy rainfall occurs within a few days of spreading. As energy costs increase, and with potential future penalties for GHG emissions, anaerobic digestion of organic wastes and utilisation of captured CH_4 for on-farm energy requirements could become increasingly attractive. This would have the additional benefits of reducing potent CH_4 and N_2O emissions to the atmosphere, and potential nutrient losses to water. The implementation of more pilot projects could be useful to demonstrate the potential of this technology.

Increased fuel costs are also improving the financial viability of energy crops as an alternative source of income for farmers. While some energy crops may not be particularly advantageous from a GHG (or more general environmental) perspective due to intensive cultivation procedures, perennial crops such as willow and *Miscanthus* (Elephant grass) could help to reduce national GHG emissions, minimise fertilizer requirements and reduce the production of animal waste. In fact, willow has been successfully used in Sweden and N. Ireland to treat human waste water, and could similarly be used to treat animal wastes (the dense root mat and high transpiration rate rapidly absorbs water and nutrients from the soil). Teagasc is also experimenting with *Miscanthus* as a biofilter. The rapid growth and extensive below-ground biomass of such crops may increase soil C storage, improving soil quality when grown on tillage land, and acting as a CO_2 sink, whilst the biomass produced could be used as a low-C fossil-fuel substitute. Financial incentives are required to overcome high initial investment costs for farmers and biomass consumers, although under the new direct payment regime, and current energy prices, energy crops could become economically attractive to Irish farmers. Crop establishment costs total €2500-€3000 per hectare, and there is considerable uncertainty regarding future market conditions combined with an aversion to the risk associated with such long-term investment. Further research is needed to ensure optimum management and dispersal of energy crop cultivation from an economic and environmental

perspective. Teagasc are beginning to do this, but the pace of research and information dissemination will need to pick up if energy crops are to offer a viable alternative to farmers facing uncertainty and reduced incomes.

Recent incentives for biofuels in Ireland will lead to some limited penetration of bio-fuel crops in the agricultural sector. Such crops could include oil-seed-rape and sugar-beet, following traditional bio-fuel production methods in Europe. The biodiesel and ethanol produced will result in GHG-emission savings, but could also have environmental impacts associated with the intensive cultivation techniques used for these crops. Of particular concern are the GHG emissions and water pollution associated with the relatively high fertilizer application rates often used for these crops. New techniques being developed to produce bio-fuels from more environmentally-sensitive crops (e.g. willow and *Miscanthus*) are being developed (e.g. lignocellulosic digestion, followed by traditional fermentation to produce ethanol). There is a need for research in this area, to identify the feasibility of implementing such techniques in Ireland in order to maximise the potential environmental benefits of bio-fuels. A cost-benefit analysis should also be conducted to inform the policy debate on the most cost-effective GHG mitigation strategy involving non-food agricultural production. In particular, the relative merits of bio-fuel production to substitute oil, and solid energy crop production to substitute C-intensive peat and coal, need to be comprehensively assessed.

The EPA has recently granted permission for the first, limited trial of Genetically Modified Organisms (GMOs) on Irish soil. GMOs are controversial. Environmental arguments are used for and against their cultivation. GMOs have the potential to improve nutrient-efficiency and reduce pesticide requirements for particular crops. Although Ireland has an abundance of agricultural land, global pressure on land and resources, in particular within developing countries, makes the prospect of developing crop characteristics such as improved efficiency and greater drought tolerance, etc, a major potential advantage in terms of sustainability. However, the potential benefits must be weighed against the possible risks, which are currently theoretical and poorly quantified. More research is required to assess these risks. In the meantime, the EU is implementing a precautionary approach with strict regulation of GMO products, and future decisions are likely to be taken at an EU level.

Summary of recommended policy changes

1) It is imperative that policy formulation and assessment becomes integrated among government departments, sectors and disciplines to identify optimum strategies to improve sustainability. Integrated assessment may identify new solutions that simultaneously contribute to the economic, social and environmental pillars of sustainable development;

2) Fund multi-disciplinary research quantifying the environmental (and associated social and economic) costs of agricultural production (and any processes displaced following agricultural diversification) using LCA and cost-benefit analysis;

3) Combining the above principles, set up a working group to devise policies that will manage the agricultural changes forecast to arise in response to decoupling of direct payments and future WTO reform, to ensure optimal outcomes; i.e. extensification in sensitive areas coupled with diversification into non-food-crop production, could make a greater contribution towards national sustainability than widespread extensification. Coordinated spatial planning will be integral to optimal solutions (DAF);

4) More imaginative agri-environmental policies that encourage positive farming practices relevant to extensive and intensive production areas:

5) Pursue, at an EU level, reform of the ETS to ensure that tighter future emission allowances are set, and that all major sectors and GHGs are included in the scheme (including agricultural sources and sinks) (DEHLG);

6) Introduce a coordinated, targeted policy to stimulate energy-crop production, including establishment grants for farmers and incentives for potential consumers. Initial results should be monitored to ascertain the environmental and socio-economic performance of these crops in an Irish context; (DAF and DCMNR for energy substitution);

7) Fund applied research and pilot projects to examine the use of solid energy crops as bio-fuel feedstock, to ensure that future EU targets on biofuel use can be met with minimum recourse to environmentally-damaging intensive tillage cultivation (e.g. for oil-seed-rape and sugar-beet) (DAF, DEHLG and DCMNR);

8) Encourage nutrient-management planning for all farmers through free or subsidised soil testing and Teagasc advice (DAF);

9) Promote an integrated farmer approach to more environmentally-friendly manure management. In particular, the timing and method of slurry-spreading could be improved through regulation and enforcement combined with financial assistance for storage facilities and spreading equipment (DAF).

Conclusion

Given current trends in the reform of European agricultural, it is not fanciful to foresee a situation where, in the not too distant future, the rationale for agricultural policy will be almost the mirror image of that of the past. Whereas agriculture was formerly dependent on productivity-based payments that paid little attention to sustainability, the decoupling of payments from production means that farmers will be able to choose between entering a competitive market or being increasingly reimbursed for environmental outputs. Most likely, this choice will be a continuum rather than an 'either/or' decision. The underlying pressures for such change have been building for many years even if national politics within the EU have made it difficult to relinquish previous support regimes. The future could involve all farmers, those in marginal areas and others in the more productive areas, being reimbursed for some degree of environmental management. There are possible opportunities for the production of organic or high quality food products, for energy crop production, and even for payments in return for carbon storage.

There are challenges to overcome. One problem is the failure of governments and farm groups to sufficiently prepare their farming sectors for this change by having treated agri-environmental policies as just another supplementary source of income, or unnecessary regulation. Another challenge will be social impacts associated with the predicted reduction in the number of farmers. There are also environmental challenges such as the extent of biodiversity loss in some areas or the saturation of soils with phosphates. However, it is certain that transfers will continue to be made to agriculture and that, so long as farmers have the flexibility to be innovative and productive, they will respond positively to such incentives as they have done in the past.

References

AfCon Management Consultants in association with University College Cork. 2003. CAP Rural Development Plan 2000-2006. Mid Term Evaluation.

Agri Food 2010. 2000. Main Report, Stationary Office, Dublin.

Agri Vision 2015 committee. Report of the Agri Vision 2015 Committee. Dublin.

Binfield, J., Donnellan, T., Hanrahan, K., Westhoff, P. The Luxembourg CAP Reform Agreement: Implications for EU and Irish Agriculture. Teagasc, Dublin, 2003 p. 1-79.

Breen J. and T Hennessy. 2003. The Impact of the MTR and WTO reform on Irish farms. FABRI Ireland Outlook 2003. Medium Term Analysis for the Agri-Food Sector. Teagasc, Rural Economy Research Centre Dublin Pp. 70-78.

Central Statistics Office, 2006. http://www.cso.ie/ Accessed June, 2006.

Coulter, B., Murphy, W.E., Culleton, Finnerty, E., Connolly, L., 2002. A survey of fertilizer use in 2000 for grassland and arable crops. Teagasc, Johnstown Castle Research Centre, Wexford.

Connolly, L., Kinsella, A. & Quinlan, G. 2004 & 2005. National Farm Survey 2003 (and 2004). Teagasc, Dublin

Culleton, N., Murphy, W.E., Carton, O.T., Cuddihy, A., 1999. An assessment of the long term effects of three phosphorus fertilizer regimes on soil phosphorus and sward composition. Teagasc end of project report, Wexford, Ireland.

Dixon, J., and Matthews, A., 2005. Impact of the 2003 Mid-Term Review of the Common Agricultural Policy. ESRI special article, ESRI, Dublin.

EPA, 2004. State of the Environment Report 2004. EPA, Wexford.

Fossitt, J. 2000. A Guide to Habitats in Ireland. The Heritage Council, Kilkenny.

Hyde, B.P., Carton, O.T., O'Toole, P., Misselbrook, T.H., 2003. A new inventory of ammonia emissions from Irish agriculture. Atmospheric Environment 37: 55-62.

Jones, D.G.L, Bignal, E., Lysaght, L., Baldock D. Phelan, J. 2003. A Review of the CAP Rural Development Plan, 2000-2006: Implications for National Heritage, Heritage Council, Kilkenny.

Kurz, I., O'Reilly, C.D., Tunney, H., 2006. Impact of cattle on soil physical properties and nutrient concentrations in overland flow from pasture in Ireland. Agriculture, Ecosystems and Environment 113: 378-390.

Leahy, P., Kiely, G., Scanlon, T.M., 2004. Managed grasslands: A greenhouse gas sink or source? Geophysical Research Letters 31: L20507.

Matthews, A., and Walsh, K., 2005. Economic consequences of the Doha round for Ireland. Forfás final report, Trinity College Dublin.

Matthews, A, O'Toole, R, Jensen, J. 2003. The IMAGE Model: Decision Making Tool for the Food Industry, Department of Economics, Trinity College Dublin.

McGettigan, M., Duffy, P., Connolly, N., O'Brien, P., 2006. National Inventory Report 2006. EPA, Wexford.

NUI Maynooth & University College Dublin. 2005. Rural Ireland 2025: Foresight perspectives.

Peters, J. 2006 Biodiesel: A New Oildorado. Proceedings of the World Congress of Environmental and Resource Economists, Kyoto, Japan, July 2006.

Shucksmith, M., Thompson, K.J. Roberts, D. 2005. The CAP and the Regions: The Territorial Impact of the Common Agricultural Policy. CABI Publishing, Wallingford, Oxfordshire, UK.

Appendix A1.

Zones and Minimum Periods of Storage Capacity for Livestock Manure, from the NAP for Nitrates Directive (DAF and DEHLG, 2005)

Nitrates Action Programme Zones and Minimum Periods of Storage Capacity for Livestock Manure		
Zone A	Zone B	Zone C
16 weeks	18 weeks	20* or 22 weeks weeks
Carlow	Clare	Cavan
Cork	Galway	Donegal*
Dublin	Kerry	Leitrim*
Kildare	Limerick	Monaghan
Kilkenny	Longford	
Laois	Louth	
Offaly	Mayo	
Tipperary	Meath	
Waterford	Roscommon	
Wexford	Sligo	
Wicklow	Westmeath	

Economic, social and environmental performance of the Irish forestry sector

Briefing Paper for Comhar[1]

Prepared by Kenneth A. Byrne and Thomas Legge

Wednesday October 4th 2006

1 This briefing paper has been prepared to inform the proceedings of the Comhar Conference "Towards Sustainability in the National Development Plan 2007-2013" – 4th to 6th October 2006. Opinions expressed are not necessarily those of Comhar but are intended to encourage debate and greater understanding of sustainability issues.

Background

> *"Forestry is a complex activity – a renewable resource with a minimum 40 year cycle, an alternative agricultural land-use, an agent of landscape change, a wildlife habitat, an environment for recreation, a carbon sink, and, not least, the source of raw material for a range of timber-based industries. It requires long term planning and foresight – decisions made today will impact on wood production, delivery of environmental services, and the social effects of forestry over the next four to five decades."* Fennessy (2005)

Following centuries of exploitation, forest cover in Ireland 100 years ago had been reduced to about 1% of the land area. In the intervening period active state promotion of afforestation has reversed this decline and by 2005 forest cover was approaching 10% of the land area. The state sector dominated afforestation until the mid 1980s. Since then government incentive schemes have led to increasing private sector afforestation and currently 31% of all forests are in private ownership. The rate of afforestation has been so rapid that approximately 54% of all forests are less than 20 years old.

The majority of these forests are coniferous plantations with the principal species being Sitka spruce (*Picea sitchensis* (Bong.) Carr.). Competition with agriculture has often confined afforestation to land considered marginal or sub-marginal for agriculture. More recently government grants have favoured a move towards more productive mineral soils and the planting of broadleaf species. Coniferous forests account for some 78% of the forest estate with the balance comprised of broadleaved and mixed woodland.

Throughout most of the 20th Century the primary aim of afforestation and forest management was to produce timber. This was in turn seen to promote employment, particularly in rural areas. However there has been a gradual shift away from this since the 1960s. Recognition of the amenity values of forests was followed by a growing awareness of the importance of the environment. While there was growing concern about the potential negative impacts of afforestation there was also an appreciation that forests could also enhance the quality of the environment. This changing perception of the role of forests gave rise to a number of standards seeking to establish standards for sustainable forest management (Farrell and Byrne 2002).

This paper aims to review the economic, social and environmental performance of the Irish forestry sector over the 2000-2006 period, identify the challenges and opportunities facing the sector, and consider what policy mixes, including investment, would improve sustainability prospects over the 2007-2013 period.

1. Performance of the Irish forestry sector, 1990-2006

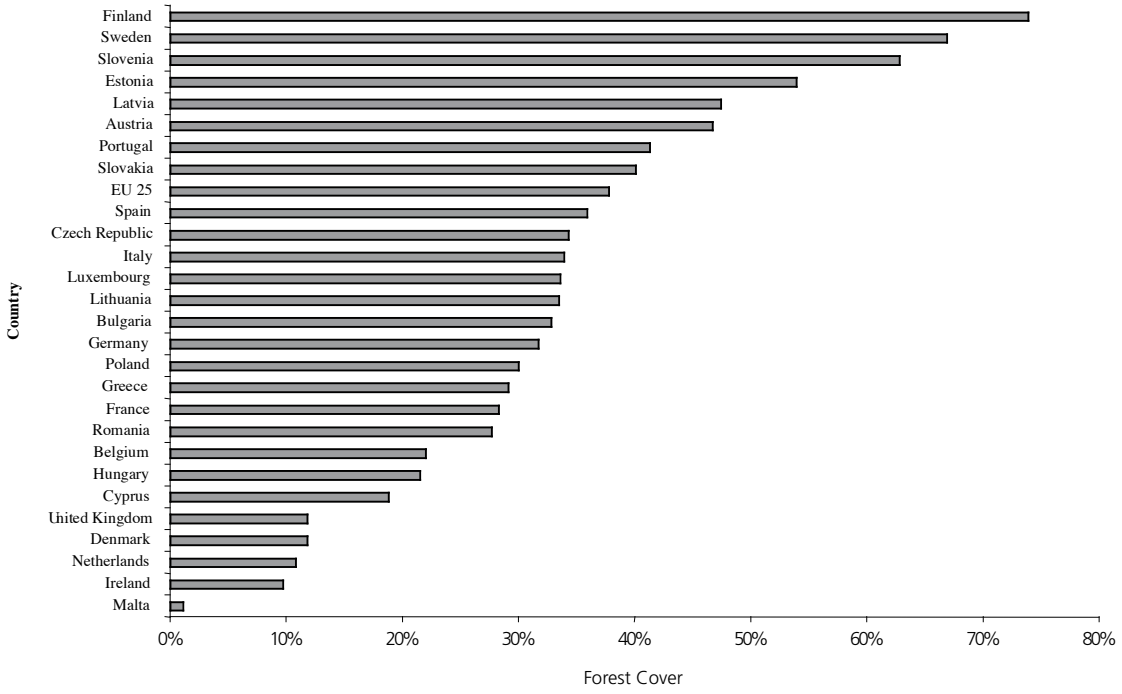
Ireland's forestry sector is small by European standards (Figure 1). Forests cover 710,000 hectares of land, or about 10% of the total landmass of over 7 million hectares (Table 1). The percentage of forested land is the second lowest in the European Union, followed only by Malta.

Table 1: Extent of forest and other wooded land

Categories	1990	2000	2005
	Area (1000 hectares)		
Total land area (including inland water bodies)			7,027
Forest	441	609	669
Other wooded land	40	41	41
Total, forest and other wooded land	481	650	710
Other land	6,408	6,239	6,179

Source: FAO (2006).

Figure 1: Percentage forest cover in the European Union, by country



Source: FAO (2006).

1.1. Forestry policy in Ireland

The Government's forestry policy was most recently defined in its 1996 strategy, *Growing for the Future* (Anon. 1996). This strategy stated that the ultimate objective was the expansion of forestry so as to maximise its contribution to national and social well being, compatible with protection of the environment. In particular, the strategy adopted the target of afforesting 25,000 hectares of land per annum up to 2000 and 20,000 per annum thereafter up to the year 2030. This would increase the total productive forest area from 464,000 hectares in 1996 to 1.2 million hectares by 2030 (or an increase from 7% to 17% of the land area).

This rate of afforestation was designed to lead to a "critical mass" of annual wood production from 2.2 million m^3 to 10 million m^3 over the same time period, which would provide economies of scale to allow Ireland to develop an internationally competitive wood-processing industry. The National Development Plan 2000-2006 included afforestation as one of four measures making up the Rural Development Plan 2000-2006 under the European Union's Common Agricultural Policy (CAP). Under this plan, forestry should also provide additional income to farmers and rural dwellers and thereby ensure the survival of a vibrant rural society, as well as increasing exports or reducing imports at little marginal cost (since most afforested land was assumed to be marginal), removing regional disparities (since a high proportion of marginal land is in the west), and improving the environment (Collier *et al*. 2004).

Afforestation was mainly conducted by public entities until 1981, when the Programme for Western Development included significant tax-free incentives for afforestation, and in 1987, when improved incentives were offered to farmers in the rest of the country. Further improvements were made in the 1989-93 Forestry Operational Programme and again in the Operational Programme for Agriculture, Rural Development and Forestry, 1994-99. These policy changes produced a sharp increase in private planting from 5,500 hectares per annum in the first half of the 1980s to about 12,000 hectares per annum between 1985 and 1995. The rate of afforestation dropped from 1996 to 1998, as a result of competition from other land uses (Collier *et al*. 2004). The 1996 strategy represented a shift towards private sector afforestation, especially farm forestry, and explicitly called for a ratio of public to private afforestation of 30:70 (Bacon 2004).

1.1.1. Sustainable Forest Management

Irish forestry policy is intended to support Sustainable Forest Management (SFM: see also Appendix). SFM was defined in 1998 as:

> *"The stewardship and use of forest lands in a way and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and that does not cause damage to other ecosystems."* (Anon. 1993)

The Irish government's 1996 strategy has the overall aim "To develop forestry to a scale and in a manner which maximises its contribution to national economic and social well-being on a sustainable basis and which is compatible with the protection of the environment." In the National Sustainable Development Strategy (Anon. 1997), SFM is defined as forestry that:

- Enhances the natural environment, including natural systems such as the carbon cycle
- Harmonises with landscape and incorporates ecological issues including protection of sensitive areas, biodiversity and water quality
- Supports the quality of rural life by providing employment and amenities
- Provides timber on a sustained yield basis

This was taken a step further with the publication of the Irish National Forest Standard (Forest Service 2000a) which outlines the criteria and indicators for the implementation of SFM. This is supported by the Code of Best Forest Practice (Forest Service 2000b) which describes all forest operations and the manner in which they should be carried out in order to be consistent with SFM. This is supported further by environmental guidelines in relation to water quality (Forest Service 2000c), archaeology (Forest Service 2000d), landscape (Forest Service 2000e), biodiversity (Forest Service 2000f), harvesting (Forest Service 2000g), aerial fertilisation (Forest Service 2001), and forest protection (Forest Service 2002).

There have also been developments regarding certification and currently all of Coillte's forests are certified by the Forest Stewardship Council (FSC). In addition at least two private forestry companies have achieved FSC certification and other private forestry companies are seeking certification. Currently 95% of the timber produced in Ireland is certified to FSC Forest Management Standards and all the major sawmills and panel board mills have chains-of-custody certified to FSC standards (Anon. 2003). Government policy in Ireland has aimed to support the establishment of a viable and self-sustaining forestry sector. The expectations for the forestry sector have moved from an original emphasis on maximising timber yield to encompass the potential broader contribution of forestry to sustainable development, including the role of forestry in the enhancement of the environment, the provision of employment in rural areas and the contribution of the forestry sector to Ireland's national heritage.

1.1.2. Public support for forestry's social and economic benefits

Successive Irish governments have supported afforestation through grant aid schemes. Government support is necessary because the benefits of forestry to society are often hidden, long-term or accrue to society and not to the individual forester. To the individual, the lack of returns for 15-20 years – even under the shortest rotations – provides a major disincentive to invest in forestry as an enterprise. Even the first thinnings are not likely to yield significant returns; this occurs only from the second and subsequent thinnings up to clear-felling at around 40 years' growth (Collier *et al*. 2004). Studies have shown that the annual premium paid to investors is the most important quantifiable factor in the decision to afforest. Other factors include the attractiveness of alternative enterprises and, as a positive factor, the availability and rate of remuneration from off-farm employment. Returns from sales of thinnings and clearfells, being heavily discounted, have very little weight in the afforestation decision. (Collier *et al*. 2004).

To society as a whole, however, forestry provides many benefits, many of which are non-marketed or intangible goods. Table 2 outlines some of the different services that society enjoys from forests. Many of these benefits are intangible and are not marketed, and therefore require government support. The ongoing reform of the CAP under Agenda 2000 divides support into two pillars, the first concerned with income support with the emphasis on food production, and the second concerned with rural development policy, especially the provision of identified public goods with an emphasis placed on environmental and rural protection objectives.

Table 2: Value of forests and forestry

Economic functions	Source of income
	Employment
	Provision of renewable resources for production and household consumption
	Provision of a local and renewable source of energy
	Supply of materials for high-quality wood products
Environmental functions	Ecosystem habitat for a diversity of species
	Enhancement of landscapes
	Protection of water resources
	Carbon sequestration
	Ecological stability in mountainous regions, especially in safeguarding against avalanches and landslides
	Preventing and stopping soil erosion
	Combating desertification
	Purifying the air
	Reduced greenhouse gas emissions when forest products displace fossil fuels for energy
Social functions	Amenities for urban dwellers
	Recreational and preventive healthcare opportunities
	Protecting against natural disasters
	Making rural areas attractive for living
	Being a cultural heritage and spiritual refuge

Adapted from European Commission (2006).

Environmental economists often assign approximate values to non-marketed or intangible goods by inferred values or other means that attempt to describe the value that a society derives from an environmental good. Using such methods, Bacon (2004) calculates the value provided by Irish forests in terms of recreation; carbon storage; biodiversity and conservation; landscape; water supply, quality and flood control; health; and heritage. Bacon finds that forestry could be worth up to €88.4 million per annum, but notes that the "experience over the past decade indicates that promoting this agenda may be perceived to conflict with the attainment of maximum commercial timber values" (Bacon 2004).

The exclusion of the forestry sector from the EU greenhouse-gas emissions trading regime means that there is no formal market mechanism to identify the value of trees to sequester carbon. However, the economic value of contribution of carbon sequestration by forests to meeting Ireland's Kyoto commitments can be estimated by comparison with the market price for carbon credits. For instance, if afforestation since 1990 creates a net carbon sink of 1.6-1.8 Mt C per year during 2008-2012 (Bacon 2004) this would have a value of €24 to €27 million per year in the period, assuming a carbon value of €15 per tonne.

The potential value of the use of forests for leisure is estimated at a maximum of €79 million per annum, based on a national forest that contained broadleaf species, larch and no Sitka spruce, although forests' recreation value declines when consumers are charged an entry fee (Bacon 2004). Forestry is seen as both contributing to and reducing biodiversity in Ireland. The impact of forestry on biodiversity depends not just on the species planted and the habitats it provides, but also the use to which the land would have been put if it had not been afforested. Bacon (2004) provides a "conservative" estimate for the value of the increase in biodiversity of €1.6 million per annum for every 20,000 hectares planted, assuming that 10% of the forest estate meets certain minimum standards in biodiversity enhancement. Evidence from the United Kingdom suggests that forestry can lead to avoided deaths through improved air quality. Bacon (2004) concludes that forestry in Ireland has failed to realise its potential to enhance the landscape, whereas it has a small but negative impact on the value of water supply and quality.

1.2. Economic performance of the forestry sector

The forestry sector was worth an estimated €763 million in 2002 (Bacon 2004). The main economic activities associated with forestry are the planting, maintenance and harvesting of forests, and the processing of the timber that is produced. In 2002, over 14,000 farmers were engaged in forestry and virtually all current annual afforestation is undertaken by farmers and other private individuals. With 1,400 new entrants each year, the number involved is expected to be around 20,000 by 2007 (Bacon 2004). The annual volume of timber produced from Irish forests is projected to increase from around 3 million m^3 in 2002 to over 8 million m^3 by 2030, of which about 60 per cent will come from farmer-owned plantations.

The afforestation targets of the 1996 strategy, as stated above, have not been realised (Table 3). Moreover, afforestation is now almost completely carried out by the private sector, following the collapse in afforestation by the state-owned forestry board, Coillte Teoranta, after 1996. This was due to a European Commission decision that Coillte Teoranta, as a public entity, could not claim the forestry premium provided for in Article 2(1)(c)2. The effect of this decision, which became effective on 1 August 1996, was to remove Coillte Teoranta from competing in the marketplace for land for afforestation. The additional decline in afforestation from 2003 was due to a reduction in Government grants.

Table 3: Public and private sector afforestation during 1996-2003

Year	Target	Total	Outcome Private	Outcome Public	Shortfall	Ratio public: private
1996	25,000	20,982	16,556	4,426	4,018	21:79
1997	25,000	11,444	10,583	861	13,556	8:92
1998	25,000	12,928	10,002	2,926	12,072	23:77
1999	25,000	12,667	11,776	891	12,333	7:93
2000	25,000	15,696	14,231	1,465	9,304	9:91
2001	20,000	15,463	15,147	316	4,537	2:98
2002	20,000	15,054	14,735	319	4,946	2:98
2003	20,000	9,097	8,969	128	10,903	1:99
Totals	185,000	113,331	101,999	11,332	71,669	
Mean	23,125	14,166	12,750	1,416	8,959	10:90

Source: Bacon (2004).

Afforestation in Ireland has been dominated by coniferous species – the principal one being Sitka spruce. This has the attraction of high productivity, short rotation lengths and relatively certain financial returns. However it does have the inherent risk of over reliance on a single species, potential consequences for biodiversity water quality and the visual landscape. Government policy has tried to improve the diversity of species in Irish forests and extend the range of potential end-uses by setting a target of 30% for the mix of broadleaf species in planting, but this target has not been reached. This is due to the financial attractiveness and greater investor certainty associated with conifer afforestation and the cessation of premium payments after 15 to 20 years, which is long before an investor can begin to realise revenues from broadleaf thinnings. Table 4 shows the proportion of broadleaf in planting in the afforestation of recent years.

Table 4: Proportion of broadleaf planting during 1996-2003

Year	%
1996	15.0
1997	15.0
1998	15.9
1999	15.1
2000	12.9
2001	12.4
2002	17.4
2003	22.8
Whole period	15.6

Source: Bacon (2004). Figures for 1996/7 are estimates.

1.3. Social performance of the forestry sector

The forestry sector provides an estimated 12,000 full-time job equivalents (COFORD 2005). Phillips (2003) estimated that a total of 3,780 people were directly employed in forestry. Of these 2,375 were involved in crop establishment with the remainder employed in harvesting and logistics. An estimated additional 6,000 people or more are employed in timber processing in Ireland. Employment from forestry is concentrated in the less developed areas of the country and the growing sector has good linkages to the economy. Most input is sourced in the economy and most labour is local. Bacon (2004) estimates that an additional five jobs created in forestry will lead to an additional three jobs elsewhere in the economy as initial incomes are spent and new inputs for the expansion are sourced.

The total market for sawn wood in Ireland is estimated at 1.65 million m^3. Irish-produced sawn timber is versatile but does not cover all categories of use demanded by the market. For this reason, the market that is accessible to Irish timber is smaller at approximately 1.14 million m^3. Irish timber has a 65% share of the accessible market and dominates the pallet and fencing markets (Bacon 2004). There has been significant investment in recent years with over €100 million being invested in technology and additional capacity since 1999. In the past four years sawn output to the Irish market has increased by 37% and at 361,000m^3 per annum, exports to the United Kingdom (including Northern Ireland) have doubled. Studies suggest that the potential role of Irish-grown hardwood has not yet been realised. There are over 250 full-time businesses in Ireland that use homegrown hardwood, employing about 800 people on a fulltime basis. There are also over 1,000 people who work with homegrown hardwoods on a part-time basis. Even still, demand for homegrown hardwoods exceeds supply for almost all homegrown hardwoods, especially oak. At the moment imported hardwoods fill this gap (Xenopolou 2004).

1.4. Environmental performance of the Irish forestry sector, 1990-2006

Since the early 1990s there has been considerable improvement in the environmental performance of the Irish forestry sector. Results from studies in the United Kingdom showed that forestry may have adverse effects on water quality. Subsequent studies in Irish forests found that forestry could have adverse effects on water quality in regions with low buffering capacity (e.g. Galway-Mayo and Wicklow), although this was not evident in Munster (see Giller and O'Halloran 2004 and references therein). Clearfelling and reforestation has been associated with increased levels of phosphorus in blanket peatland streams (Cummins and Farrell, 2003). The introduction of guidelines in relation to water quality, harvesting and aerial fertilization will have helped to ameliorate these impacts. In addition criteria and measures relating to water protection are set down in the Irish National Forest Standard (Forest Service 2000a).

Ireland is a signatory to the Convention on Biological Diversity (CBD) and is committed under Article 6B to "integrate as far as possible and as appropriate, the conservation and sustainable use of biological diversity in relevant sectoral or cross sectoral plans, programmes and policies." Prior to 2001 there was little direct investigation of the implications of afforestation and forest management for Ireland's flora and fauna. There is therefore a need for criteria and measures relating to biodiversity and these are set out in the National Forest Standard. Research to collect relevant information has been ongoing since 2001 (Wilson *et al*. 2005). Management and planning guidelines in relation to forestry and bird diversity has been published (O'Halloran *et al*. 2002).

Ireland became a party to the United Nations Framework Convention on Climate Change in 1994 and is therefore required to compile national inventories of greenhouse gas (GHG) emissions by sources and removals by sinks. Forestry is one such sector for which an inventory is required. Ireland is also a party to the Kyoto Protocol and is committed to limiting its GHG emissions to 13% above 1990 levels by 2008-2012. Under the terms of the Kyoto Protocol, carbon stock changes which occur during 2008-2012 as a result of afforestation, reforestation and deforestation since 1990, can be used to offset GHG emissions. Countries have to report carbon stock changes in the following pools: above-ground biomass, below-ground biomass, litter, dead wood and soil organic matter. Forestry has the potential to make a significant contribution to the reduction of GHG emissions and this has been recognised in the National Climate Change Strategy (Anon. 2000). Achieving this requires the development of a GHG inventory for Irish forests that is transparent and verifiable, makes the best use of resources and limits uncertainty. Since the first assessment by Kilbride *et al*. (1999) there have been large advances regarding our understanding of carbon stocks and fluxes in Irish forests. Furthermore a national system for reporting carbon stocks and fluxes in Irish forests has been developed (Gallagher *et al.,* 2004). This has been greatly assisted by the COFORD funded CARBiFOR project which has provided information on carbon cycling in Sitka spruce forests. However, considerable information gaps remain, particularly in relation to soil- carbon stocks and turnover rates, the C sequestration status of peatland forests, broadleaf plantations and non-CO_2 greenhouse gases.

All stages of the forest cycle from afforestation to clearfelling and subsequent replanting impact on the visual character of the landscape. This has been exacerbated by the perception of coniferous plantations as both monotonous and visually intrusive and detrimental to the traditional character of the landscape. Given the current, and expected future rate of afforestation there is a need to ensure that forestry will complement our landscape heritage. The Forest Service Landscape Guidelines seek to ensure that planning and establishment of forestry in the landscape is addressed adequately and adherence to the guidelines is mandatory. Afforestation is prohibited in protected areas of landscape listed in the 1997 Inventory of Outstanding Landscapes. All landscape aspects of forestry development must be compatible with County Development Plans. All afforestation projects covering areas over 70 hectares require an Environmental Impact Assessment and are subject to planning permission. Projects covering more than 25 hectares are referred to local authorities.

Ireland has a rich archaeological heritage that is an important source of historical information and an important educational and recreational resource. Careless or unplanned forestry development can impact negatively on over-ground and underground archaeology. The Forest Service Forestry and Archaeology Guidelines (Forest Service 2002d) assist non-archaeologists involved in forestry development to identify archaeological sites and sets out procedures which should be followed in order to avoid site disturbance.

2. Key issues and challenges faced for the future, globally and locally

The current rate of afforestation is about 13,000 hectares per annum. If this trend continues, about 1 million hectares, or 14-15% of Ireland's land area, will have been converted to forestry by 2025. Even though this rate of afforestation is below the government target of 20,000 hectares per annum, and the projected levels of forested land in 2025 would still be well below the current EU average of 25%, afforestation nevertheless represents the single biggest land use change over the past decade.

The challenges facing Irish forestry can be divided into two broad areas, economic and societal. First, the low rate of planting, which have fallen below the government targets every year since 1996, may mean that the national forest estate will not have the economy of scale to be sufficiently competitive internationally (Bacon 2004). Second, the Irish forestry sector is not yet fulfilling its potential to provide environmental and other goods to society. The importance of the environmental and social dimension of forestry has grown, mainly as a result of instruments such as the Kyoto Protocol arising from the Rio process, the support for the principles of Sustainable Forest Management and changing societal views on forests and the practice of forestry. Unfortunately, the emphasis of the 1996 Government strategy on timber production has led to a concentration on fast-growing conifer species and an under-realisation of the contribution of forestry to sustainable development more generally.

Bacon (2004) identified several reasons for the low rates of afforestation over the period since 1996, including competition for land use, lack of skills and reluctance among farmers to commit agricultural land irreversibly to a single crop. In general, forestry is challenged by uncertainties, for example regarding the availability of markets for thinnings from the private sector. If markets are not developed, then crops will go unthinned, which will in turn act as a disincentive to plant, leading to further reductions in afforestation. Government support will be necessary to compensate for such uncertainties. Under the new Rural Development Regulation, however, government subsidies for afforestation are scheduled decline from 100% to 70% of the cost of afforestation in advantaged areas and to 80% in disadvantaged areas, and the payment period for annual premiums will be reduced from 20 to 15 years (COFORD 2005). These changes will reduce planting levels substantially in the absence of any additional government funding.

The forestry sector is exposed to increasing competition from wood supply from new EU Member States, which generally have lower costs and prices (COFORD 2005). Ireland's competitive advantages are being eroded by increased costs across the sector, although costs could be reduced through reform of the timber sales area and in the areas of harvesting and transport (COFORD 2005). A further challenge is the relatively small size of many private sector plantations, which are an average size of eight hectares but include many farms of between two and three hectares. The ability of the private sector to achieve forest certification is also important, since many panel board mills and sawmills now require roundwood to be sourced from forests that have been independently certified as well managed (COFORD 2005).

Employment in forestry is currently in the region of 12,000 full-time job equivalents (COFORD 2005), but difficulties are being encountered in attracting and retaining new forest workers. Studies have cited the lack of nationally accredited forestry training courses allied to proper career structures, similar to those in other countries, which could attract and retain the young people needed to raise productivity and international competitiveness of the forestry sector (COFORD 2005).

Forests can provide vital public goods and services, but in the Irish forestry sector there is a risk that these services will be lost or underprovided because they are undervalued. Forests sequester atmospheric carbon dioxide, and the recreational value of forests will also grow along with increasing affluence, population levels and urbanisation. Forests also have a significant role to play in biodiversity conservation and enhancement, at the genetic, species and ecosystem levels. The EU Water Framework Directive will bring an increasing emphasis on the role of riparian woodland in achieving water quality standards. Unless proper incentives are in places, however, there is a risk that these benefits will not be realised.

A major uncertainty into the future is the effect of climate change on Irish forests. Climate change has the potential to create new threats – such as new kinds of pests and unfavourable growing conditions – as well as sector-specific opportunities that might arise if forests are included in future carbon-trading schemes or used to offset national greenhouse-gas emission-reduction targets.

3. Future trajectory under 'business as usual'

The report "Rural Ireland 2025. Foresight Perspectives" (Forfás 2005) presents a projection of the forestry sector up until 2025. The report suggests that the amount of forested land will double by 2025 but that the value of forestry and wood output will increase at a slower rate. Both the Foresight report and the 2004 Bacon report emphasise that the Irish forestry sector will fail to realise its full potential to contribute to sustainable development in the absence of new financial incentives and other policies to reward private foresters for the non-marketed goods like carbon sequestration, biodiversity conservation and recreation that forests provide.

3.1. Afforestation

Bacon (2004) predicts that annual afforestation will rise to the Government target of 20,000 hectares due to the reform of the CAP and other factors. Reforms under the CAP have attempted to simplify the system of farm supports and increase the incomes resulting from payments to farmers while reducing the costs of the farm budget and reducing distortions in product markets. The most significant effect is to "decouple" payments and production, which allows farmers to choose the productive output of their land while still receiving payments. Depending on the level of payment to farmers, CAP reforms are expected to lead to increased afforestation as payments are no longer directed at specific production like livestock and as land leased for production is released for alternative uses (Bacon 2004).

Nevertheless, afforestation has consistently fallen short of the 1996 strategy's targets. If afforestation continues at around the current rate of about 13,000 hectares per year, by 2025 up to one million hectares of land (Table 5), amounting to some 15% of the total is likely to be converted to forests. Approximately two thirds will be private forestry, mainly owned by farmers with the balance in public ownership. Private forests are expected to be small and scattered, of an average size of just eight hectares (COFORD 2005).

Table 5: Projected forest area in 2025*

Owner	Area (hectares)
Coillte	406,000
Private	611,000
Total	1,017,000
Per cent total land area	14.4%

** Assuming an afforestation rate of 14,000 hectares in 2004 and 15,000 hectares per annum thereafter.*
Source: Fennessey (2005).

The reforms of the CAP that came into effect in 2006 have resulted in a reduction of EU forestry grants and premiums. By 2025 grants for afforestation and annual premiums are likely to have been substantially reduced or even discontinued (COFORD 2005).

3.2. Economic performance

According to the Foresight 2025 report (COFORD 2005), the Irish forestry sector is expected to harvest 6 million cubic metres of roundwood annually by 2025, with roughly equal amounts being produced by the private and public sectors. The forestry output in 2025 is expected to be about 75% sawnlog and 25% pulpwood (Table 6). The real price of roundwood in 2025 may be lower than current prices, and the forest contracting and other support infrastructural services may be operating at marginal profitability. The residential construction industry might expand its use of timber frame to 50% of new construction (in 2005 it was 27%), but the share of the construction market supplied by domestic sawnwood is likely to be limited. According to the Foresight 2025 report (COFORD 2005), the forestry sector has the potential to provide sustainable employment for up to 20,000 rural dwellers and also contribute to farm incomes. This depends on training for those engaged in forest management, harvesting and transport, and processing (including farmers as well as those employed in the sector), as well as a mix of state and private funding and investment and sustained funding for a strategic research programme.

Table 6: Forecasted roundwood supply in 2025

	Assortment			
	Pulpwood	Small sawlog	Large sawlog	Total
Owner	000,000 m^3			
Coillte	0.66	1.02	1.61	3.29
Private	0.90	0.90	0.80	2.60
Total	1.56	1.92	2.41	5.89

Source: Phillips (2003).

3.3. Projected environmental trends

The Irish forestry sector can expect a continued emphasis on the environmental benefits of forestry and their integration with forestry's socio-economic functions. The development of the Irish National Forest Standard, the Code of Best Forest Practice and the suite of supporting guidelines has helped to strengthen the environmental performance of forestry and this will continue in the future. However, given the current and projected future rate of afforestation it is necessary that these guidelines, as well as current legislation and forest practices, be reviewed and enforced in order to ensure successful implementation of SFM. Ongoing research will enable assessment of guidelines and identify changes which will improve the environmental performance of Irish forestry. Increasing emphasis on environmental issues at national and EU level will further stimulate the need for sustainable development. Certification will remain an important issue and will become increasingly important for the private sector as timber output from these forests grows.

A number of current initiatives will assist the implementation and delivery of SFM. The National Forest Inventory will provide an up to date assessment of the national forest estate and will be a vital resource in planning future management. In addition the forthcoming Indicative Forest Strategy will assist in the assessment of the potential for forestry development in a particular area, taking into account environmental and other constraints. Potential changes in forest management will have positive environmental benefits. These include continuous cover forestry, which is already being set up at demonstration level by Coillte and will deliver potential benefits in terms of biodiversity, water quality, landscape and amenity. Peatland forestry has been associated with a range of environmental problems. Coillte has begun a programme of restoration and approximately 1200 hectares have been restored to date. If continued this will help to redress this situation with positive consequences for biodiversity and water quality. If the rate of broadleaf afforestation stays at current levels, there may continue to be an overdependence on exotic conifers. Continued population growth and increasing affluence is likely to create greater demands for amenity services from forests. However, the ability of the forestry sector to provide these services will depend on continued and increased financial support from government as well as on the willingness of the public to pay for these services. Financial support will also be required to maintain and expand the current rate of broadleaf planting.

EU regulations will continue to influence forestry. For instance, the forthcoming soil protection strategy will set standards for the protection of soils and will have consequences for national policies and research.

Carbon sequestration in forests will make a significant contribution towards the meeting of Irelands' commitments under the Kyoto Protocol. The maintenance of the carbon sink in the medium to long term requires an ongoing programme of afforestation, however. For this reason, the current rate of afforestation should be maintained until at least 2035. Research will continue to inform our understanding of carbon sequestration in Irish forests and to underpin international reporting commitments.

Forestry is likely to play an increasing role in bioenergy production. This will involve utilisation of forest residues and recovered wood. If properly supported through financial incentives this will assist in the reduction of greenhouse gas emissions and reduce dependence on fossil fuels. Furthermore, the replacement of fossil fuel intensive products, such as concrete, with timber products can assist in the reduction of greenhouse gas emissions.

4. Review of policy changes likely to make trajectory more sustainable

Irish forestry is well placed to become more sustainable in the future, but this depends on many changes and developments. Sustainable Forest Management is an appropriate basis for Irish forestry policy. A fundamental requirement is the need for the value of public goods provided forestry (as well as other sectors) to be quantified and priced and for their full value to society to be included adequately in the process of policy formulation (COFORD 2005). The ongoing National Forest Inventory (NFI) will provide an essential resource in planning and executing SFM. However, it is essential that this be repeated at 5-10 year intervals in order to provide up-to-date information for management and planning and to assist in charting progress towards more sustainable forestry. The main national contributions of the forestry sector will be in public goods provision, for instance recreational uses, carbon sequestration and biodiversity conservation. This will require financial incentives for the public goods provided by forestry, as well as increased and sustained investment in nationally accredited forestry training courses, technology research and development (COFORD 2005).

Bacon (2004) presents three sets of projections for the long-term sustainability of the Irish forestry sector. If the current rate of afforestation of about 13,000 hectares per annum per cent continues, the period 2030-2040 would see a major increase in output of timber for processing followed by a sharp contraction in output by over 25 per cent after 2040. Increasing the rate of afforestation to 20,000 hectares per annum would provide a much more stable level of timber output into the future. For this reason, Bacon concludes that afforestation at a rate of 20,000 hectares per annum is the most appropriate minimum target to secure a sustainable commercial processing sector (Bacon 2004, 32-49).

Such a rate of afforestation might secure the economic sustainability of the forestry sector, but it is equally important that afforestation and forest operations in general have due regard for the natural and cultural environment, in particular biodiversity and archaeological features. Although Forest Service guidelines have been developed for a range of areas, including archaeological protection, biodiversity conservation and water quality, there is a need to check if the guidelines are achieving their objectives. Where necessary this should be carried out by establishing monitoring mechanisms and targeted research projects. Furthermore guidelines may need to be tailored to specific needs such as regional differences in geology, soils and climate, as in the case of the water quality guidelines.

The State can lead by example in the practice of sustainable forest management. Bord na Móna estimates that potentially 25,000 to 40,000 hectares of land that was previously used for peat production could be suitable for afforestation in the long term, of which 5,000 to 6,000 hectares is immediately available for afforestation. The availability of large tracts of land in the effective ownership of the State provides an opportunity for afforestation of a character that emphasises the non-timber benefits of forestry, for instance by promoting species diversity or forestry on a larger scale than the average for private-sector forests (Bacon 2004).

Climate change has the potential to exert a significant influence on the productivity of Irish forests. Given the long-term nature of forestry there is a need for studies on the impact of projected climate change on the productivity and viability of Irish forests. Forestry has a central role in the achievement of national compliance with the Kyoto Protocol. Considerable information gaps remain regarding carbon sequestration in Irish forests, although many of these will be addressed by forthcoming COFORD funded research. The potential role of forests in any post-Kyoto international agreements on climate change will be closely linked to the continued achievement of afforestation targets.

Forestry can also play a significant role in renewable energy and financial support for this is likely to increase. With the growing interest in green energy, many of the 30,000 part-time farmers that Ireland is expected to have in 2025 as well as a number of the projected 10,000 full-time commercial farmers, will be producing wood biomass as an important component of their farming enterprises. Bacon (2004) identifies a specific opportunity for Bord Na Móna to afforest depleted peatland for biomass production, which could then be used to supply biomass in the place of peat in the nearby peat-burning power stations. This would provide a renewable energy source as an alternative to peat for power generation, which is carbon-intensive, non-renewable and destructive to important biodiversity habitats.

The environmental contribution of forests will require further government support. For example, forests could be supported under the EU Natura 2000 programme, which provides funding for areas that have been designated as special areas of conservation. Fifty per cent of proposed Natura 2000 sites have forest areas. Traditional commercial agriculture and forestry is not possible on Natura 2000 sites, but economic activities such as leisure, tourism, hunting and sustainable forestry are possible. The aim is to achieve multi-functional forestry on Natura 2000 sites. This means that the non-timber benefits of forestry are emphasised and landowners are compensated for the lost timber or other land use production. According to Bacon (2004), Ireland could gain additional support from the European Union for forests that place more emphasis on the management of plantations and the environmental impact and non-market benefits of

forests, along the lines of the Native Woodland Scheme and Forest Road Scheme, but such an approach would be at odds with the current focus on increased timber production. Changes in silvicultural practices, such as the adoption of continuous cover forestry, could play a significant role in SFM. Coillte has set up demonstration areas and COFORD has funded research in this area (Ni Dhubháin *et al*. 2005).

Certification of Irish timber will be essential for the future competitiveness of the Irish wood-processing industry. Although Coillte forests are certified under the international standard Forest Stewardship Council (FSC), attention will also focus on private sectors forests as these plantations approach maturity and are harvested. The ability of the private sector to achieve forest certification is important since many of the panel board mills and sawmills now require roundwood to be sourced from forests that have been independently certified as well managed (COFORD 2005).

The future competitiveness of the forestry sector will require greater cost efficiencies throughout all segments of the wood supply chain, as well as significant investment in R&D in all aspects of the wood-chain, including process and product R&D. In regard to the farm forestry sector in particular, the development of cost-effective harvesting and transportation systems is essential. The Foresight 2025 report recommends the creation of a Forestry Advisory Body, a Forest Development Agency, and the outsourcing of many of the services being provided. The Forest Service has focused on afforestation to date but now a more developmental and commercial market focus is required. It was suggested that the role of the Forest Service should be limited to regulatory and supervisory functions.

A further possible source of value from the forestry sector lies in non-wood forest products. Such products include foliage (used for flower bouquets), forest tourism and alternative healthcare. Of these products, foliage is seen as having the highest potential to generate income (Collier *et al*. 2004). Support for the development of this sector could help to compensate investors during the long period before forestry generates returns from harvesting wood,

Overall a number of initiatives, as identified in the Foresight report, are required to make the forestry sector more sustainable in the future. Among these are the following:

- Management planning in all forests supported by Forest Service inventory and area related databases
- Comprehensive designation of forest land-use at a national level
- Commitment from Government to longer term multi-annual budgeting for the sector and continued investment in afforestation
- Support for continued upgrading of the sawmill sector
- Encouragement of investment in forestry by private sector companies and pension funds
- Integrated support for wood energy by government agencies and departments
- Management informed and led by R&D findings and continued investment in R&D
- Creation of a forest owners association to facilitate macro level forest management planning and timber production
- Continued development of training and education programmes for forestry professionals, farm foresters, forest operatives and contractors.

Conclusion

Irish forests currently cover some 10% of the national land area and it is government policy to increase this to 17% by 2030, to provide a critical mass that will support the development of an indigenous wood-processing industry. Based on current trends the target for afforestation will not be met without additional policies and measures. The contribution of the forestry sector to sustainable development will also require explicit and financial government support for the social and environmental benefits provided by forestry.

Irish forests are managed in accordance with the principles of Sustainable Forest Management as described in the Irish National Forest Standard. This is supported by the Code of Best Forest Practice and a suite of environmental guidelines. There is a need for ongoing review and enforcement of these guidelines in order to ensure that SFM is improved. Management planning should be supported by regularly updated forest inventory data and ongoing research related to all aspects of SFM. Continued growth of the sector, in a manner consistent with SFM, will require financial support from the government. Private sector afforestation will decline if there is a reduction in current grants and premia. Linkages with other sectors of the economy, such as bioenergy, tourism and amenity should be encouraged. Although the non-timber benefits of forestry are recognised by SFM there is a need for these to be valued appropriately.

References

Anon. 1993. Ministerial Conference on the Protection of Forests in Europe, 16-17 June 1993, Helsinki. Ministry of Agriculture and Forestry, Helsinki, Finland.

Anon. 1996. Growing for the Future: A Strategic Plan for the Development of the Forestry Sector in Ireland. Department of Agriculture, Food and Forestry. Government Publications Sale Office, Molesworth Street, Dublin 2.

Anon. 1997. Sustainable Development, A Strategy for Ireland. Government Publications Office, Molesworth Street, Dublin 2.

Anon. 2000. National Climate Change Strategy Ireland. Department of the Environment and Local Government, Custom House, Dublin.

Anon. 2003. National Report to the Fourth Session of the United Nations Forum on Forests – Ireland. 20pp.

Bacon. 2004. A Review and Appraisal of Ireland's Forestry Development Strategy. Final Report, September 2004. Peter Bacon Economic Consultants in association with Deloitte

Cummins, T. and Farrell, E.P. 2003. Biogeochemical impacts of clearfelling and reforestation on blanket peatland streams I. phosphorus. Forest Ecology and Management, 180:545-555.

European Commission. 2006. Commission Staff Working Document, Annex to the Communication from the Commission to the Council and the European Parliament on an EU Forest Action Plan, COM (2006) 302.

FAO. 2006. Global Forest Resources Assessment, progress towards sustainable forest management. FAO Forestry Paper 147.

Farrell, E.P. and Byrne, K.A. 2002. The emergence of the multifunctional forest in Ireland. In: Convery, F. and Feehan, J. (Eds.), Achievement and Challenge Rio + 10 and Ireland. The Environmental Institute, University College Dublin. 18-22.

Fennessy, J. 2005. Foresight Report on the Forestry Sector in Ireland. In: Rural Ireland 2025, Foresight Perspectives. NUI Maynooth, University College Dublin and Teagasc.

Forest Service. 2000a. Irish National Forest Standard. Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2. 58pp.

Forest Service. 2000b. Code of Best Forest Practice. Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2. 198pp.

Forest Service. 2000c. Forestry and Water Quality Guidelines. Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2. 16pp.

Forest Service. 2000d. Forestry and Archaeology Guidelines. Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2. 14pp.

Forest Service. 2000e. Forestry and the Landscape Guidelines. Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2. 14pp.

Forest Service. 2000f. Forest Biodiversity Guidelines. Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2. 10pp.

Forest Service. 2000g. Forest Harvesting and the Environment Guidelines. Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2. 19pp.

Forest Service. 2001. Forestry and Aerial Fertilisation Guidelines. Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2. 16pp.

Forest Service. 2002. Forest Protection Guidelines. Forest Service, Department of the Marine and Natural Resources, Leeson Lane, Dublin 2. 40pp.

Gallagher, G., Hendrick, E. and Byrne, K.A. 2004. Preliminary estimates of biomass carbon stock changes in managed forests in the Republic of Ireland over the period 1990-2000. Irish Forestry, 61(1): 35-49.

Giller, P.S. and O'Halloran, J. 2004. Forestry and the aquatic environment: studies in an Irish context. Hydrology and Earth System Sciences, 8(3): 314-326.

Kilbride, C.M., Byrne, K.A. and Gardiner, J.J. 1999. Carbon sequestration and Irish forests. COFORD, Dublin. 37pp.

Ni Dhubháin, A., Bolger, T., Keane, M., Freeman, N., Holzmann, M., Kennedy, S. And O'Hare, D. 2005. Continuous cover forestry in Ireland. In: Hendrick, E. (Ed.), Forest Research and Development in Ireland 2004 – Underpinning Industry Development, Proceedings of the COFORD conference, 20-21 September 2004, Tullamore Court Hotel, Tullamore, Co Offaly. COFORD, Dublin. 27-34.

O'Halloran, J., Walsh, P.M., Giller, P.S. and Kelly, T.C. 2002. Forestry and bird diversity in Ireland: a management and planning guide. COFORD, Dublin.

Phillips, H. (2003) Economic Impact of Forestry. Unpublished paper, COFORD

Wilson, M.W., Gittings, T., O'Halloran, J., Smith, G.F., Oxbrough, A., O'Donoghue, S., French, L., Giller, P.S., Iremonger, S., Pithon, J., Kelly, D.L., Mitchell, F.J.G., Kelly, T.C., Dowding, P., O'Sullivan, A., Neville, P., McKee, A.-M. and Coote L. 2005. Forestry and biodiversity in Ireland and a case study of the Hen Harrier (Circus cyaneus): BIOFOREST project. In: Hendrick, E. (Ed.), Forest Research and Development in Ireland 2004 – Underpinning Industry Development, Proceedings of the COFORD conference, 20-21 September 2004, Tullamore Court Hotel, Tullamore, Co Offaly. COFORD, Dublin. 35-39.

Appendix: Sustainable Forest Management

Initiatives aimed at establishing standards for SFM have their origin in the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. This produced the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change (UNFCCC). In Europe, the concept was developed through a series of Ministerial Conferences and was concluded at the Third Ministerial Conference on the Protection of Forests in Europe led in Lisbon in 1998. SFM was defined as the following:

> *"The stewardship and use of forest lands in a way and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and that does not cause damage to other ecosystems."*

The conference adopted six criteria of SFM, the maintenance and improvement of which is required for sustainability:

1. Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.
2. Maintenance of forest ecosystem health and vitality.
3. Maintenance and encouragement of productive functions of forests (wood and non-wood).
4. Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.
5. Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).
6. Maintenance of other socio-economic functions and conditions.

The need for forestry to be sustainable was in the overall aim of *Growing for the Future*, the strategic plan for the development of the forestry sector in Ireland (Anon. 1996). The overall aim of the strategy is: "To develop forestry to a scale and in a manner which maximises its contribution to national economic and social well-being on a sustainable basis and which is compatible with the protection of the environment."

SFM was defined in the National Sustainable Development Strategy (Anon. 1997) as carrying out the following functions:

- Enhances the natural environment, including natural systems such as the carbon cycle
- Harmonises with landscape and incorporates ecological issues including protection of sensitive areas, biodiversity and water quality
- Supports the quality of rural life by providing employment and amenities
- Provides timber on a sustained yield basis

Economic, social and environmental performance of the Irish energy sector

Briefing Paper for Comhar[1]

Prepared by Thomas Legge[2] and Matthew Gray

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Sustainable development is a broad concept with many different interpretations, but it is most commonly defined as development that "development that meets the needs of current generations without compromising the ability of future generations to meet their own needs". This was the definition contained in the 1987 UN report, *Our Common Future*,[4] and recently reiterated in the renewed EU Sustainable Development Strategy (EU 2006). The definition is often further interpreted to mean a balance between economic, social, and environmental development (Goodland 1995). The energy sector has been at the heart of concerns over sustainability due to its influence on each of these areas and on quality of life in general. Globally, the trend in energy has been towards increasing consumption to fuel economic growth and accommodate growing populations. This trend has been accompanied by concerns about the physical limits of fossil-fuel sources, their increasingly disproportionate location in unstable regions of the world or hard-to-access places, and the social and environmental costs of energy production and combustion.

Ireland's recent economic growth has been fuelled by energy, and these concerns are more salient than ever. As the Government pointed out in its 1997 National Sustainable Development Strategy, "the growth model of the 20th century, characterised by increases in the use of energy and raw materials and leading to over-exploitation of scarce environmental resources, cannot be sustained indefinitely into the 21st century" (DELG 1997, 24). The Government has identified several issues that threaten the sustainability of energy in Ireland: the increasing total consumption of energy, as well as increasing per capita energy consumption; the high dependence on imported fuels and on fossil fuels for electricity generation; increasing emissions of CO_2 from the burning of fossil fuels; and low use of renewable energy resources (DELG 2002, 43). Irish energy policy is designed to address these issues by focusing on three areas of concern: cost competitiveness, security of supply and the environmental impact of energy production and consumption (DCMNR 1999). Recent trends in the Irish energy sector underline these three areas of concern. First, rising demand for energy, particularly in the residential and transport sectors, is associated with rising costs and congested infrastructure, which reduces quality of life and undermines Ireland's attractiveness as a location for investment for both Irish and international employers. Second, Ireland is highly dependent on imported oil and natural gas for most of its energy needs, which exposes the economy to international price fluctuations and the consequences of any interruption of supply. Third, both the supply and consumption of energy are accompanied by increasing environmental and social costs, ranging from increasing greenhouse-gas emissions to local pollution to congestion. These trends are expected to continue into the future without intervention.

The preparation of a new National Development Plan provides a window of opportunity to address some of these areas of concern. Many of the spending decisions contained in the plan will directly or indirectly affect the energy sector, from infrastructure projects to spatial-planning decisions. Furthermore, many of these decisions will have long term implications for the sustainability of the Irish energy sector. Physical infrastructure like power stations or roads have life spans of decades, and once installed they can constrain behaviour – for good or ill – in ways that can be expensive to change.

This paper outlines the recent performance of the Irish energy sector with regard to the three areas of concern, with particular regard to the period from 1990 to the present.[5] The paper reviews the future projections and presents some of the ways that the sustainability of the energy sector could be improved during the period of the next National Development Plan, 2007-2013.

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4 *Our Common Future* is the name given to the report of the 1987 World Commission on Environment and Development. It is often known as The Brundtland Report after its main author, Gro Harlem Brundtland.

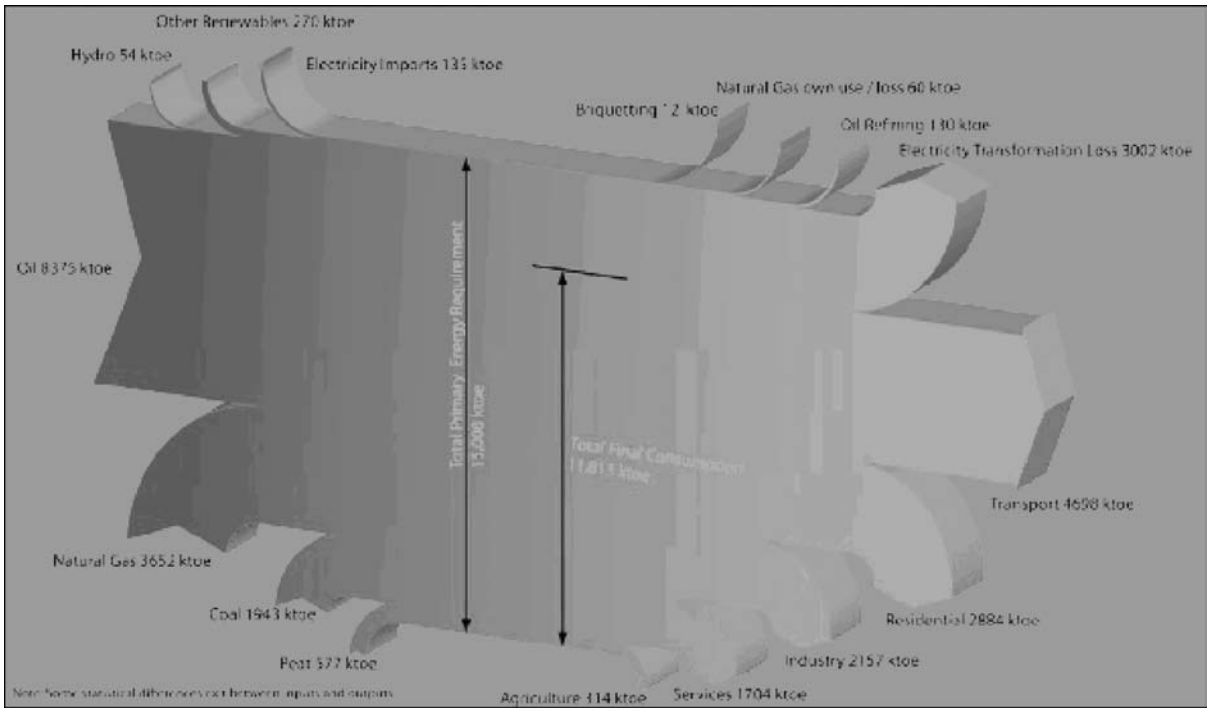
5 Most data for the period are available only up until 2004.

1. Recent performance of the energy sector

Ireland's recent economic history has been a story of unprecedented growth but also increasing problems associated with this prosperity. As Ireland's economy has expanded, so too have the country's energy needs, at a rate that is unsustainable into the future. Ireland's growing demand for energy has been met largely by increased imports of fossil fuels.

Figure 1 shows the energy balance for Ireland in 2004 as a flow diagram, illustrating the amount of energy that flowed through the Irish economy, the relative amount from each fuel type and the uses to which that energy was put (SEI 2006a, 13).[6] Ireland required just over 15 million tonnes of oil equivalent (Mtoe) of primary energy in 2004. Most of this energy came from fossil fuels, the vast majority of which were imported. Of the total primary energy, about 20 per cent, or 3,002 thousand tonnes of oil equivalent (Ktoe), was lost in the transformation of primary energy to electricity (SEI 2006a, 13). Most of the remainder was used for the transportation, industrial and residential sectors.

Figure 1: Energy flow in Ireland in 2004



Source: SEI 2006 a, 13

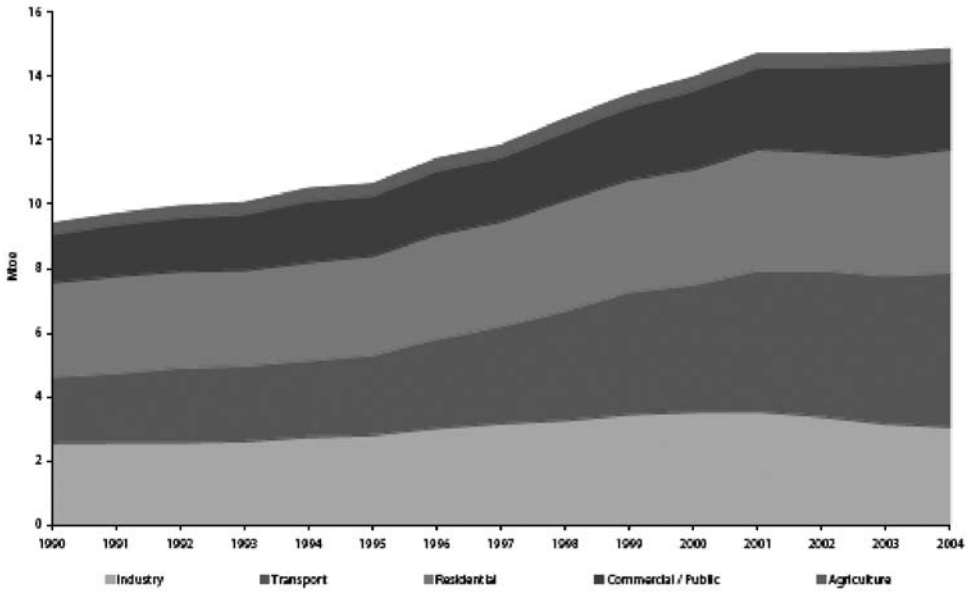
6 Much of the information in this section comes from Sustainable Energy Ireland, the national energy agency, which was established on May 1st 2002 under the Sustainable Energy Act 2002. SEI's mandate is to promote and assist the development of sustainable energy. This encompasses environmentally and economically sustainable production, supply and use of energy, in support of Government policy, across all sectors of the economy.

This section provides a description of the demand for and supply of energy in Ireland since 1990 and the implications of these trends on the three aspects of Irish energy policy: security of supply, price competitiveness and interactions with the environment.

1.1. Energy Demand

Demand for energy in Ireland is growing every year, standing at 15 Mtoe in 2004, about 50 per cent higher than a decade earlier. Figure 2 highlights the five major categories of end usage for energy, and how they have changed since 1990. Every sector of the Irish economy, with the exception of industry, has increased its consumption of energy over this period. Total energy consumption is especially increasing in the transport and residential sectors. These increases are partially explained by the growth of the Irish economy by almost two and a half times between 1990-2004, as well as rising population levels that exceeded 4 million people in 2005 (SEI 2006a, 8; CSO 2006).

Figure 2: Total final energy requirement by sector



Source: SEI 2006a, 11

1.1.1. Transport

Transport is the fastest growing sector in the Irish energy economy and accounts for the largest, and rising, share of Ireland's final energy demand – 40 per cent in 2004, or 4.7 Mtoe (SEI 2006a, 7). While Ireland's total primary energy requirement (TPER) increased by 56 per cent from 1990 to 2002, energy consumption in the transport sector more than doubled in this period (EPA 2004a, 161). Factors influencing this growth include the growth in numbers of vehicles (exceeding 2 million for the first time in 2004); the average fuel efficiency and engine size of vehicles; increased commuting distances, which doubled to 13.3 miles between 1991 and 2002; and congestion, which causes inefficient driving patterns (SEI 2006a, 7, NESC 2005, 53). Ireland's per-capita ownership of private cars, at 468 per thousand inhabitants over 15 years old, is still below the 2002 EU-15[7] average of 555, however, suggesting that there is room for further growth in this sector even with no rise in population (CSO 2006). Transport of goods by road has also increased recently: Between 1995 and 2002, national road haulage volumes more than doubled, compared with an EU-15 average cumulative growth of just 19 per cent. Over the same period, rail haulage volumes fell by 28 per cent in Ireland, while they rose by an average of 6 per cent with the EU-15 (Amarach 2006, 34). The Irish are also travelling by air much more frequently. Between 1990 and 2002, the number of passenger kilometres generated by Irish air travellers to other EU-15 countries more than doubled, compared to a rise of 78% in total EU air traffic over the same period (Amarach 2006).

1.1.2. Residential

Over the period 1990-2004 residential consumption of primary energy – used mainly for heating and electricity – increased by 32 per cent, or an average of 2 per cent per annum, to a figure of 2.9 Mtoe (SEI 2006a, 57). During this time the number of households in the State increased by 43 per cent, from approximately 1.01 million to 1.44 million at the end of 2004. In 2004 the residential sector was the only other sector besides transport to experience growth in primary energy usage compared to 2003, at 3.4 per cent (SEI 2006a, 7). While a rapidly rising population is one explanation for the increase, energy consumption in the residential sector is growing at a faster rate than population growth, indicating that this is a sector where overall energy efficiency is declining (EPA 2004a, 155, SEI 2006a, 57). Individual houses and apartments have become somewhat more energy efficient: between 1990 and 2003, overall energy consumption per dwelling declined by 2.3 per cent, most of which occurred in the early 1990s when more efficient fuels and appliances supplanted many open fires and back boilers. On the other hand, electricity consumption per dwelling rose by 20 per cent over the same period, owing largely to increased ownership of household appliances and external lighting. (ESRI 2005b, 129; SEI 2006a, 62).

7 EU-15 refers to the 15 Member States of the European Union before the 2004 enlargement. EU-25 refers to the current 25 Member States of the European Union after the 2004 enlargement.

1.1.3. Services

Over the period 1990-2004 the use of primary energy by the commercial and public services (also known as the tertiary sector) grew by 70 per cent, or an average of 3.2 per cent per annum. This high rate reflects the growth in the absolute size of the sector. This sector uses mainly oil, gas and electricity, with recent growth in consumption coming predominantly from electricity consumption (SEI 2006a, 68). Although primary energy use in the tertiary sector fell by 3.4 per cent in 2004, it is expected to rise again into the future (SEI 2006a, 28).

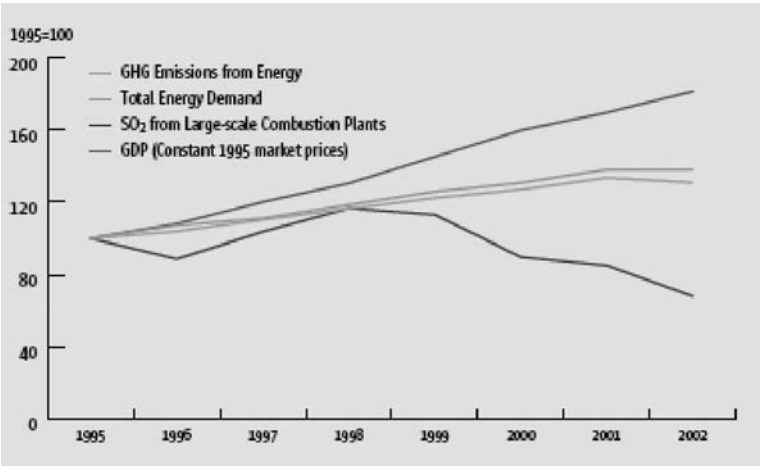
1.1.4. Industry

Final energy use in industry grew by 25 per cent to 2.2 Mtoe over the period 1990-2004. Industry's demand for energy (predominantly electricity and heating) grew at an average rate of 1.6 per cent per annum between 1990 and 2004, but has fallen in recent years due to plant closures and improvements in electricity generation efficiencies (SEI 2006a, 49; EPA 2004B).

1.2. Energy efficiency

The Irish economy and energy demand have both grown, but not at the same rate. Over the period since 1990 the rate of economic growth has outpaced the rate of growth in energy demand (see Figure 3). Since between 2001 and 2004, the energy intensity of the Irish economy decreased by 12.3 per cent (SEI 2006a, 6). This compares with the trend of much of the 1990s, when demand for energy rose broadly in line with economic growth. This "decoupling" of energy demand and GDP growth is largely because the economic activity in Ireland has moved away from heavy industry and towards services and other less energy-intensive economic activities, and because of efficiencies gained in the generation of electricity.

Figure 3: Eco-efficiency of the Irish energy sector, 1995-2002

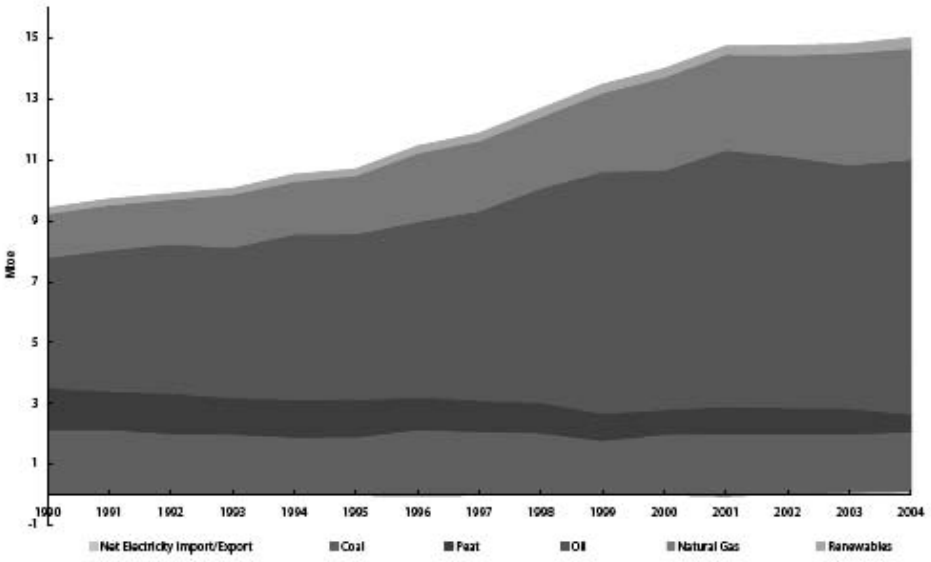


Source: EPA 2004A, 153

1.3. Energy Supply

Between 1990 and 2004, the total energy supply to Ireland increased at an average annual growth rate of 3 per cent. Figure 4 shows how Ireland's total annual primary energy requirement grew, broken down by energy type. Ireland depends on fossil fuels for well over 90 per cent of its energy needs, especially oil (used mainly for transport) and gas (used for space heating and, increasingly, for electricity generation). The remaining energy is supplied from renewable energy sources, including biomass for heating and renewable electricity, as well a small but growing amount of electricity imported from the United Kingdom. Ireland's rising demand for energy poses several long-term problems. It exposes Ireland to sudden international price rises and to the consequences of any short-term energy-supply disruptions. Energy production and consumption has a serious impact on the environment, especially due to the threat of climate change from greenhouse gas emissions.

Figure 4: Total primary energy requirement by type

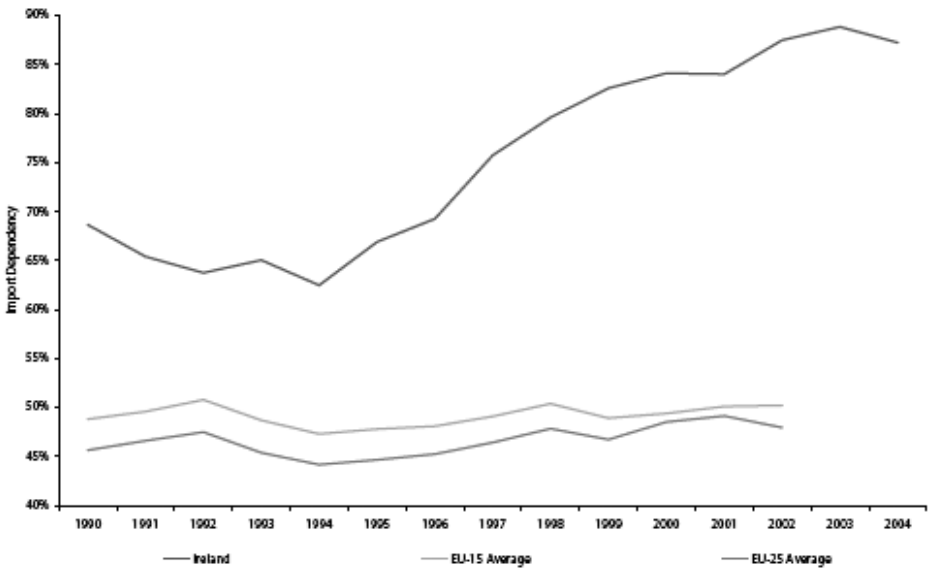


Source: SEI 2006a, 10

1.3.1. Import dependency

Ireland does not have any natural advantage in the provision of energy, with the exception of underdeveloped resources like wind and ocean energy. As a result of this and due to rising energy consumption, Ireland imports a large – and increasing – share of its total energy requirements. In 1990, Ireland was dependent on imported energy for 68 per cent of its needs, but this rose to a high point of 89 per cent in 2003, compared to an EU average import dependency of 49 per cent in 2003 (see Figure 5).

Figure 5: Import dependency in Ireland and EU average, 1990-2004

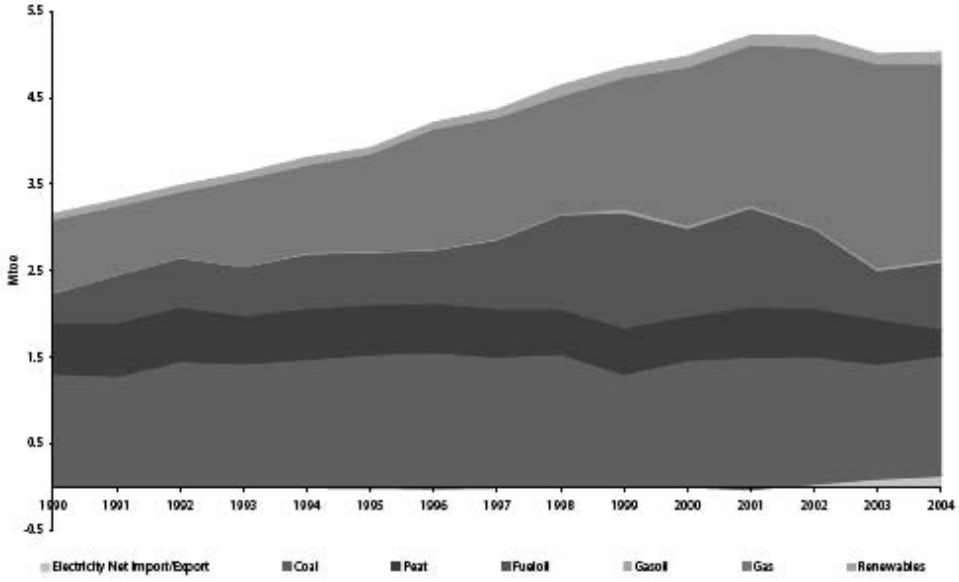


Source: SEI 2006b, 17

1.4. Electricity generation

Ireland's rising import dependency is due largely to the growing amount of fossil fuels needed to supply the demand for electricity. As of 2004, approximately one-third of Ireland's fuel sources were utilised for the generation of electricity. Ireland's primary fuel requirement for electricity generation grew by 65 per cent between 1990 and 2004, from 3.2 Mtoe in 1990 to a high of 5.2 Mtoe in 2001/2002 (see Figure 6). Ireland's electricity is generated from imported coal, natural gas and fuel oil; from domestically produced natural gas and peat; and from renewable electricity. Natural gas is now the most significant fuel in electricity generation after rising by 5.3 per cent per annum from 2000 to 2004. Natural gas provides 44.8 per cent of the electricity consumed in Ireland, up from 27 per cent in 1990 (SEI 2006a, 19). The amount of natural gas used in electricity production rose by 5.3 per cent per annum in 2000-2004, at 2.3 Mtoe in 2004, or 45 per cent of the total, up from 27 per cent in 1990. Imports constitute a growing share of natural gas consumption in Ireland, a trend that is compounded by the decline in the Kinsale gas field.

Figure 6: Primary fuel mix for electricity generation



Source: SEI 2006a, 20

The Irish electricity market has also been transformed by liberalisation, which began in 2002. Liberalisation has created greater flexibility in the market, but the sector as a whole has suffered from poor investment in new plants. The Republic of Ireland is also weakly interconnected with the electricity network of Northern Ireland. There is currently an interconnector with Britain, and the two islands may become more fully interconnected in the future. Currently, however, the Irish electricity system is vulnerable to distribution problems due to the lack of spare generating capacity.

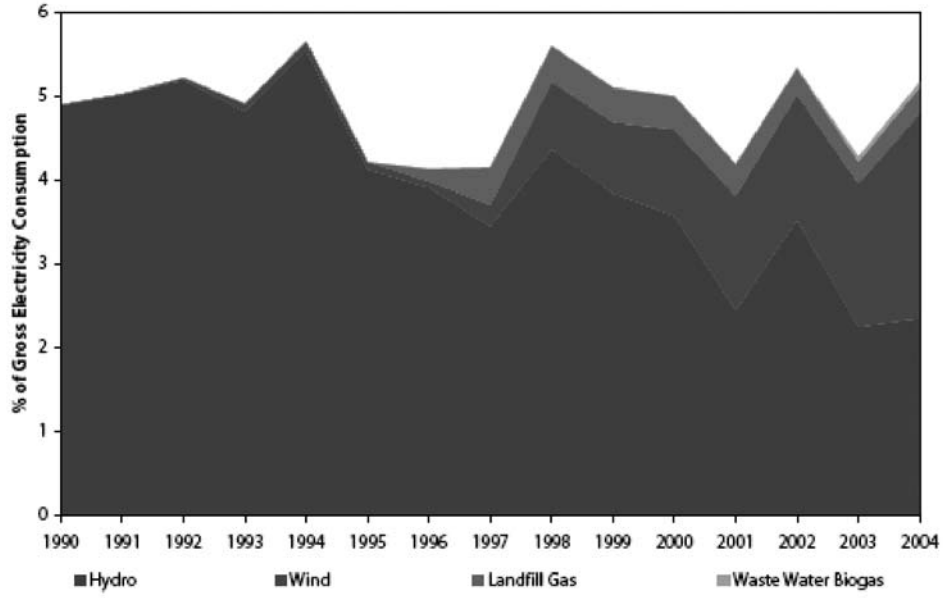
1.4.1. Generation mix

The Irish electricity system has a disproportionate amount of base-load plant, typically combined-cycle gas turbine (CCGT). Such plant has high capital costs, runs continuously at high output and is well suited for providing the electricity market with a guaranteed minimum supply. But it is inefficient when operated at part load. Moreover, it is expensive to start up and shut down, and therefore inflexible and unresponsive to fluctuating demands. For this reason it cannot support increasing amounts of variable electricity on the grid, particularly wind and other variable types of renewable energy. According to some estimates, there is more than double the required amount of base-load plant in Ireland to satisfy minimum system demand (O'Connor 2006). This inappropriate generation mix has developed in response to rather crude market incentives, and not strategic planning.

1.4.2. Renewable electricity

Renewable energy comes from energy sources that are effectively inexhaustible (e.g. wind, wave, solar, hydro) or can be replenished at about their rate of consumption (such as managed forests and energy crops). This sector has experienced strong growth in absolute terms of 22.4 per cent per annum on average, but from a small base (ESRI 2005b, 106). Renewable energy's contribution to gross electrical consumption in 2004 was 5.2 per cent of the total, compared with 4.3 per cent in 2003 and 4.8 per cent in 1990 (see Figure 7). This is well short of Ireland's indicative target of 13.2 per cent under the 2001 EU Directive on Renewable Electricity. Renewable electricity in Ireland has been traditionally dominated by hydroelectric power. In recent years however, wind-generated electricity has grown to be the largest source of renewable electricity by installed capacity, with a total of 495 MW installed by the end of 2005 (SEI 2006a, 34).

Figure 7: Renewable electricity contribution to gross electricity consumption, 1990-2004



Source: SEI 2004A, 11

1.4.3. Combined heat and power

Combined heat and power (CHP), or cogeneration, provides a promising way of further increasing efficiency by generating heat and electricity in a single process. Installed capacity of CHP grew at an annual rate of about 7.5 per cent between 1990 and 2002. In 2004, installed capacity of CHP comprised 139 units, equalling 145 MW of output. The majority of CHP units are gas-fired (84 per cent), with the remainder fuelled with coal, peat or oil. Ireland's first solid biomass CHP plant was commissioned in 2004 (SEI 2005b, 2).

1.5. Cost competitiveness

Dependency on imported fossil fuels has exposed the Irish economy to recent rises in the prices of oil and gas. Oil prices to industry in Ireland were 21 per cent higher in mid-2005 than they were in 2000, although this is similar to the increases found in the rest of OECD Europe. Unlike oil prices, however, natural gas prices rose in Ireland at a higher-than average rate, more than doubling since 2000; the United Kingdom was the only other EU-15 country to experience a higher rise in prices (SEI 2006a, 40-41). Ireland's geographical location at the periphery of the European energy-distribution network poses a disadvantage. Prices in Ireland for electricity, gas and oil, which had moved generally into line with those of other EU countries, have recently risen above the EU average, suggesting that Ireland pays a premium for the transport of oil and gas relative to its neighbours (ESRI 2005b, 11).

1.6. Social performance

1.6.1. Employment

It is difficult to calculate the number of Irish people directly or indirectly employed in the energy sector, but the generation, supply and distribution of energy is both a major source of employment in its own right and a precondition for employment in all other sectors of the economy. The ESB alone employs about 9,600 people in the generation and supply of electricity in Ireland (ESB 2006). As energy consumption increases and the need for reducing the environmental impact of energy production becomes more of a priority, attention is shifting to renewable energy sources. This could have major implications for both the location and quantity of energy-based employment. For example, an EU-wide study carried out in 1999 estimated that the renewable-energy sector has the potential to create over 900,000 new jobs in the European Union by 2020, including 515,000 jobs in agriculture and biomass fuel supply (ECOTEC 2002). Already countries like Germany and Denmark are achieving high employment levels from renewable energy activities, especially in the wind energy sector. To date, however, Ireland's renewable energy sector has not fulfilled its employment potential. Although Ireland is increasing its installed capacity of wind energy, it has failed to capture any of the associated manufacturing jobs such as in turbine production (Oireachtas 2006). This contrasts with Denmark, which leads the world in wind-energy turbine manufacture. Furthermore, distributed generation, which includes many kinds of renewable electricity, is often located close to the point of consumption, thereby promoting local employment and encouraging economic and social cohesion to dispersed regions of Ireland.

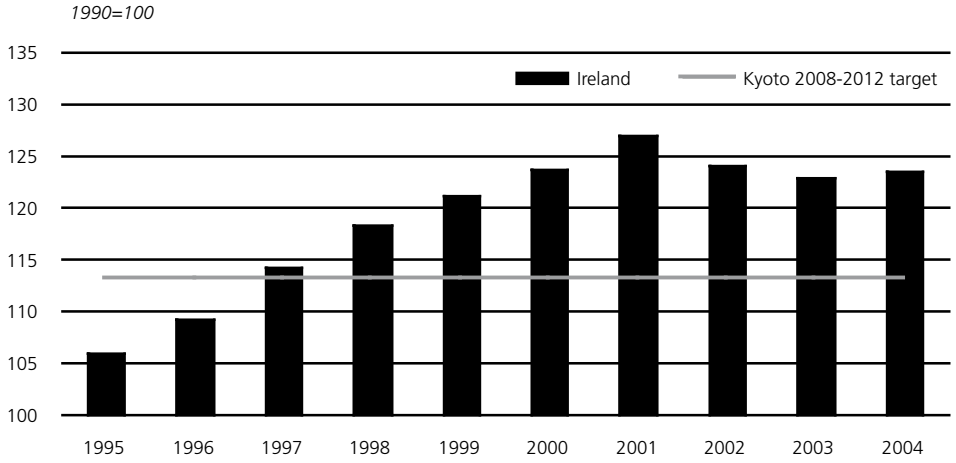
1.6.2. Fuel poverty

Fuel poverty describes the situation faced by low-income households that are unable to afford adequate home heating. A national estimate of the number of households suffering fuel poverty stood at 226,000 in 2001 (Healy and Clinch 2002), or 17 per cent of total households. In Ireland, like in Britain, poorer households tend to spend a higher share of their income on energy than the average. One reason for fuel poverty is that residents cannot afford the up-front costs of insulating their homes, which leads to a vicious circle as they are forced to spend more of their income on heating. This is a major social concern in Ireland, with clear linkages between fuel poverty and increased mortality during cold seasons, but it also leads to unnecessarily high greenhouse gas emissions as a result of the energy wastage (SEI 2003, 14). The existence of fuel poverty means that higher energy prices are likely to be disproportionately detrimental for such households, which could lead to resistance to important environmental measures, such as a carbon tax.

1.7. Environmental Performance

Rising energy consumption in Ireland and the increasing overall dependence on fossil fuels have led to a large increase in greenhouse gas emissions (see Figure 8). Energy-related emissions constitute the largest, and rising, share of Ireland's total greenhouse gas emissions (SEI 2006a, 29). Indeed, the bulk of Ireland's increased greenhouse gas emissions since the baseline of 1990 have occurred in the energy sector, which grew from 58 per cent of total greenhouse gas emissions in 1990 to 69 per cent of greenhouse gas emissions in 2004. CO_2 emissions from the transport sector in 2004 were 134 per cent higher than in 1990 (an average annual growth rate of 6.3 per cent), making transport now the largest CO_2 emitting sector (SEI 2006a, 34).

Figure 8: Total net greenhouse gas emissions in Ireland, 1995-2004



Source: EPA, CSO 2006

While recent years have seen a partial decoupling of CO_2 emissions and GDP growth, this does not reflect efficiency improvements in final energy consumption as much as the use of less carbon-intensive fuels and improvements in generating efficiency (ESRI 2005b, 115). Between 2001 and 2004 Ireland's primary fuel requirement for electricity fell by 3.5 per cent, while at the same time the final consumption of electricity increased by 11 per cent. This was largely due to the closure of Irish Fertilizer Industries Ltd. (Arklow) in 2002 and Irish Steel (Cork) in 2003, as well as the introduction of 735 megawatts (MW) in installed capacity of new CCGT plant in 2002 (SEI 2004A, 17), which has higher generating efficiency and produces fewer CO_2 emissions than coal, the fuel it has largely displaced in Ireland. Unfortunately, with rising use of gas comes reduced fuel diversity. This explains the continued use of peat for electricity generation, which is supported through the Public Service Obligation charge paid by all consumers. Even though recently constructed peat-fired generating stations are relatively efficient, the reliance on peat is expensive and also leads to greenhouse-gas emissions (ESRI 2005b, 81) as well as the degradation of important wildlife habitats through the extraction of peat.

Some of the main environmental pressures from energy generation include over-consumption of natural resources (especially water), lost biodiversity from infrastructure construction, emissions to air and water, noise pollution and land contamination. Emissions of sulphur dioxide (SO_2) and nitrogen oxides (or NO_x, the collective term for nitrous oxide and nitrogen dioxide) from electricity generation and motor transport lead to acid rain and smog. Emissions of sulphur dioxide from power stations amounted to 63.6 per cent of total national emissions in 2002, although these emissions declined by 42 per cent between 1998 and 2002 due to the move to natural gas, which contains less sulphur than coal. In 2002, power stations emitted 30 per cent of the total NO_x emissions, with transport accounting for 42 per cent of these emissions. Large quantities of water are also consumed at some energy generation plants, giving rise to emissions of warm water that degrades local aquatic ecosystems (EPA 2004a, 8).

1.8. Irish energy policy

Energy policy in Ireland focuses on three broad areas (DELG 1999):

- The protection of security of energy supply
- The development of competitive, efficient markets that provide a choice of energy services and support economic growth throughout Ireland
- Ensuring that energy supply and use are environmentally sustainable

To date, however, Ireland has not articulated a comprehensive national energy policy. The Government is expected to publish a Green Paper on energy policy towards the end of 2006.

1.8.1. Security of supply

Security of supply is a complex concept that attempts to explain how a country's economy is vulnerable to changes in the supply and distribution of energy. Security of supply comprises such issues as price and quantity risk, the proportion of total energy that is imported, the diversity of fuels used, the sources of imported energy and the stability of the energy distribution network. The exposure of a country to these risks depends on total demand and the energy intensity of the economy, today and into the future.

Irish policy has attempted to increase the indigenous supply of energy, diversify away from oil, maintain strategic fuel stocks, reduce demand, support research into renewable energy sources, and provide a more stable market through liberalisation, increased competition and the extension of electricity and gas networks across Ireland and between Ireland and the rest of Europe. This is a complex set of priorities to balance, however, and Ireland's energy policy is constrained by several factors including Ireland's island location on the periphery of Europe, its rejection of nuclear power as a potential source of electricity, and domestic priorities such as the promotion of peat-based electricity generation as a way of providing rural employment. The trends of increasing overall energy consumption and import dependency outlined above indicate that policies to improve security of supply have been limited at best. The high rate of growth in transport energy demand is problematic in particular because the transport sector is so dependent on imported oil.

1.8.2. Environmental protection

Energy production and consumption in Ireland impose heavy environmental costs. The dominance of fossil fuels in the Irish energy mix leads to local and transboundary air pollution and contributes to the global problem of climate change through the emission of greenhouse gases. Ireland has reduced its emissions of particulates from electricity-generating stations thanks to the installation of better filters and the switch from coal to natural gas, which has lower sulphur content. Emissions of sulphur dioxide from power stations declined by 42 per cent between 1998 and 2002 with the introduction of low-sulphur energy sources such as natural gas, while power station nitrogen oxide emissions declined by 4.5 per cent between 1998 and 2002. The electricity-generating sector accounted for 63.6 per cent of total national emissions of sulphur dioxide in 2002 and 30 per cent of total emissions of NO_x; transport accounting for a further 42 per cent of NO_x emissions (EPA 2004A, 153).

Ireland's overall strategy to reduce its greenhouse gas emissions was set out in the National Climate Change Strategy in 2000 (DELG 2000). This strategy estimated that Ireland would exceed its permitted level of greenhouse gas emissions by 8 to 9 million tonnes annually in the absence of appropriate policies and measures. The centrepiece of Ireland's response was the introduction of an emissions trading system for Ireland's large sources of CO_2 emissions, which particularly affected the electricity-generating sector and was expected to lead to reductions of 4.3 million tonnes annually. The ESRI (2005b) criticised this policy for granting many of the emission permits to polluting companies for free, which reduced the immediate economic impact of the policy to affected companies but was highly inefficient for the economy as a whole. Moreover, the decision of the Government in 2003 to withdraw its plans for a carbon tax meant that large segments of the economy are not covered by any policies, fiscal or otherwise, to reduce their greenhouse gas emissions. This has contributed to Ireland's failure to date to rein in its overall emissions. Likewise, the growth in the motor transport sector, which has been a predictable but at least partially avoidable side-effect of Ireland's economic growth, has led to increased air pollution and the degradation of natural areas through road building and urban and suburban development.

1.8.3. Cost competitiveness

Under the third main aspect of Irish energy policy, cost competitiveness, the Government has effected since 2000 the liberalisation of the energy markets and the integration of Ireland into a Single European Market in the key energy supplies of electricity and gas. EU directives obliged Ireland and other member states to allow consumers to choose their energy supplier in a new competitive market. To facilitate this, the Commission for Electricity Regulation was established as an independent regulatory body and Eirgrid was set up as an independent body to govern the operation and planning of the electricity transmission system. The 2006 Oireachtas Joint Committee on Communications, Marine and Natural Resources report on energy found that liberalisation has not, so far, led to the lower costs for consumers that were expected, partly because investors are unwilling to make long-term plant decisions in the absence of a long-term energy policy. Another reason is that liberalisation has not led to significant entry of new market participants into the electricity-generating market. The Oireachtas Joint Committee report identified the complex structure of the first trading and marketing system, which relied on heavy regulatory controls, as a reason for the continued dominance of the incumbent, ESB.

1.8.4. Cross-cutting policies

Recent Irish policy to increase the share of renewable energy in Ireland has been designed to further all three policy objectives. Renewable energy helps diversify Ireland's sources of energy and it is almost by definition indigenous. The ReFIT feed-in tariff for wind energy, adopted in May 2006, is seen as a cost-effective incentive that provides predictability to investors in wind energy. Ireland is now seen as on track to meet its target of 13.2 per cent of electricity produced by renewable energy sources by 2010, largely from wind energy. Despite this outlook, however, the configuration of the national grid and the installation of plants that are more suited to continuous generation will pose problems to a larger-scale deployment of wind energy (Eirgrid 2005).

Energy efficiency can likewise reduce Ireland's external dependence, reduce the environmental impact of energy and lead to cost savings for businesses and individual households. The EU Directive on the Energy Performance of Buildings, which came into force in Ireland in January 2006, could improve energy efficiency in thousands of buildings by obliging landlords and vendors of buildings to provide information about a building's energy efficiency while also recommending ways that the building's energy performance could be improved. Another important policy is the reduction in excise tax for biofuels that was announced in the Government's 2006 budget in December 2005, which could support the use and production of about 163 million litres of biofuels per year by 2008, representing 2 per cent of transport fuels.

2. Key issues and challenges faced for the future

The 1997 NSDS identified the following issues that challenge the sustainability of Ireland's energy sector:

- Increasing total and per-capita consumption of energy
- High degree of dependence on imported fuels
- High degree of dependence on fossil fuels for electricity generation
- Increasing emissions of CO_2 from burning of fossil fuels
- Low use of renewable energy resources

Each of these issues affects the three components of sustainable energy outlined by the Government – security of supply, cost competitiveness and environmental impacts – and all are projected to remain pertinent into the medium term.

2.1. Security of supply

Ireland's total demand for energy is rising, especially in the transport sector, and although economic growth has been partially decoupled from energy consumption, it is also becoming relatively more dependent on imported fuels. As the NSDS (1997) pointed out, Ireland also suffers a number of marked disadvantages due to its small size and isolation from the European energy infrastructure. Ireland's reliance on imported energy is not necessarily a problem *per se*, but it exposes Ireland to factors over which it, as a small consumer, has little or no control. These include rising world energy prices, supply disruptions and increasing environmental controls. With its already limited source of fossil fuels declining in importance, Ireland's dependence on imported energy has increased from 69 per cent in 1990 to 89 per cent in 2003 (SEI 2006b, 17). Although Ireland's energy intensity has declined in recent years, absolute energy dependence is expected to rise into the future as the economy continues to expand. The source of most of this energy is expected to be imported fossil fuels, especially gas for electricity generation and oil for transport.

The issue of "peak oil" is related to concerns about security of supply. The theory of peak oil, as argued especially by Colin Campbell and others, describes the possibility that production of the world's economically extractable reserves of oil and gas may reach a peak, after which point production will decline as resources are depleted. Proponents of the theory of peak oil point out that oil is a finite resource and therefore it is only a matter of time before the physical constraints of the resource are manifested in increased prices and a gap between supply and demand. Opponents point out that the substitution of other fuels in the past – for instance from coal to oil – occurred because of cost and public need, not scarcity, and that the same could happen with oil and gas.[8] The possibility that oil production has peaked or will soon peak is a major concern to segments of the Irish economy (Forfás 2006). This concern stems largely from the Irish economy's exposure to any rise in international oil and gas prices,

8 For a review of the issues in the debate in peak oil, see for example Maugeri (2004) and Bentley (2002).

temporary or long term, because of the extent to which Ireland relies on imported sources of energy. High international energy prices would be a particular concern for rural Ireland, because of the reliance of rural dwellers on motor transport and the requirement for more extended transport networks (COFORD 2005).

2.2. Competitiveness

A priority of the National Sustainable Development Strategy is to pursue least-cost solutions to achieving more sustainable energy systems and services (NSDS 2002). Recent policies, especially the EU Emissions Trading System and the Large Combustion Plant Directive, are expected to raise the price of emitting CO_2 from burning fossil fuels and cause a shift away from coal and peat and towards gas (ESRI 2005b, 28). This is leading to concerns about an over-reliance on imports that may be concentrated in unstable parts of the world or increasingly in demand from the rising economies of Asia. In a very gas-dependent economy a sudden rise in gas prices would have the potential to cause significant economic disruption. On the basis of past behaviour of prices this has a much higher chance of occurring at some stage in the future than a sustained quantity interruption. Such a price shock could damage the competitiveness of the economy (ESRI 2005b, 24). At the same time, the environmental costs of energy production and consumption will increasingly need to be addressed, leading to the prospect of further increases in the price of energy. Lack of competition in the electricity sector may also raise costs. Despite the liberalisation of the Irish electricity market from 2002, electricity supplies remain dominated by ESB and a relatively small number (currently about 15) of power stations, whose combined installed capacity only barely meets Irish electricity demand. In contrast, most EU countries have surplus capacity. Ireland, unlike most of its European neighbours, will have to invest in additional generating capacity by about 2009, further raising the cost of electricity to consumers.

Meeting increasing environmental concerns will also pose challenges for the country's economic competitiveness, especially without proactive intervention. Ireland is already in excess of its targets for greenhouse gas emissions under the Kyoto Protocol and may need to purchase additional emission permits to be in compliance with its international commitments. The European Union is committed to further action on climate change, and the growing scientific and political consensus about the gravity of the threat posed will likely lead to further constraints on greenhouse gas emissions beyond the end of the first compliance period of the protocol in 2013. This would have major implications for economic growth in Ireland, but it also provides opportunities for further development of a long-term and domestic response to the challenge of climate change in Ireland. For instance, COFORD (2005) points out that an expanded forestry programme and other forms of carbon sequestration, together with renewable energy sources, could play an important role in Irish energy policy.

2.3. Interactions with the environment

Industrialised countries can no longer afford to ignore the environmental side of economic processes. In Ireland, the environmental issues associated with energy production and consumption outlined above will increase in importance, both globally and locally. The energy sector has inherited a legacy of investment decisions dating from periods where environmental sustainability was less of a priority. As a result, policy reform in support of sustainable energy generation poses a challenge because the energy

infrastructure of Ireland, like most countries, required substantial upfront costs and contains numerous entrenched stakeholders, making it relatively inflexible to change.

The greatest global issue facing the energy sector is climate change. The Kyoto Protocol, which was negotiated in 1997 and came into force in 2005, is the first legally binding international agreement that attempts to tackle climate change. Ireland is already well in excess of its permitted emissions of greenhouse gases under its EU and UN commitments related to the Kyoto Protocol, itself considered just a first step towards addressing climate change. Whether or not the international community agrees on new targets to reduce greenhouse gas emissions, Ireland and the EU as a whole are committed to reducing emissions further. This implies that Ireland will face a growing constraint on the use of fossil fuels for its energy needs in the coming decades. Electricity generation will also face increasing constraints on the emissions of other air pollutants.

Renewable energy is seen as one of the solutions to the problems that threaten the sustainability of the energy sector, but energy from renewable sources has increased only marginally, from 1.8% of the energy supply in 1990 to 2.2% in 2004 (CSO 2006). This is due to obstacles to the development of renewable generating capacity that still exist today. The first major problem, despite favourable tariffs and the rising cost of imported fossil fuels, is the relatively high price of energy from renewables. This has led to increased reliance on natural gas, despite the associated price and supply risks for the future. Wind energy is a major exception, with prices per kWh comparable to fossil-fuel sources of electricity, but wind and other kinds of renewable energy are impeded by the inability of Ireland's electricity grid to connect large numbers of renewable and CHP electricity generators (SEI 2002, 16). Although Ireland is on track to meet its target of 13.2 per cent of renewable electricity by 2010, further deployment will be problematic without investment to facilitate the entry of more intermittent power to the electricity distribution system (ESRI 2005b). The isolation of the Irish market also poses problems for the increase of renewables. Penetration of wind power of up to 20 per cent in parts of Germany or Denmark is possible because these areas are part of the much larger UCTE electricity network. In Ireland, which has a discrete electricity network, ESB National Grid has already expressed its concern about the implications for security of supply of wind penetration beyond a certain threshold (775 MW in 2004) (O Gallachoir & McKeogh 2005).

The other approach is to reduce consumption, but here too Ireland faces particular challenges. The energy efficiency of electricity generation has improved due to the deployment of combined cycle gas turbines. In general, however, measures to improve energy efficiency by reducing consumption have come up against entrenched patterns of high energy dependency. The growing use of private cars, longer commuting times and the declining share of non-road modes of freight transport are leading to increased emissions of CO_2, NO_x and other air pollutants from road traffic (EPA 2004B, 9). The inadequacy of public transport and the growth of suburban housing developments have not only propelled the rise of automobiles and residential energy usage, but also created the need for an energy infrastructure further and further away from the city centres (EPA 2004B, 9). Other challenges for reducing energy consumption in the transport sector include economic growth, increased air travel, and increased ownership of larger and less efficient automobiles.

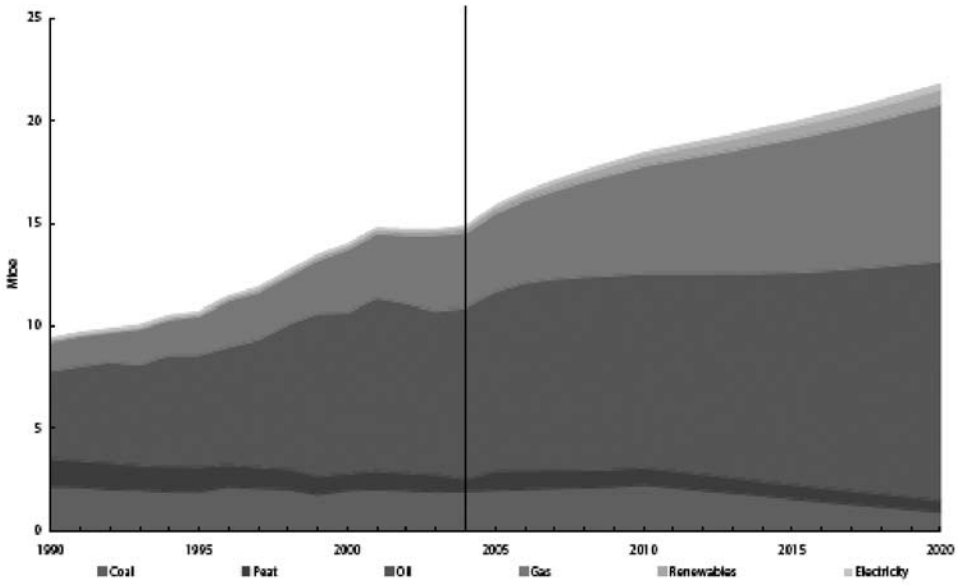
3. Future trajectory under business as usual

The prediction of energy trends is a treacherous business. During the oil shortages of the 1970s almost no one predicted that oil would return to a surplus within two decades. Similarly, most European countries have found it more difficult than expected to reduce their energy consumption sufficiently to meet their obligations under the Kyoto Protocol. Some trends can be extrapolated into the near future quite easily, although even these require important assumptions. This section outlines some of the likely features of the Irish energy sector up until 2020, which is the horizon for Sustainable Energy Ireland's current set of energy projections.

3.1. Energy supply and demand

Figure 9 shows the trends for Ireland's Total Primary Energy Requirement historically and projected up until 2020. Oil is projected to remain the dominant fuel, accounting for 53% of energy supply in 2020. Natural gas supply is predicted to increase more significantly, contributing to increased energy supply growth and also displacing coal and oil in electricity generation. The most significant period of growth in natural gas supply is projected to take place in the next 5 years (at an average rate of 6.6% per annum) due to the anticipated commissioning of new combined cycle gas turbine (CCGT) plants and increased use of gas for residential heating. Coal is projected to decline from 13 per cent in 2004 to just 4.3 per cent in 2020. Renewable energy is expected to rise at an average rate of 11 per cent per annum up to 2010, largely due to the deployment required to meet Ireland's target of 13.2 per cent of electricity supplied by energy from renewable sources by 2010 (SEI 2006a, 23). Renewable energy will also grow faster than energy supply but is still only projected to contribute 3.3 per cent of total energy supply in 2020.

Figure 9: Total Primary Energy Requirements, 1990-2020



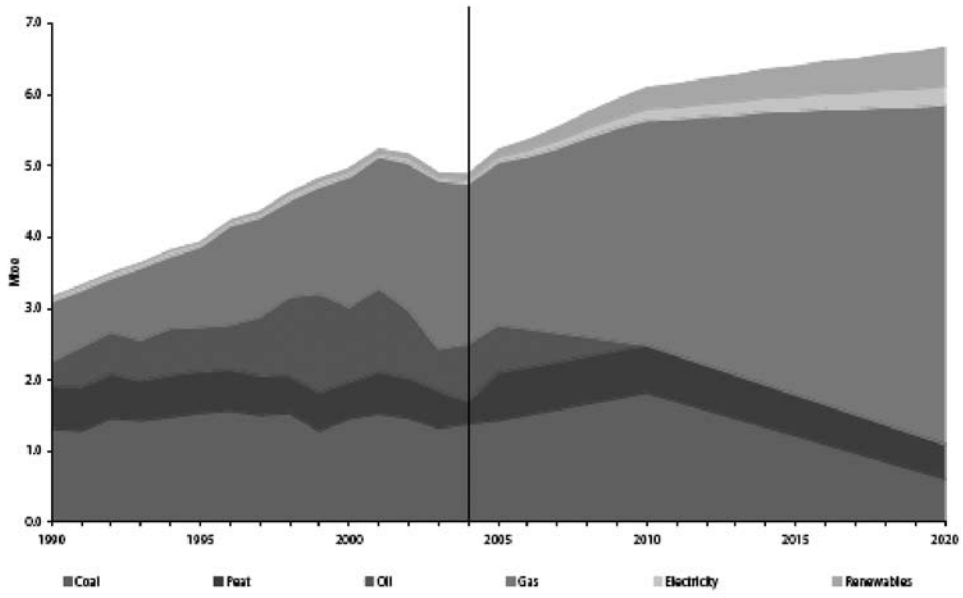
Source: SEI 2006a, 23

3.1.1. Electricity generation

As shown in Figure 10, the demand for electricity is forecast to grow at rates of between 2.5 per cent and 4.3 per cent per annum (Eirgrid 2005, 33). This increasing demand will require increased electricity generation. Expected constraints on CO_2 emissions will cause a shift towards renewables, but especially natural gas, for electricity generation. By 2020 gas-fired plants are expected to be responsible for 68 per cent of total electricity generation (ESRI 2006b; SEI 2006a, 26).

Renewable electricity will likely meet the government's target of 13.2 per cent of installed capacity by 2010, mainly due to an expected increase in installed wind power to over 1000 MW by 2011 (Eirgrid 2005, 45). The growth of CHP will depend on government policies and the price ratio of natural gas to electricity, but it seems that the NCCS target for the contribution of CHP to CO_2 abatement, 0.25 Mt CO_2e, or about 250 MW of CHP capacity, will not be met (SEI 2004a, 38; Eirgrid 2005, 44).

Figure 10: Primary fuel mix for electricity generation 1990-2020



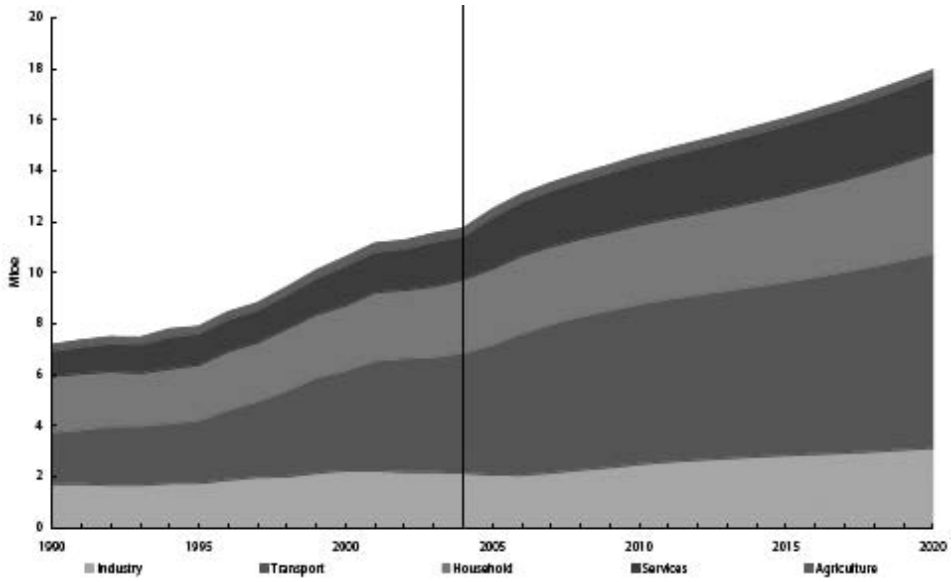
Source: SEI 2006a, 26

3.1.2. Energy demand

Energy demand is expected to continue to rise at an average rate of almost 3 per cent per annum. Figure 11 shows the expected growth in demand by sector. The overall changes in shares for each sector of final energy consumption are expected to be largely similar as today. The most significant increase in energy demand will be from the transport sector, where demand is expected to be 33 per cent higher than in 2005, at over 6 Mtoe. By 2020, transport is expected to account for 42 per cent of energy demand (compared with 40 per cent in 2004), and the household sector is projected to reduce its share

from 25 per cent in 2004 to 22 per cent in 2020. The rising number of households will cause a rise in energy demand in the residential sector. According to the ESRI, the services and industrial sector will also witness strong growth between 2005 and 2010, and more moderate growth thereafter (ESRI 2005a, 79).

Figure 11: Total final consumption by sector, 1990-2020



Source: SEI 2006a, 24

3.2. Implications for the sustainability of the Irish energy sector

This section explores in more detail what these trends mean for the three main policy areas of the Irish energy sector: security of supply, cost competitiveness and the environmental impact.

3.2.1. Security of supply

Ireland's dependence on imported energy will continue to increase in the future, with projected levels of dependency on imported energy at 93% of Ireland's total energy supply by 2010. This is compounded by increasing total energy requirements. Ireland will therefore continue to become more dependent on imported non-renewable fossil fuels. The energy intensity of the Irish economy is expected to continue to fall as the economy continues to grow at a higher rate than TPER, however, which somewhat reduces Ireland's exposure to the risks of supply disruptions or increasing scarcity. Electricity demand is expected to be met through the building of new generating plants or increased imports from Britain (SEI 2006a, 38).

3.2.2. Environmental impacts

The greatest environmental challenge in the medium term is the need to reduce greenhouse gas emissions. Ireland's CO_2 emissions are expected to rise to 37 per cent above 1990 levels by 2010 (74 Mt CO_2 equivalent by 2010, or 13.1 Mt CO_2 above Ireland's Kyoto target) (SEI 2006a, 32). On the other

hand, if Ireland follows the strategy laid out in the National Climate Change Strategy, greenhouse gas emissions would be reduced by 15.4 Mt CO_2 equivalent by 2010 against business-as-usual projections, in compliance with Ireland's Kyoto commitments (SEI 2006a, 32). Improvements in energy conversion efficiency are expected as high-efficiency units replace older generating equipment. Recent policy initiatives such as the ReFIT feed-in tariff for renewable electricity could help Ireland meet its target of 13.2 per cent of electricity from renewable sources by 2010, although there remain obstacles to the wider deployment of renewables, especially the inability of the electricity distribution grid to accommodate embedded generation (see below). Other means of increasing energy efficiency might come from such initiatives as the implementation of the EU Energy Performance of Buildings Directive (EPBD). Without intervention to cover those parts of the economy not covered by the Emissions Trading System or to improve energy efficiency and increase the share of renewable energy, however, Ireland will have difficulties in meeting its Kyoto targets.

Along with CO_2 emissions, Ireland is also behind most EU countries with respect to other notable air pollutants, such as NO_x, VOCs, and SO_2 (EPA15, 2004, 8). Despite improvements in recent years with respect to NO_x and SO_2 emissions, Ireland will struggle to meet the 2010 Directive on national emission ceilings. Ireland is expected to face most difficulties in meeting the ceilings for VOCs and NO_x, although targets for SO_2 and NH_3 by 2010 are realisable (EPA 2004b, 5).

3.2.3. Competitiveness

Real energy prices are expected to remain at least at current levels or to rise in the future. The price of oil and gas is expected to continue to rise due to increased competition for resources from Asia. The price of natural gas is also expected to rise due to the need to remunerate capital investment. An OPEC study from March 2003 shows Ireland to have a low to average sensitivity to oil price increases, but gas prices could be relatively higher in Ireland due to the country's geographical position at the end of the European distribution grid (Goodbody Economic Consultants 2002, 28). Most of Ireland's competitors have surplus electricity-generating capacity, unlike Ireland itself, which could mean that Irish enterprises could face higher energy prices in comparison to competitors as Ireland installs the additional capacity – estimated at 2,000 MW – over the coming 15 years to meet demand (Goodbody Economic Consultants 2002, 44). The Irish electricity price henceforth will have to signal the full, long-run cost of production in order to remunerate recent and potential capital investment (ESRI 2005a, 16). The electricity transmission infrastructure is also inadequate to the needs of a rapidly growing economy. Unless the planned major further investment is delivered on time, it could have a wider impact on growth (ESRI 2005, 17). High energy prices could also pose serious problems for vulnerable members of society. The residential sector is the least efficient sector in Ireland and consumes 35 per cent more energy (corrected for climate) per dwelling than the EU-15 average of 2003 (SEI 2006a 59), which is one of the causes of fuel poverty. The large proportion of dispersed single-dwelling houses means that rural Ireland will also be particularly vulnerable to increases in motor-fuel prices.

4. Policy changes to improve the sustainability of the Irish energy sector

The Irish energy sector is conditioned by the country's recent economic performance but also constrained by Ireland's small size and island location, as well as by policy preferences. Ireland's relative isolation from Europe's energy infrastructure accentuates the need for security of energy supplies, efficient energy infrastructure, and the development of indigenous energy resources. As a small country, however, Ireland has little scope to affect the international sources of energy supply. Instead, Ireland should seek to reduce its exposure to the risks of supply disruptions or shortages. Therefore, the emphasis in Irish energy policy is on reducing the environmental impact of energy production and consumption, reducing demand through improved energy efficiency and demand-side management, and increasing the contribution of renewable energy and other domestic sources of energy. Nuclear energy, which could theoretically reduce Irish energy dependence as well as the emission of greenhouse gases, is not currently considered an option for electricity production due to concerns about safety, high up-front costs and the problem of storing radioactive waste.

While each of the three areas of concern – security of supply, cost competitiveness and environmental impacts – is important, they are also interdependent. For example, promotion of embedded generation would spur growth in indigenous, renewable energy sources, much of which would be located in rural areas. Ireland would subsequently become less dependent on imported fossil fuels, improve its environmental health by moving toward its Kyoto greenhouse gas targets, and also support the National Spatial Strategy that seeks to create more equal regional development throughout Ireland. Although the primary challenges facing Ireland's energy sector are most easily addressed separately, any strategy seeking to address these concerns necessitates a more holistic, comprehensive view of energy in Ireland. Finally, Irish energy policy should look to the long term, but mindful of the fact that many decisions today predetermine tomorrow's policy options. Moving from an energy infrastructure based on imported fossil fuels to one more focused on indigenous, renewable sources will take decades to accomplish. For this reason, guaranteeing sustainable energy into the foreseeable future requires radical change in the present.

This section outlines some of the ways that Ireland could improve the sustainability of the energy sector beyond business-as-usual projections.

4.1. Energy supply

Security of energy supply can be improved by diversifying the sources of energy supply. Unlike oil and coal, which are traded relatively freely on the international market, natural gas is constrained by geography. The security of gas supply could be increased by the development of a Liquefied Natural Gas (LNG) terminal, but this would be an expensive undertaking. Nevertheless, investing in an LNG terminal in the UK or even mainland Europe would enhance Irish supply security through greater interconnectedness of the markets. In the meantime, security could be enhanced by the negotiation

of long-term contingency supply contracts that provide an agreed volume of oil for Ireland's economy in the event of a global shortage, priced at premium as necessary to guarantee delivery (Amarach Consulting and Hirsch, 2006). Irish companies could also invest in gas fields in Norway or possibly Russia, but preferably in companies owning a portfolio of gas fields that supply the European area. The issue of insuring the whole economy against oil and gas price shocks should be taken into account when framing the investment strategy for the national pension reserve fund (ESRI 2005b, 24). Another option would be to bring the offshore Corrib gas field on-stream. This could result in Ireland becoming over 50 per cent self-sufficient in gas supplies well into the 2010s (ESRI 2005b, 27).

In the end, however, it will be necessary to reduce the dependence of the Irish economy on fossil fuels. This would have additional costs, especially in the short term, but would be worthwhile for reasons both of supply security and environmental protection. Oil in Ireland is mainly (and increasingly) used for transport, where alternative transport fuels (biofuels or hydrogen) are still far from competitive. Biofuels currently make up only 0.1 per cent of Ireland's fuel consumption. Ireland has large potential for the production of biofuels from agriculture, such as biodiesel from rapeseed oil, as well as from other industrial activities like vegetable oils recovered from the food industry. The development of this form of indigenous energy production could be supported – for instance, the Oireachtas Joint Committee (2006) recommends that the Government investigate the possibility of supporting the conversion of the Mallow sugar factory to bioethanol production. But even an increase in the use of biofuels to 2 per cent by 2008, as foreseen under current policy, will make only a small inroad into Irish energy needs. Therefore, policies to reduce dependence on oil should focus on demand-side measures (see below). Gas is increasingly used for electricity generation, as well as space heating, so policies to reduce Ireland's dependence on gas should focus on improving efficiency and broadening the mix of fuels used for these purposes. Increased interconnection with the UK gas market would also enhance the security of the supply system by creating greater diversity and backup supply. Finally, Ireland could also invest in backup infrastructure. The systematic provision for temporary dual firing of CCGT plants can, at a cost, provide additional security by allowing generators to withstand a temporary interruption of gas supply.

4.2. Electricity supply

A long-term approach to improving the sustainability of the energy system should include an emphasis on the energy delivery systems themselves, and particularly the electricity distribution system. A stable, flexible energy-distribution system would provide additional security of supply and, if it facilitated small-scale embedded electricity generation, would also lead to reduced environmental impact while also bringing social benefits in terms of increased employment. The ongoing All Island Grid Study is investigating large-scale penetration of renewables, particularly wind, in the context of the "2020 Vision" project to promote renewable energy on the island of Ireland by 2020 (DETI/DCMNR 2005).

4.2.1. Electricity generating capacity

Ireland, unusually among European countries, must install new generating capacity over the next five years. This means that upcoming decisions on the mix of generating plant will determine Ireland's energy mix for the next 20 years. Since there is currently a disproportionate amount of base-load plant (mainly

CCGT), the Commission on Energy Regulation should provide incentives to ensure that new generating plant will complement further deployment of variable electricity generation. The Irish government already promotes diversity in fuel generation by requiring ESB to produce electricity from peat. The other major domestic source of fuel is coal, which is competitive with gas. Both fuels have detrimental environmental impacts, however. Coal produces the highest proportion of greenhouse gases of any fuel, and is regulated by the EU ETS, which raises prices. A proposal to replace Moneypoint generating station with a gas-fired station would improve environmental performance but lead to further dependence on imported natural gas. If coal remains part of the energy mix, it should be accompanied by CO_2 sequestration, a technology that is still far from being cost effective. Peat is an indigenous source of energy that provides local employment, but its extraction destroys valuable habitats for biodiversity and emits even more CO_2 than coal. One solution would be to replace peat – and, eventually, other fuels – with biomass, which would retain the social benefits of local employment that are gained by using peat (which is in any case less important today, with near-full employment in Ireland) while also boosting the use of a renewable source of energy with fewer environmental impacts. Moreover, the rising cost of fossil fuels and reforms of the Common Agricultural Policy provide an opportunity for a greater production of biomass for energy fuels. The use of land for the cultivation of energy crops offers real opportunities for farming and rural areas (NESC 2005, 202).

4.2.2. Electricity from renewable sources

Renewable energy holds the greatest long-term promise to improve security of supply and reduce environmental impacts. Ireland has enormous and largely untapped resources of renewable energy. For example, a 1997 study estimated that wind power could generate around 345TWh per year, about 19 times the current electricity production of the ESB system (ESBI/ETSU 1997). Because renewable energy is often small in scale, it also provides important social benefits by providing investment opportunities and employment, often in rural areas. In the short-term, however, the potential of renewable energy will not be realised without government support. This is because many renewable energy technologies are expensive because they are at the early stage of development, and because such technologies have not yet attained the economies of scale to become competitive with conventional energy sources. Government policy to encourage research and development in renewable technology is necessary because of uncertainty in the energy sector and the fact that the gains from research may not be captured by those who invest in the research (ESRI 2005b, 97). Another problem is the inability of Ireland's electricity grid to connect large numbers of electricity from intermittent or dispersed sources (such as wind energy and CHP). The government could facilitate high wind penetration (e.g. 15 per cent) by encouraging the deployment of open cycle gas turbine stations, which have a relatively low capital cost and provide the flexibility to balance the energy system when the wind drops (ESRI/EPA 2004, 17). Another promising area for long-term development is ocean energy from waves or tides, which is abundant around the island of Ireland and, because it is predictable, could provide a backup source of energy to support wind power (SEI 2006c, 10). The most important and long-term challenge, however, will be to ensure that the fundamental characteristics of the energy system are in place to accommodate greatly increased deployment of dispersed, often small generators of electricity from renewable energy sources (SEI 2002a, 20).

4.2.3. Embedded generation

"Embedded" or "distributed" generation is electricity generated in small-scale units that are connected to regional electricity distribution networks. Embedded generation has the potential to increase the number of generating units, diversify fuel and increase reliance on domestic sources of power, while also reducing greenhouse gas emissions. The security of the electricity distribution network would also be improved by increasing the number of generating units and the energy sources that they use (Goodbody Economic Consultants 2002, 70). Reforming the Irish electricity market structure would also increase competition efficiencies and reduce costs to consumers. Embedded generation can also reduce overall costs to the consumer by providing a more efficient electricity system that generates and delivers power close to the point of consumption; embedded plant generally has lower capital costs and can be sized to match a particular level of demand. In Ireland there is much potential for new technologies such as modular combined cycle gas turbine, open cycle gas turbine, combined heat and power (large-scale, mini and micro) and fuel cells to be included in a national system of distributed generation.

A detailed cost-benefit analysis of the connection of embedded generation to the Irish electricity distribution network found that embedded generation would bring several important benefits to energy sustainability (SEI 2005a). First, embedded generation would lead to avoided emissions of greenhouse gases and particulates, depending on such factors as the fossil fuel fired generation that is replaced, or avoided, and the specific mix of embedded generation technologies adopted (not all embedded generation is from renewable energy). The deployment of embedded generation would also reduce the need for Ireland to purchase carbon credits from the EU ETS or even provide income from sales of surplus allowances (SEI 2005a, 159). Second, embedded generation would reduce the need for imported fuel and provide a step towards improved energy self-sufficiency for Ireland, reducing Ireland's exposure to short-term price volatility in world energy prices. Third, embedded generation would bring employment opportunities to local communities in the construction and operation of embedded generation (SEI 2005a, 195-6). Renewable energy electricity generation, if it leads to the displacement of more polluting forms of electricity generation, could also lead to such social benefits as reduced hospital care cost due to reduced pollutants and the wider economic benefits that arise from any such improvement in the general health of the population, although these benefits are difficult to quantify (SEI 2005a, 164).

4.2.4. Combined Heat and Power

Combined Heat and Power (CHP), also known as cogeneration, is the simultaneous production of usable electricity and heat in a single process (SEI 2004B, 4). CHP can contribute to a more sustainable energy future in several ways. CHP units are about 20-25 per cent more efficient than conventional electricity generating units because they use the heat produced rather than releasing it into the atmosphere, thereby leading to less CO_2 emissions. CHP units can be small and are often embedded into the network close to point of use, thus increasing efficiency by reducing transmission losses. CHP can also enhance the security of the electricity supply network by increasing the diversification of the fuel mix and because embedded generation that is close to the point of consumption improves physical security and regional self-sufficiency (SEI 2004b, 7). ESB National Grid predicts that 67 MW of installed CHP capacity will be added by 2012, from a base of 145 MWe at the end of 2004 (Eirgrid 2005). The

National Climate Change Strategy sets a target of 0.25 Mt reduction of CO_2 per annum attributable to CHP, relative to business as usual, to be achieved by 2010. ESB National Grid estimates that an additional 250 MW of new CHP plant will need to be installed by 2010 to achieve this target (Eirgrid 2005, 44). Unlike renewable energy systems, which explicitly offset imported fuels and create greater energy self-sufficiency, CHP plants may not lead to reduced import dependency because they tend to be fuelled with natural gas. Nevertheless, there is still a considerable displacement benefit arising from CHP due to its overall higher thermal efficiency in terms of the ratio of fuel energy in to the useful energy produced (both electricity and heat) (SEI 2005b, 167). According to the Oireachtas Joint Committee, incentives for the development of CHP and district heating would enable the use of some of the 60% of energy that is currently wasted from power generation plants and will help to raise the efficiency of the electricity supply from 40% to closer to the 60% level, as is currently achieved in Denmark.

4.2.5. Microgeneration

Microgeneration, which includes such technologies as domestic solar panels, brings embedded generation closest to the point of use. Allowing the connection of microgeneration to the grid would greatly increase the competitiveness of this form of electricity generation. Unfortunately, there is currently no way to connect microgeneration and small-scale electricity generation to the electricity network. Any measure to allow grid connection should be as simple and standardised as possible to reduce the barriers to market entry. The ESB could develop a simpler and more rapid connection process for micro-generation, based on similar principles to those used in the United Kingdom and that are currently being developed at the European level (SEI 2005a, 320). Standardised connection terms may provide a sliding scale of connection charges linked to the generator capacity and incorporating the costs and benefits associated with typical import/export profiles for this class of customer (SEI 2005a, 199).

4.3. Demand-side measures

Demand-side management has the potential to reduce the size of the energy sector relative to the whole economy. Reducing Ireland's overall energy demand, or at least slowing its rate of growth, will be essential to reducing Ireland's dependence on imported energy, environmental impacts and vulnerability to increased prices. Opportunities to reduce demand vary across sectors. Some policies could target specific sectors, whereas others are more horizontal in nature. Those sectors with the greatest rates of growth – transport and the residential sector – require the most attention.

4.3.1. Energy efficiency

The EU Directive on energy end-use efficiency and energy services notes that energy consumption is potentially about 20 per cent higher than can be justified on economic grounds. The 2005 European Commission Green Paper "Energy efficiency, or doing more with less", says that saving 20 per cent on energy consumption by 2020 would allow the EU to save an estimated €60 billion on its annual energy bill (European Commission 2005, 4). Energy efficiency can deliver huge environmental and economic benefits at less cost than renewable and other new technologies. This is because it requires fewer technologies, fewer resources, and a reduced environmental impact (ESRI 2005b, 112). Of the options for mitigating CO_2 release, ranging from wind power to CHP to building efficiency, energy efficiency

initiatives with respect to major refurbishment programmes and new buildings, using existing and proven technology, are among the most cost-effective means available to policymakers (ESRI 2005b, 116). Unfortunately energy efficiency does not have the attraction for investors compared to renewables and new technologies. Many cost-effective opportunities for industries and the public sector to invest in energy efficiency, and at a higher rate of return than investing in new capital, are ignored due to market barriers such as imperfect information, access to capital and hidden costs (ESRI 2005b, 131).

4.3.2. Transport

Energy consumption is rising fastest in the transport sector, as a result of longer commuting times, increased size of engines, growing use of road transport for freight and increased air travel. All of these trends are the result of many interconnected economic factors and are not easily reversed. Nevertheless, there are several measures that have the potential to reduce energy demand in the transport sector. Ireland could adopt more radical tax incentives to encourage hybrid vehicles and increase the taxation of heavily polluting vehicles along the lines of other European countries (Amarach 2006). To reduce demand, measures should focus on increasing the provision of public transport, an area that has long suffered from under-investment in Ireland, as well as shifting the tax burden away from smaller and more efficient vehicles. Congestion charges, or schemes similar in nature, could also reduce demand for driving but their effectiveness depends on the parallel provision of adequate public transport options. The government could also support employers to encourage teleworking practices (Amarach 2006). The most important and long-term measure to reduce transport demand, however, is spatial planning. Current development patterns encourage suburban sprawl and housing estates that effectively oblige homeowners to drive long distances daily. An alternative approach should focus on urban containment, involving high-density residential development, mixed land uses and good public transport (EPA 2004A, 159; NESC 2005, 62).

4.3.3. Residential

The residential and business sectors consume a growing amount of energy for electricity and space heating. The construction of public housing provides the opportunity for pilot programmes of reduced energy usage through alternative technology and improvements in efficiency. In general, however, basic planning regulations could require higher minimum efficiency standards for all buildings. Studies imply that there is considerable scope for efficiency gains in the residential sector and that these could be encouraged by information dissemination, greater conviction that financial savings can be made and assistance with investment costs for low-income households (ESRI 2005b, 129).

4.3.4. Energy pricing

Pricing incentives are among the most effective ways to influence behaviour. In Ireland, energy prices often do not reflect the real environmental or social costs, or even producer costs, which leads to an over-consumption of energy. The government should ensure that energy prices reflect their true costs as far as possible. In the short term, policies could focus on removing subsidies for polluting forms of energy, bearing in mind any social benefits that the subsidies support. In the longer term, energy prices should move closer and closer to reflecting the true social and environmental costs of energy production and consumption.

One of the most effective ways to realise many of the requirements of sustainable energy is via a carbon tax. A 2002 study by ESRI found that a carbon tax of €20 a tonne of CO_2 in Ireland would make a significant contribution to achieving Ireland's targets on emissions reduction under the Kyoto protocol – holding emissions to a limit of 13% above the 1990 level in the 2008-2012 period. The study found that such a tax would reduce projected emissions in 2010 from around 27% above 1990 levels, on a no policy change basis, to being only 18% above the 1990 level (ESRI/EPA 2002, 32). The regressive nature of a carbon tax could be countered by a rebate or compensation for low-income households, for instance by increasing the amount of fuel allowances. The longer-term effect of a carbon tax would be to provide incentives for consumers to switch to more energy-efficient heating systems or implement energy-saving measures, such as improving insulation. Measures to support energy-efficiency measures at home (such as window replacement, loft insulation) would not only bring about savings of, on average, 2.6 tonnes of CO_2 per household per year, but also increased warmth and comfort for the houses' inhabitants (ESRI 2004, 19).

A carbon tax would generate large revenues, estimated by ESRI/EPA in 2002 at about €860 million, or 1.1 per cent of GDP in 2003 (ESRI/EPA 2002, 20). It would also cause a reduction in greenhouse gas emissions through reduced energy use of around 4.4 million tonnes per year, or about 9 per cent below projected CO_2 emissions in 2010 (ESRI/EPA 2002, 20). Revenues could be used not just to compensate low-income households but also, as proposed by ESRI/EPA 2004, to remove other distorting taxes in general and improve the functioning of the economy. Analysis by the EPA/ESRI (2004, 31) suggests that the long-term cost to the Irish economy of a carbon tax, if the revenues were used to reduce income tax or Value-added Tax and increase in welfare payments, would be small, at less than 0.2 per cent of GDP per year after 10 years, or even positive. Therefore a 9 per cent reduction in CO_2 emissions by 2010 could be achieved in a relatively painless way at the aggregate economy level. However, for individuals who consume above average amounts of energy or who are very dependent on solid fuels, the effects may be more adverse (ESRI/EPA 2004). Even still, the competitive effects would be reduced if Ireland's competitors also introduce such fiscal measures, as appears likely in the European Union. The effects of a carbon tax would be most pronounced in the electricity-generating sector but least so in the transport sector. This highlights the need for additional policies and measures such as spatial planning (ESRI 2004, 35).

Conclusions

The Irish energy sector has been transformed by almost two decades of rapid economic and population growth. This has been accompanied by a rise in concerns for the social and environmental impacts of energy production and consumption. Perhaps the most tangible feature of Irish energy today is its overwhelming and growing dependence on imported fossil fuels, which exposes Ireland to risks of international supply shocks, growing scarcity and environmental problems.

The policy response has focused on improving security of supply and reducing the environmental impact, while encouraging energy-market liberalisation and cost competitiveness. In general, however, Irish energy policy has been criticised for reacting to external pressures rather than anticipating them and for having a short-term planning horizon (e.g. Oireachtas 2006). Certainly, Irish energy policy tends to focus on the supply of energy with only limited attention to reducing energy consumption. This is in part because the causes of energy consumption are so varied and diffuse that to tackle them would require an unprecedented level of inter-ministerial and inter-agency coordination. In particular, measures to reduce demand and encourage energy efficiency are hindered by the continued low real cost of energy in Ireland and underlying structural problems such as Ireland's spatial planning, which encourages dispersed settlement and long daily commutes. Nevertheless, increasing environmental constraints, EU directives and the rising real cost of energy are causing a gradual shift from the traditional supply-side focus of energy policy in Ireland to a greater emphasis on developing and promoting more energy efficient technologies and practices across all end use sectors. Even though there is no Common Energy Policy at the EU level, the European Union has provided many of the incentives for the modernisation of the Irish energy sector and the growing awareness of the sustainability aspect of energy.

Meeting the energy challenges of the coming decades will require stronger leadership from the public sector, which alone has the instruments to facilitate the necessary long-term and coordinated actions. In this regard the Government should consider setting very broad and long-term targets, even if the means to achieve those targets are not yet obvious. The Oireachtas Joint Committee (2006) recommendation for a radical long-term target for the reduction of greenhouse gas emissions by 60 per cent below 1990 levels by 2050 is a good example that emulates the examples of other countries (e.g. the United Kingdom, which has a similar target for 2050). Such benchmarking with other EU countries could provide an effective spur to further action. One possible means of setting such a radical, long-term target would be to reach broad political consensus between different political parties and other stakeholders on the need for the long-term "decarbonisation" of the Irish economy. Under this rubric, Ireland could adopt specific and time-bound targets for the share of renewable electricity, energy efficiency, CHP, and the provision of public transport, among other issues. In the end, if Ireland is to increase its security of supply, retain its competitiveness and improve the social and environmental performance of its energy sector, all stakeholders must be prepared to go beyond business-as-usual and adopt proactive and radical policies, even if these may appear costly to some segments of the economy in the short term.

Appendix: Key policies and policy instruments

Irish energy policy seeks to address the three areas of concern outlined about: security of supply, cost competitiveness and the environmental impact. To this end, Irish energy policy aims:

- To develop a competitive energy supply industry
- To ensure security and reliability of energy supplies
- To develop energy conservation and end-use efficiency

This section provides a brief summary of the main policy instruments, including international agreements, EU directives and national policies, designed to meet these goals and address the three areas of concern.

International agreements

Ireland is party to a number of international agreements that directly or indirectly affect energy policy, including:

- United Nations Framework Convention on Climate Change (UNFCCC) (1992)
- Kyoto Protocol to the UNFCCC (1997)
- UNECE Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) (1991)
- UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) (1998)
- UNECE Convention on Long-range Transboundary Air Pollution adopted the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol) (1999)
- Energy Star: an international voluntary labelling scheme for energy-efficient office equipment. The European Union joined Energy Star in 2003
- Energy Charter Treaty: an international agreement based on integrating the energy sectors of the former Soviet Union and Eastern Europe into the broader European and world markets. The treaty was signed in 1994 together with a protocol on energy efficiency and related environmental aspects

European Union Directives

Much of Ireland's legislation is set at the EU level. The Irish government is responsible for transposing EU Directives into national law. The four directives that most directly affect sustainable energy in Ireland include:

- Directive 2001/77/EC on the Promotion of Electricity from Renewable Energy Sources in the Internal Electricity Market
- Directive 2002/91/EC on the Energy Performance of Buildings
- Directive 2003/87/EC Establishing a Scheme for Greenhouse Gas Emission Allowance Trading within the Community
- Proposal for a Directive of the European Parliament and the Council on the Promotion of End-use Efficiency and Energy Services, COM (2003) 739 final

Other directives of importance are:

- Directive 2003/30/EC on the Promotion of the Use of Biofuels or other Renewable Fuels for Transport
- Directive 2004/8/EC on the Promotion of Cogeneration Based on a Useful Heat Demand in the Internal Energy Market
- Directive 93/98/EC on Liberalisation of the Gas Market
- Directive 2001/80/EC on the Limitation of Emissions of Certain Pollutants into the Air from Large Combustion Plants
- Directive 2001/81/EC on National Emission Ceilings for certain Pollutants (covers the four pollutants responsible for acidification, eutrophication and ground-level ozone pollution: SO_2, NO_x, VOCs and ammonia)

National policies

General policy is established in the National Sustainable Development Strategy (1997) and the Green Paper on Sustainable Energy (1999). The National Climate Change Strategy (2000), which deals mainly with meeting Ireland's commitments under the 1997 Kyoto Protocol to the UN Framework Convention on Climate Change, bears heavily on the energy sector.

Fiscal policies

- Emissions trading: implementation of the EU Emissions Trading Scheme
- Biofuels Excise Tax Relief: €20 million of relief, rising to €35 million in 2007 and €50 million in 2008-2010, supporting the use and production of about 163 million litres of biofuels per year, representing 2 per cent of transport fuels by 2008. Announced in December 2005
- Plans to introduce a carbon tax were dropped in 2003

Regulations (command and control)

- Integrated Pollution Prevention and Control (IPPC): came into force in 2004, requiring many industrial processes to meet energy efficiency and emissions standards. The IPCC replaces the Integrated Pollution Control (IPC) licensing, which came into force in 1994
- Air Quality Standards Regulations 2002: transposed EU Directives into national law and established new air quality standards for SO_2, NO_2 and NO_x, lead, PM_{10}, CO and benzene
- 1997 Building Regulations, Part L: Conservation of Energy and Fuel: amendments introduced under the NCCS require a reduction in fuel use by 20 per cent

Direct investment and subsidy

- Renewable Energy Feed in Tariff (ReFIT): a market mechanism to encourage deployment of renewable energy technologies that was launched on 1 May 2006. It replaces the Alternative Energy Requirement (1996), which required the ESB to purchase electricity from renewable sources for contracts of 15 years at a guaranteed price. The AER was funded through a levy on customers' supply bills known as the Public Service Obligation (PSO)

- The EPA-coordinated Cleaner Greener Production Programme provides grant aid to selected organisations to apply integrated preventive environmental strategies to processes, products and services
- Social Infrastructure Operational Programme: a grant programme under the National Development Plan providing €12.7 million for energy efficiency in public-sector buildings

Negotiated or voluntary agreements

- LIEN (Large Industry Energy Network): a voluntary network initiative operated by Sustainable Energy Ireland for the largest industrial energy consumers in Ireland, providing energy auditing and management, common reporting, and assistance to meet energy-efficiency targets
- Energy Agreements Programme: a framework to help firms address their energy needs strategically, administered by Sustainable Energy Ireland. The programme is based on the Energy Management Standard IS 393. Participating firms are required to obtain and retain certification to IS 393 and to implement the Standard in a way that will maximise its impact.

Research and development

- European Union 6th Framework Programme: Thematic Priority 6 – Sustainable Development, Global Change and Ecosystems – provides grant funding for projects in sustainable energy systems, including clean energy sources, alternative motor fuels, fuel cells, storage, renewable energy technologies, and capture and sequestration of CO_2
- Grants programmes administered by Sustainable Energy Ireland, including:
  - Greener Homes Scheme: grant programme to provide assistance to homeowners who intend to purchase a new renewable energy heating system for either new or existing homes
  - House of Tomorrow: funding for developers to design and construct as demonstration projects
  - Renewable Energy R&D: launched in 2002 and due for completion in 2006. Provides partial and full grants for projects that stimulate the deployment of renewable energy technologies that are close to market or assess the development of technologies that have prospects for the future

Information

- Odyssee/Mure Project: an EU-wide initiative, established 1992, that aims to develop, produce and publish appropriate indicators to assess energy trends and gain improved understanding of the drivers behind these trends
- Energy Performance Building Directive: requires obliges specific forms of information and advice on energy to be provided to building purchasers, tenants and users. It came into force in January 2006
- Sustainable Energy Ireland provides an array of energy-information services
- Energy labelling of appliances was introduced in Ireland in 1995 and the legislation currently covers a wide selection of household appliances

Other

- EU Directive on Strategic Environment Assessment (2001/42/EC): aims at identifying and assessing the environmental consequences of higher-level plans and programmes during their preparation and before their adoption, including in energy, industry and transport policies

References

Amarach (2005), "Ireland's Oil Dependence: Trends, Prospects & Options", Amarach Consulting & Robert Hirsch, Forfás, Dublin, February 2006

Bentley, R.W. (2002), "Global oil & gas depletion: an overview", *Energy Policy* 30, 189-205

Brundtland, G. H. (1987), *Our Common Future – Report of the World Commission on Environment and Development*, United Nations General Assembly, New York

COFORD (2005), "Rural Ireland 2025. Foresight Perspectives". Joint Publication by NUI Maynooth, University College Dublin and Teagasc, COFORD 2005

CSO (2006), "Measuring Ireland's Progress 2005", Central Statistics Office, Dublin, June 2006

DCMNR (1999), "Green Paper on Sustainable Energy", Dublin, 1999

DELG (1997), "National Sustainable Development Strategy", Department of Environment and Local Government, Dublin

DELG (2002), "Making Ireland's Development Sustainable", Department of Environment and Local Government, Dublin

DELG (2000), "National Climate Change Strategy", Department of Environment and Local Government, Dublin

DETI/DCMNR (2005), "All-Island Energy Market. Sustainability in Energy Supplies: A '2020 Vision' for Renewable Energy", Department of Enterprise and Industry (UK) and Department of Communications, Marine and Natural Resources, July 2005

ECOTEC (2002), "Renewable Energy Sector in the EU: its Employment and Export Potential. A Final Report to DG Environment", ECOTEC Research & Consulting Limited, Brussels

EPA (2004a), "Ireland's Environment 2004", Environmental Protection Agency, Wexford

EPA (2004b), "Ambient Air Quality in Ireland 2004", John Delaney, Office of Environmental Assessment, Environmental Protection Agency, Wexford

EPA (2006), "Ireland's emissions of greenhouse gases for the period 1990-2004", Environmental Protection Agency, Wexford, March 2006

Eirgrid (2005), "Generation Adequacy Report 2006-2012", ESB National Grid, Dublin, November 2005

ESB (2006), http://www.esb.ie/main/about_esb/ataglance1.jsp

ESBI/ETSU, "Total Renewable Energy Resource in Ireland", ESB International and ETSU, March 1997

ESRI/EPA (2004), Sue Scott, and John Eakins, "Carbon Taxes: Which Households Gain or Lose?", prepared for the Environmental Protection Agency by The Economic and Social Research Institute, Environmental Protection Agency, Wexford

ESRI (2005a), "Medium-Term Review: 2005-2012, No. 10", J. FitzGerald, A. Bergin, I. Kearney, A. Barrett, D. Duffy, S. Garrett, Y. McCarthy, Economic and Social Research Institute, Dublin, December 2005

ESRI (2005b), "Aspects of Irish energy policy", J. FitzGerald, M. Keeney, N. McCarthy, E. O'Malley, S. Scott, Economic and Social Research Institute, Dublin, September 2005

European Commission (2005), "Doing more with less: Green Paper on energy efficiency", COM (2005) 265, Brussels, 22 June 2005

European Union (2006), "Review of the EU Sustainable Development Strategy (EU SDS) – Renewed Strategy", Brussels, 9 June 2006

Goodbody Economic Consultants (2002), "Assessment of the key competitive issues and policy requirements facing the Irish energy market, focusing on Irish electricity market", Dublin, December 2002

Goodland, Robert. (1995). "The Concept of Environmental Sustainability." *Annual Review of Ecology and Systematics*, 26:1-24.

Healy, J. D. and J. P. Clinch (2002), "Fuel poverty in Europe: A cross-country analysis using a new composite measurement", University College Dublin, 2002

Maugeri, L. (2004), "Oil: Never Cry Wolf – Why the Petroleum Age Is Far from over" *Science* 304, 1114-1115

NESC (2005), "NESC Strategy 2006: People, Productivity and Purpose", National Economic and Social Council, Dublin, December 2005

O'Connor, Dave, "Generation Mix – Securing Security of Supply", presentation to IWEA Annual Conference, Galway 30 March 2006

Ó Gallachóir, B, P., and E. J. McKeogh (2005), "Wind energy and security of supply: The wind farm grid connection moratorium in Ireland", University College Cork, 2005

Oireachtas (2006), "Seventh Report: Review of Energy", Oireachtas Joint Committee on Communications, Marine and Natural Resources, 12 June 2006

SEI (2003), "A Review of Fuel Poverty and Low Income Housing", Sustainable Development Ireland, Dublin, November 2003

SEI (2004a), "A Study on Renewable Energy in the New Irish Electricity Market", Sustainable Development Ireland, Dublin, June 2004, Sustainable Energy Ireland Energy Policy Statistical Support Unit, Cork, October 2005

SEI (2004b), "Combined Heat and Power in Ireland: Trends and Issues 1991-2002", Fergal O'Leary, Brian Ó Gallachóir and Martin Howley, Sustainable Energy Ireland Energy Policy Statistical Support Unit, Cork, March 2004

SEI (2005a), "Combined Heat and Power in Ireland: Trends and Issues – 2004 Data Update", Fergal O' Leary, Martin Howley and Brian Ó Gallachóir, Sustainable Energy Ireland Energy Policy Statistical Support Unit, Cork, October 2005

SEI (2005b), "Energy Consumption and CO_2 Emissions in the Residential Sector 1990-2004", Fergal O' Leary, Martin Howley and Dr. Brian Ó Gallachóir, Sustainable Energy Ireland Energy Policy Statistical Support Unit, Cork, December 2005

SEI (2006c), "Renewable Energy in Ireland 2005 Update", Fergal O' Leary, Martin Howley and Dr. Brian Ó Gallachóir, Sustainable Energy Ireland Energy Policy Statistical Support Unit, Cork, January 2006

SEI (2006a), "Energy in Ireland 1990-2004: Trends, issues, forecasts and indicators", Martin Howley, Fergal O'Leary and Brian Ó Gallachóir, Sustainable Energy Ireland Energy Policy Statistical Support Unit, Cork, January 2006

SEI (2006b), "Security of Supply Metrics", Morgan Bazilian, Fergal O' Leary, Brian Ó Gallachóir and Martin Howley, Sustainable Energy Ireland, Dublin, January 2006

Towards a sustainable transport system

Comhar Briefing Paper[1]

Prepared by Richard Douthwaite, David Healy and Kevin Leyden

1 This briefing paper has been prepared to inform the proceedings of the Comhar Conference "Towards Sustainability in the National Development Plan 2007-2013" - 4th to 6th October 2006. Opinions expressed are not necessarily those of Comhar but are intended to encourage debate and greater understanding of sustainability issues.

Introduction

A transport system can be regarded as sustainable only if it is possible to imagine it being continued unchanged for several hundred years because it is not damaging society or the environment and is not dependent on a non-renewable, depleting resource to run. However, as this report shows, the Irish transport system has developed over the past few years in a way which has made it less sustainable by becoming, on a per capita basis, more heavily dependent on one increasingly scarce non-renewable resource - oil - than perhaps any other system in Europe. This dependency has arisen largely because of the recent under-priced, uncontrolled growth in the use of the private car. Many of the houses, shopping centres and industrial estates built recently will turn out to be very badly located if cars become too costly to use on anything like the present scale as a result of the increased cost of oil, whether the increase is a result of resource depletion or measures to protect the global climate.

This report begins by looking at the increased use of the Irish transport system in recent years and the extent to which the increases were necessitated by the country's economic growth. It shows that the increase in freight transport was largely unavoidable given the growth path followed but, if the pattern adopted in other EU countries had been followed, more of it could have been carried by rail. In Ireland, unlike most EU states, rail freight tonnage has declined in the past ten years.

However, where the country went more seriously wrong was in keeping the cost of driving a mile in a private car very low, with the result that demand for car use was higher than it would have been if the same tax burden had been imposed on motorists in a different way. Specifically, Ireland made the cost of owning a car high, but the cost of using one low, too low to cover the externalities imposed by a vehicle's use on the rest of the population, Removing this subsidy would have encouraged people to pay more attention to minimising the distance they travel to work and to lower energy transport modes. As aviation has also been subsidised by allowing it untaxed fuel and by the state paying a large proportion of the cost of flights from Dublin to regional airports, overall, the historically low cost of energy and the subsidies have encouraged people to use highly energy intensive transport modes and for less energy intensive ones to grow more slowly or to decline.

The report discusses the far-reaching environmental and social effects of allowing these changes to happen. It then turns to look at the policies and techniques that are available to rectify the situation.

PART 1

Recent performance - An overview of changes in transport volumes

The amount of transport activity in Ireland has increased more rapidly than in any other EU country since the early 1990s, according to the TERM report (EEA, 2006). As a result, Irish people now travel a greater distance in the course of a year than those in any other EU state.

Figure 1: Transport volumes 1993 and 2002

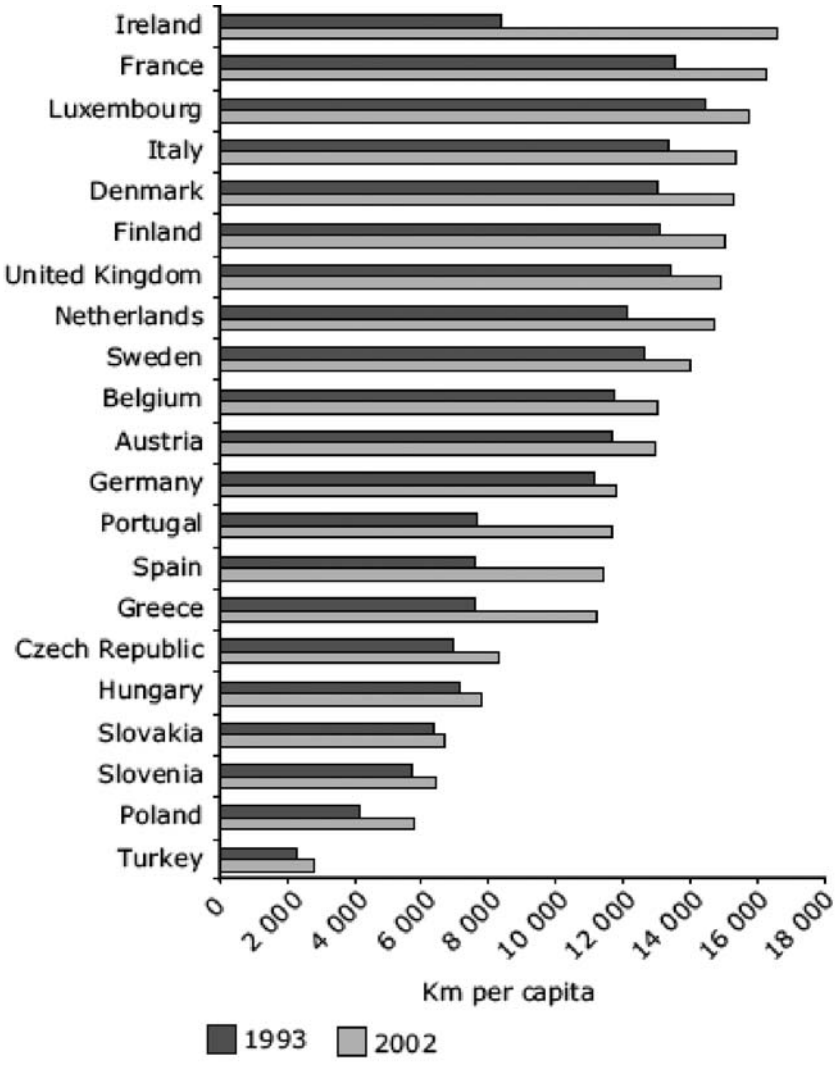


Figure 1: *In the ten-year period between 1993 and 2002, Ireland moved from being a middling country in terms of the distance its population travelled in the course of a year to the most travel intensive in the EU. The distances included above cover all forms of passenger travel including cars and air.*
Source: *European Environment Agency, 2006.*

High transport growth, high levels of mobility, and resultant environmental problems are a Europe-wide phenomenon. The report comments:

> *"Passenger transport per capita has grown particularly fast in Ireland. This can partly be explained by very strong growth in air transport by Irish-registered airlines, which also transport passengers from other countries. But even when air transport is excluded, Ireland still has the highest level of growth and would be at a level comparable to the United Kingdom."*

The most solid data available for Ireland are the travel to work data collected by the CSO in the census (CSO, 2004). This data series shows a sharp increase in the number of people travelling to work and that, simultaneously, there was a sharp increase in the number of trips made by car.

Figure 2: Total travelling to work and total working at home, censuses 1981 to 2002

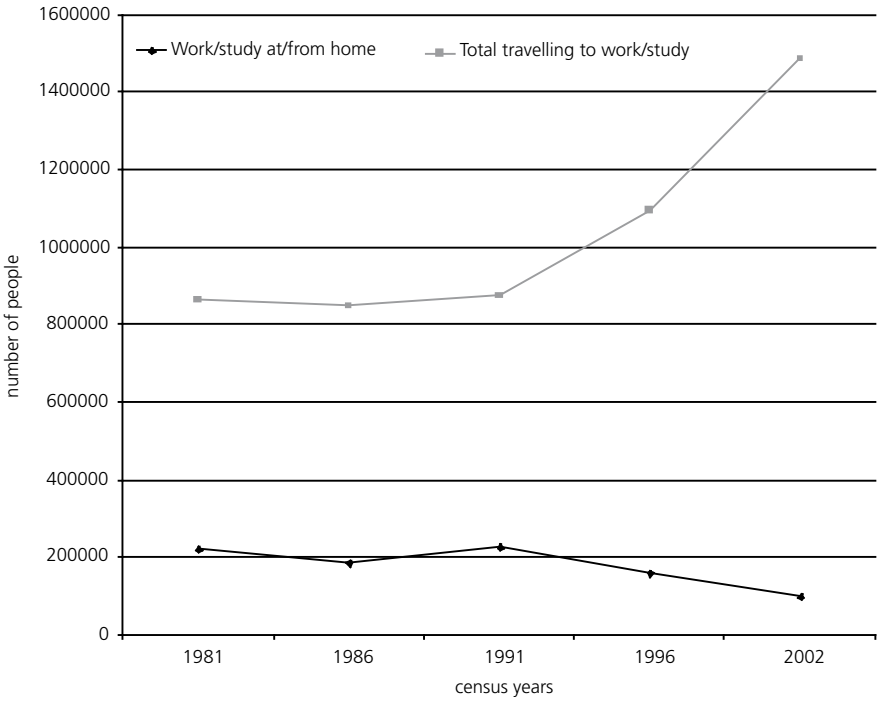


Figure 2: *As the numbers of people in employment grew, so, naturally did the number of those travelling to work.*

Figure 3: Modal split for travel to work 1981 to 2002 censuses

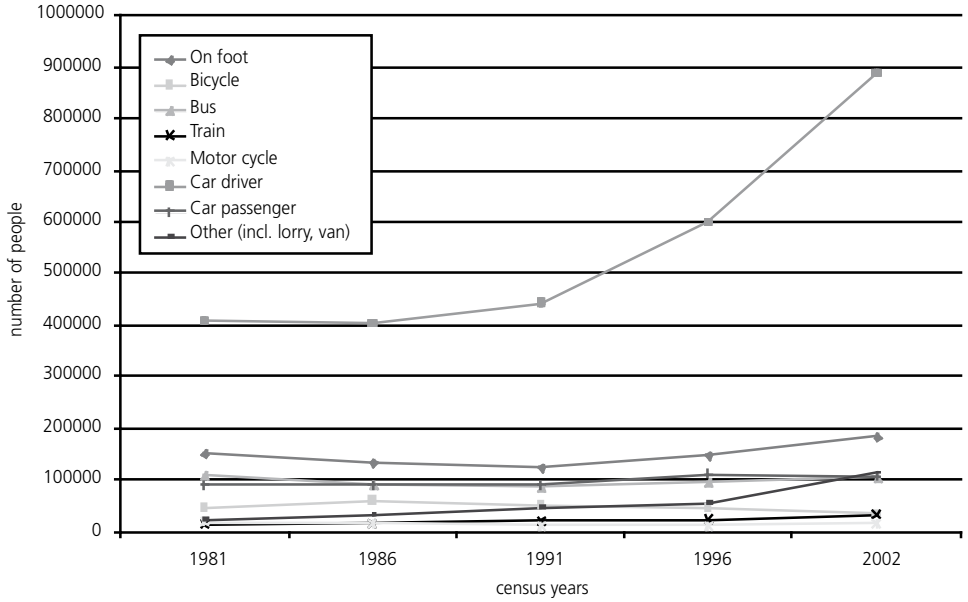


Figure 3: *Many more journeys to work are now made by car.*

The distances people travelled to work increased significantly (Walsh *et al.,* 2005) and a long-distance commuter zone developed around the major cities. A rough calculation from the CSO data suggests that between 1981 and 2002 total (one-way) mileage that people travelled to work each day increased from around 5 million miles to around 12 million miles. This increase was matched by a big increase in the number of motor vehicles registered annually. (DoEHLG, 2004)

Figure 4: Registered vehicles 1985-2004

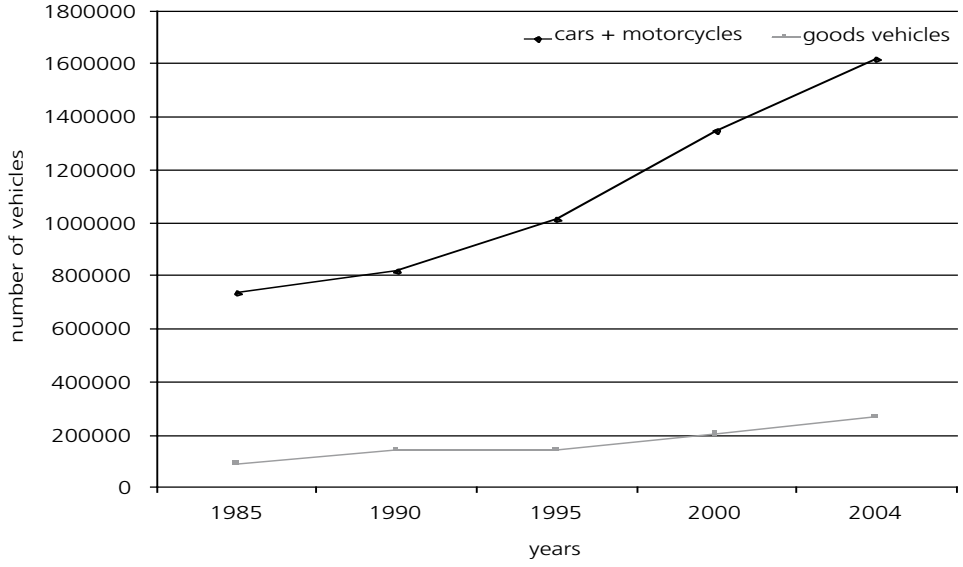


Figure 4: *The number of new cars and motorcycles being put on to Irish roads each year doubled between 1986 and 2004.* ***Source:*** *DoELG 2004.*

Growth in road freight has been even faster than in car travel, as shown in Figure 5. However, rail freight has declined sharply (Booz Allen Hamilton, 2003) and Irish Rail now carries 2% of the total freight (EEA, 2006), the second lowest percentage in Europe (excluding countries without a rail network).

Figure 5: Goods by Road, million tonne kilometres

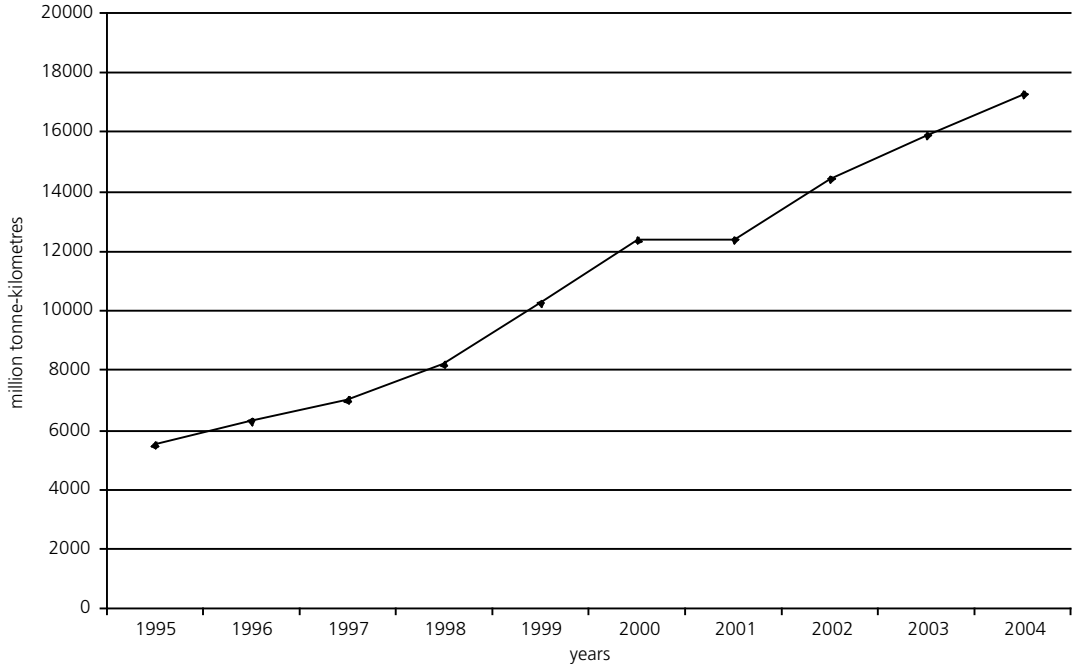


Figure 5: *The amount of road freight carried tripled between 1994 and 2004.* ***Source:*** *CSO, 2005*

Sea freight has shown an increase albeit more gradual and variable, from 30 million tonnes per year in 1993 to 43 million tonnes per year in 2000 to 52 million tonnes per year in 2005. Aviation has seen particularly sharp increases.

Figure 6: Freight Tonne Kilometres – 2004 against the Base Year

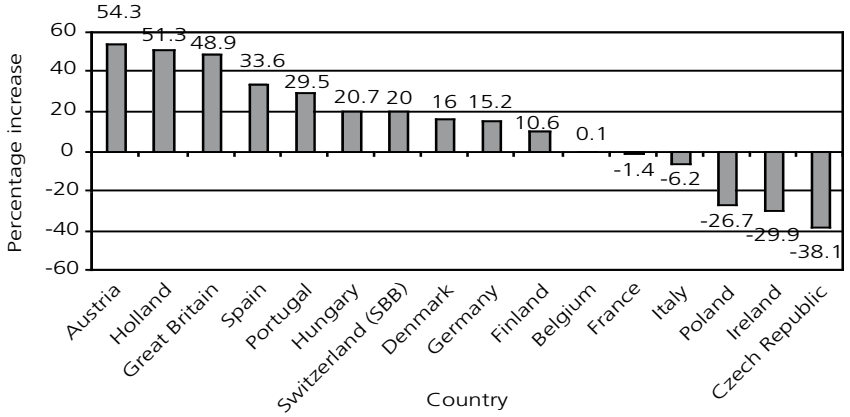


Figure 6: *Other EU rail systems increased the amount of freight they carried between 2004 and the base year, the average or the 1993, 1994 and 1995 figures. In Ireland, however, rail freight declined.* ***Source:*** *Ten-year European Rail Growth Trends, Association of Train Operating Companies, July 2005*

Figure 7: Number of Air Passengers

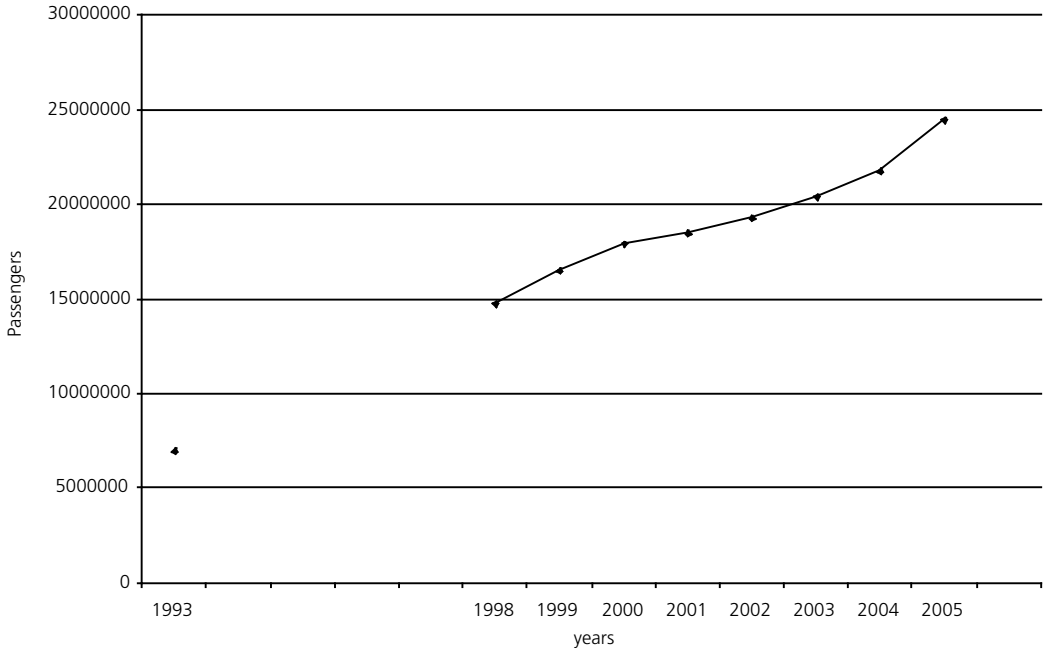


Figure 7: *There was a fourfold increase in the number of passengers going through Irish airports between 1993 and 2005.* ***Source:*** *EPA, 2004, Aer Rianta, 2003, Dublin Airport Authority, 2006.*

This growth in transport was the result of a combination of the following factors, some of which are interdependent:

- Increased discretionary income available for transport.
- Increased income available for purchase of goods.
- Increased and substantial public capital investment in transport infrastructure and vehicles.
- Increased and substantial private capital investment in vehicles.
- Real fuel costs reducing as a proportion of income.
- Direct or indirect subsidies to all forms of motorised transport.
- Land use patterns generating increased transport demand.

The reasons for the increase in transport

As Adam Smith's famous pin making example showed, societies raise their productivity and hence their incomes by organising themselves so that their workers and factories become increasingly specialised. This allows each worker to move up a single learning curve, becoming better and better at doing a very limited job, particularly as he or she can employ machinery and tools designed specifically for that job.

This trend has meant that mixed farms producing a wide range of foods and raw materials such as wool with few bought-in inputs have given way to very specialised "factory" farms which buy in all their feedstuffs and produce just a single product. Similarly, factories like the Foxford Woollen Mills, which took in the raw wool from the farms in the area and processed it right through to the finished blanket have been displaced by businesses in which almost every activity is out-sourced. Sales may still be done in house, perhaps, but manufacture and design are contracted out to specialist firms.

Specialisation has vastly increased the number of products we can use in a day. The Summer 2006 Argos catalogue lists over 30,000 different products, each of which is assembled from many components. Making each of these components cheaply enough to allow the products to be sold at affordable prices can only be done on a scale far beyond the capacity of a small country like Ireland to absorb. Hauliers move the components from the specialist factories which make them to the factories where the products are assembled, often in another country, and then to move the products to the dozens of countries in which they will be sold. The more products we use, therefore, the fewer can be made in Ireland at competitive cost and the more transport required to get them to us. The Argos range would be impossible without global trade.

International transport is therefore an essential part of the modern production process and its cost has fallen remarkably in the past 50 years thanks to containerisation. In 1956 loading loose cargo cost $5.83 per ton. That same year, the first container ship cost less than 16 cents a ton to load[2]. Container ships have significantly reduced the difference in cost between shipping goods from a relatively close port on, say, the east coast of the US and one much further away in, say, Japan. They have also increased the speed with which exports can reach markets.

The cost of air freighting goods as a proportion of their value has also fallen, although more gradually than for sea freight. It fell by almost 3.5 per cent a year between 1973 and 1993[3]. As a result, volumes have grown hugely and, on a global level, more air cargo was carried on a single average day in 1999 than in the whole year fifty years earlier. As a result of these falls, it can quite easily cost more to get a container to or from a factory in Ireland to the port than it costs to ship it to the other side of the world.

As a result, Irish exporters have applied considerable pressure on successive governments to bring the cost of road haulage down and one effect of this has been that the sector has been allowed to externalise a lot of the costs it imposes. At a European level in 2000, the total external costs for all transport modes combined, excluding congestion, were estimated to be at least 7.3% of GDP. The fact that these costs were externalised constitutes a large subsidy to transport as an activity. Road transport

2 "Globalisation and International Locational Competition", lecture by Anne O. Krueger, First Deputy Managing Director, International Monetary Fund May 11, 2006, http://www.imf.org/external/np/speeches/2006/051106.htm

3 Ibid

alone accounts for 83.7% of external costs and thus gets that proportion of the subsidy, followed by air transport with 14%. Rail is responsible for only 1.9% of the externalities and waterways, 0.4%.

Two-thirds of the overall external costs stem from passenger transport and one third from freight transport. For passenger transport, railways have external costs 3.3 times lower than those of road transport, and 4 times lower than road freight. Since road transport contributes 22% to the European economy[4], and the externalities attributable to it are equivalent to 6.1% of European GDP, it is getting a subsidy equal to roughly a quarter of its total operating costs. The external costs making up this figure arise from accidents, noise, air pollution, climate change, damage to nature and landscapes, the loss of time to people needing to cross a road, the use of scarce space in urban areas, and the upstream and downstream effects of transport activity such as the environmental costs of producing the fuels and the vehicles etc.

According to a European Environment Agency report[5], less than half the full external cost of running a freight vehicle on Irish roads is covered by the fuel tax paid. UK hauliers pay almost twice the tax rate.

Figure 8: External costs and fuel tax

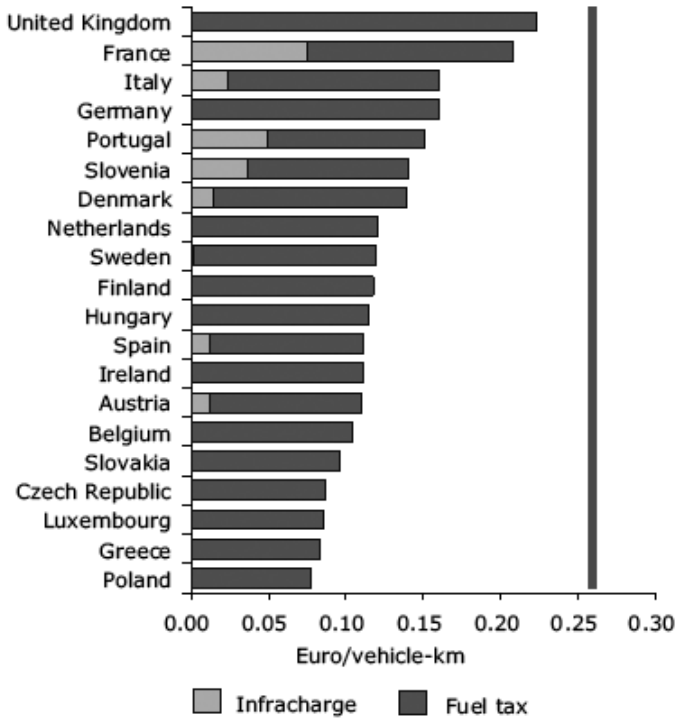


Figure 8: *In Britain, road haulage companies almost cover the damage they do to the environment through their fuel tax payments. Their counterparts in Ireland pay less than half the cost. This constitutes a subsidy from the planet and the public.* ***Source:*** *EEA, 2006.*

4 http://www.erf.be/images/stat/2006_chap1.pdf

5 European Environment Agency, 2006, *Transport and the Environment: Facing a Dilemma* http://reports.eea.europa.eu/eea_report_2006_3/en/term_2005.pdf

This road-use pricing policy did nothing to inhibit a doubling[6] in the number of heavy goods vehicles on Irish roads in the 25 years between 1976 and 2001 although given that national income more than doubled in that period and that rail freight was not promoted as an alternative, this increase was unavoidable in view of the strategy for growth adopted.

Figure 9: Number of HGVs

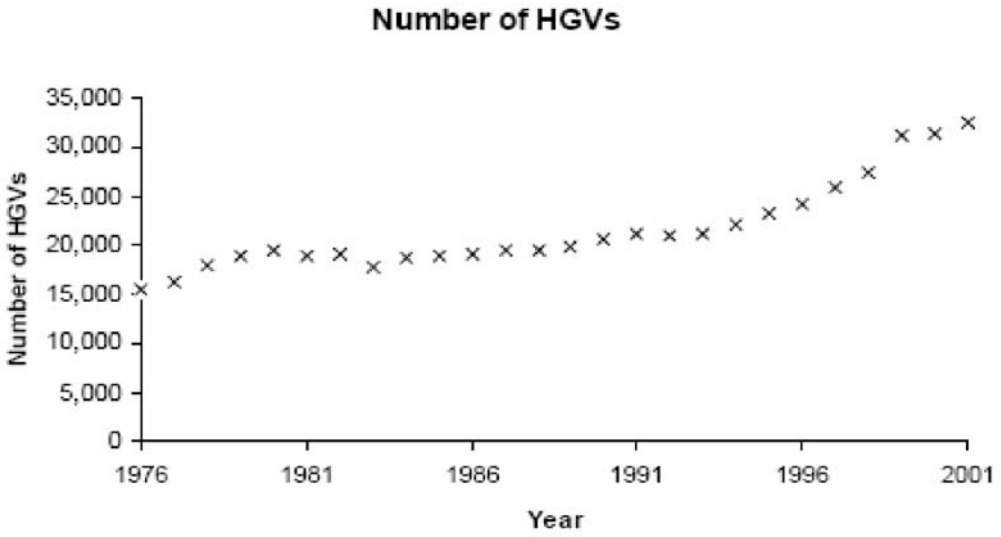


Figure 9: The number of heavy goods vehicles using Irish roads more than doubled between 1976 and 2001. However the carrying capacity increased by more because the average size of the vehicles increased.

Ireland does, in fact, have a low freight transport propensity for the size of its national income. It rates as a relatively efficient economy in this respect, as shown in Figure 10 below.

6 National Roads Authority, Future Traffic Forecasts 2002-2040, August 2003, downloadable from http://www.n4.ie/PublicationsResources/DownloadableDocumentation/Transportation/file,863,en.PDF

Figure 10: EU Freight Movements

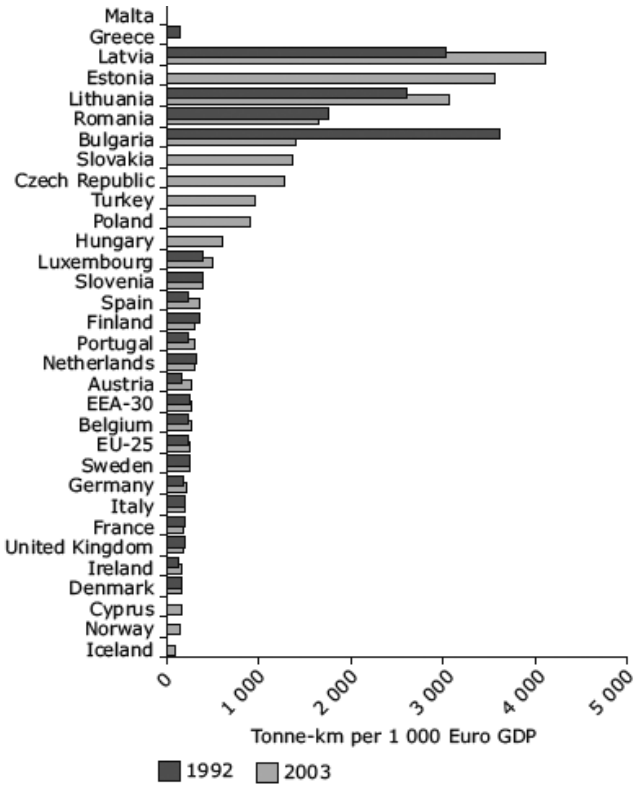


Figure 10: *Although Ireland moved freight less than most EU countries in relation to its national income, it became less efficient in this respect between 1992 and 2003.* ***Source:*** *EEA, 2006.*

There was, however, an alternative to allowing the uncontrolled expansion of motor car use. As workers have become more specialised, there has been an explosion in the number of occupational roles. Hunter-gatherer societies are said[7] to contain no more than a few dozen distinct social personalities, while modern European censuses recognise 10,000 to 20,000 unique occupational roles, and industrial societies may contain more than a million different kinds of social personalities overall. People with one occupational role cannot readily substitute for those with another, so the more occupational roles a society has, the more travelling has to be done to get people with different specialities to where they are needed. Fewer of us can live as close to our work as less specialised workers did a century ago because many jobs now involve visits to several customers or locations in the course of a week, so some expansion of car use was necessary. However, the price of car ownership and use has been falling in real terms for many years and, by failing to limit or prevent this fall, successive governments have distorted the way that this country has developed spatially. As the chart below shows, Ireland has become the EU's most car dependent country and therefore its least efficient and most unsustainable economy in this respect.

7 J.A. Tainter, *The Collapse of Complex Societies*. Cambridge: Cambridge University Press, 1988. See also R. H. McGuire, 'Breaking down cultural complexity: inequality and heterogeneity' in *Advances in Archaeological Method and Theory*, Volume 6, ed. Michael B. Schiffer, pp. 91-142. New York: Academic Press, 1983.

Figure 11: Petrol passenger cars

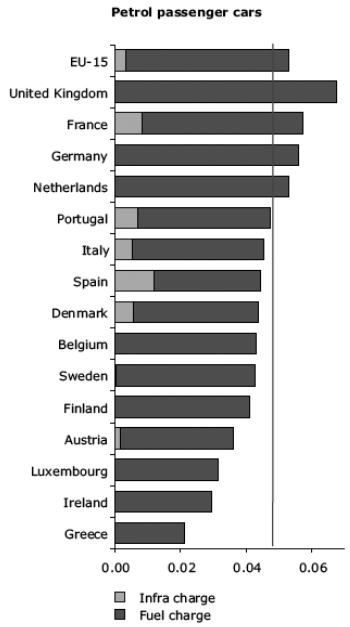


Figure 11: The red line gives an indication of the cost in euro cents that driving a typical petrol car a kilometre imposes on society and the environment. In Ireland, the level of fuel tax is too little to cover this damage.
***Source:** EEA, 2006*

Figure 12: Diesel passenger cars

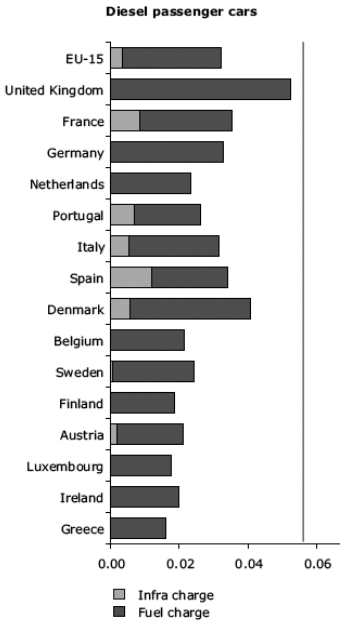


Figure 12: Diesel cars do more damage to the environment and to people than petrol cars but they pay a smaller proportion of that cost in Ireland and in the rest of the EU. They are therefore getting a greater subsidy.
***Source:** EEA, 2006.*

As with road freight, Ireland has not been charging motorists for the full cost of the burden they are placing on the environment and on other people. As a result, the transport mode with the greatest environmental impact has been encouraged, as shown in Figure 13.

Figure 13: Average External Costs: Passenger 1995

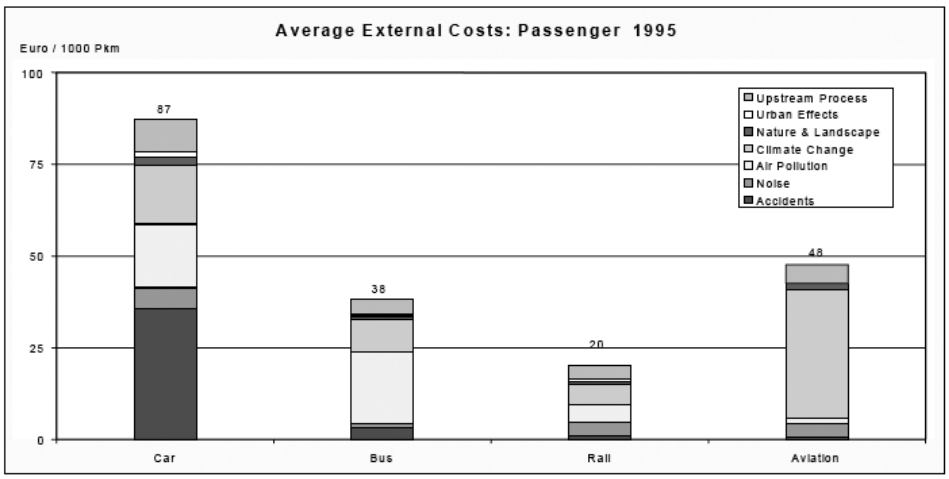


Figure 13: *In terms of the external cost imposed per passenger per kilometre travelled, car travel is twice as bad for society and the environment as bus travel and four times as bad as train travel. This is largely because of the number of road accidents cars cause. Surprisingly, this chart shows car travel to be worse than air travel but we suspect that the damage the latter does to the global climate might be underestimated. Current thinking is that an aircraft's con trail and NO_x emissions double its warming effect. This might not have been taken into account here. See the IPCC's Aviation and the Global Atmosphere http://www.grida.no/climate/ipcc/aviation/index.htm* ***Source:*** *INFRAS, 2000.*

The cost of congestion has been omitted from the externalised cost figures we have quoted so far, possibly because this is a cost that road users impose on each other rather than the public or the environment as a whole. Congestion simply increases the effective price of using the road system. However, another reason for its exclusion is that its cost is difficult to measure and most of the figures given for it are little more than guesstimates. In 1999, the EU estimated[8] that the cost of congestion in the EU-15 in 1996 was 2% of its GDP. If that proportion applied in Ireland at present it would mean that the cost of congestion here is about €3.2 billion a year, or €800 per person. The Dublin Chamber of Commerce told an Oireachtas committee in December 2003 that the cost in Dublin alone was €3bn, a figure they said was based on an EU White Paper published the previous year[9]. In August 2005 the DCC cut its figure back to €2.5 billion[10]. The managing director of Dublin Bus Joe Meagher told[11] the Oireachtas Committee on Transport in May 2006 that congestion was currently costing the company €60 million a year and that the average speed of buses across the network had fallen to just 12km/h. This cost amounted to a third of its ticket revenue in 2005, or the equivalent of its state grant. The €60 million figure excludes the value of the bus passengers' time, which would have been a much larger figure.

8 European Commission, European Transport in Figures, Statistical Pocketbook, 1999

9 "Businesses call for Dublin metro as gridlock costs €3bn a year" by Chris Dooley, *Irish Times*, 3 December, 2003

10 Ireland's Strategic Infrastructure Investment 2020, Goodbody Consulting, September 2005.

11 Dublin Bus wants roads deal with Luas, by Tim O'Brien, *Irish Times*, 18 May, 2006.

The question has to be asked: "Who benefits from the consistent underpricing of road access?" It could be argued that, as far as road freight is concerned, everyone does. This is because the lower freight costs make Ireland more attractive as a production-for-export location and, in the absence of the subsidy, there would either be less direct and indirect employment in the sector or that the wages it paid would have to be lower to compensate. On the other hand, the lower freight costs make imports cheaper and lower distribution costs within the country for firms producing for the local market. Overall, then, lower freight costs are likely to favour bigger firms, whether at home or abroad, and more centralised production.

As far as car use is concerned, the only winners appear to be landowners who were able to sell sites in places that, but for the car, would not have been readily accessible, and their gains have been at the expense of other landowners in places either closer to where people shop, work, go to school and seek entertainment, or where such services could have been developed. Country dwellers may appear to have gained because, under past policies, the cost of running a car has been kept down, but, as incomes rose, bus services and better local shops would have developed, and other rural services would have been improved or maintained. The clear losers are those unable to afford a car, or unable to drive one - the young, the old and the ill - whose needs are badly served. And all of society has lost, too, because a system has been created that takes a lot of resources to run and not only costs a lot to use in money terms but also, thanks to congestion, in terms of its users' time. Car owners in Ireland pay less tax per mile travelled than any other EU-15 country apart from Greece and Luxembourg, while they pay more each year to own their vehicles than anywhere else besides the Netherlands.(Burnham, 2001) The high cost of ownership here is largely due to Vehicle Registration Tax. Thus, although motorists in Britain and Ireland paid about the same amount of tax in total to run their cars for a year, the lower costs per mile here encouraged car use while the higher ones in Britain discouraged it. Vehicle registration tax is levied on the "Open Market Selling Price" of a vehicle, as calculated by the Vehicle Registration Office. Cars and minibuses with less than 12 permanently fitted passenger seats, are charged at 22.5% up to 1400cc, 25% between 1401cc - 1900cc and 30% above that. Only half of the normal VRT is payable on hybrid vehicles that derive their power from a combination of an electric motor and an internal combustion engine.

Figure 14: Annual Ownership Taxation for a 1600cc car

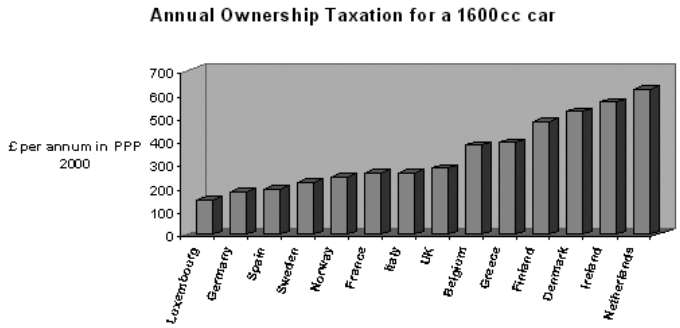


Figure 14: The annual cost of owning a car in Ireland is amongst the lowest in the EU.
Source: UK Commission on Integrated Transport, 2001

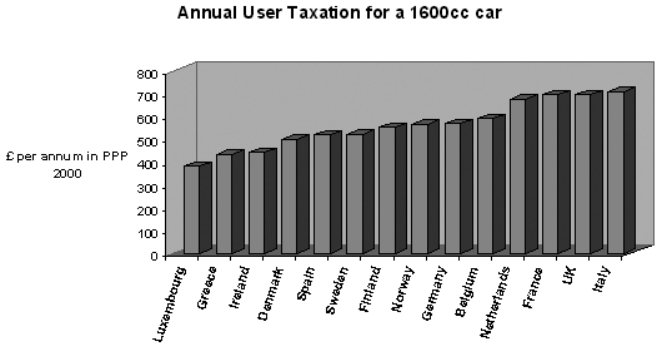


Figure 15: By contrast, the cost of using a car in Ireland is amongst the lowest in the EU.
Source: CFIT, 2001

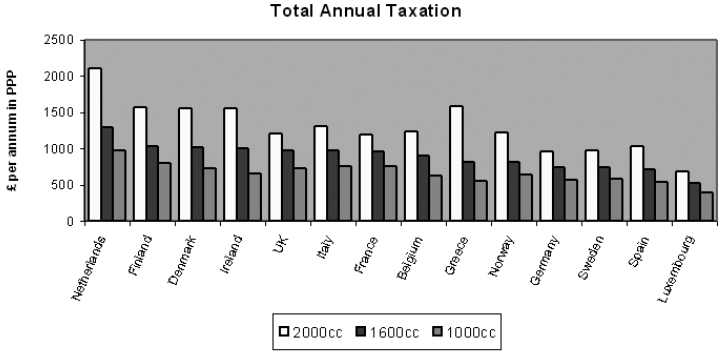


Figure 16: As a result, the total cost of running a car doing 14,000 km a year is much the same in Britain and Ireland. However, the Irish tax system is more encouraging of greater car use.
Source: CFIT, 2001

VAT is payable on the VRT. So its effect is to increase the cost of purchasing a vehicle in Ireland by Ireland perhaps a third in comparison with countries in which only VAT is charged. This has a significant effect on the annual cost of owning a vehicle - the figures in the barcharts amortised the purchase price over 14 years. Another component of the annual cost of ownership is Road Tax which is levied on a vehicle's engine size. It runs from €151 a year for a vehicle under 1000cc to €1,343 on vehicles above 3000cc.

Ireland may not be able to maintain Vehicle Registration Tax much longer. In July 2005 the European Commission proposed (COM(2005)261 final) that registration taxes for passenger cars be gradually abolished over a period of five to ten years and that the annual tax paid on a car should be based on its CO_2 performance. Most economists would probably support treating the purchase of a car in the same way as any other purchase - that is, levying VAT at the standard rate but nothing else - while ensuring that its owners pay the true cost of every journey they make in some form of user charge. We will return to this is a later section.

While Irish petrol is cheaper than average, Irish truck operators pay roughly the same in excise duty and VAT combined on their fuel as their average EU counterpart. The EU-15 average excise duty is €374 per 1,000 litres.

	Excise Duty/1000 litres in 2005
UK	€693
Germany	€470
France	€417
Italy	€413
Denmark	€404
Sweden	€394
Ireland	€368
Netherlands	€365
Belgium	€341
Finland	€319
Portugal	€314
Austria	€297
Spain	€294
Luxembourg	€278

Source: European Road Federation.

Aviation companies pay no tax at all on their fuel, despite the fact that they are in competition with other modes of transport. Even in Ireland, airlines are in competition with trains. Moreover, they get other subsidies to compete with surface transport. Last year, Aer Arann and Loganair were awarded contracts[12] valued at €45.8 million for the latest round of State-subsidised air links to six regional airports. It is arguable that this sum could have benefited far more travellers if it had been used if it had been used to provide earlier and later or more frequent train services instead.

The interrelationship between transport and land use

Most people do not readily recognise the important linkages between transport, and land-use factors. Yet the two are deeply interconnected. The type of transport system chosen profoundly affects the type and character of land-use decisions that follow and the way in which residents end up commuting and attaining their daily needs.

A decision to build a motorway, for example, creates pressures to convert (or re-zone) farm land into housing estates or retail outlets. Recent evidence suggests that when this development occurs in Ireland it tends to follow a car-oriented form of land development similar to what is currently found in suburbs in the U.S. Much of Ireland's new growth around motorways is largely designed using American style Euclidean Zoning. Euclidean zoning's main characteristic is the segregation or separation of uses. Shops, schools, and other amenities tend to be separated from residential zones and often best accessed by car. Car use is typically a requirement due to distances and the lack of connectivity between housing estates. Zoning regulations or planning guidelines "often favour disconnected cul-de-sac street designs over more connected grid networks." (Frank *et al.,* 2006) In such places children are typical driven to school and all shopping or the enjoyment of amenities is car-dependent.

Transport planning efforts that emphasised public modes of transport typically have a very difference impact on land-use planning and the built environment. Transit-oriented development of village-oriented development uses public transport to deliver commuters to community, neighbourhood, or village centres where residents can walk or cycle to their homes and to attain their daily needs in neighbourhood shops, thus seriously reducing the need for a car. Land-use densities are also affected in part because residential density is needed to enhance the viability and efficiency of public transport.

12 "€45m in State air contracts goes to two airlines", Lorna Siggins, *Irish Times*, 27 May 2005.

PART 2

Overview of the environmental and social impact of transport

Environmental impact

The environmental impact of transport in Ireland is set out effectively in *Ireland's Environment 2004* (EPA).

Greenhouse gases and acid precursors

The latest figures in relation to GHG emissions (EPA, 2006) indicate that Ireland's emissions in 2004 were 23.5% above than the 1990 baseline. Transport related emissions were and are the fastest growing sector of greenhouse gas emissions, growing by 143% between 1990 and 2004. In 1990 transport emissions were 9.3% of the total; this had grown to 18.3% by 2004.

The EPA, in *Ireland's Environment 2004*, comments as follows in relation to both CO_2 and NO_x:

> *"The need to curb the massive growth in energy consumption and associated emissions of CO_2 and NO_x from road traffic is a daunting challenge at the present time. The problem is exacerbated by the incompatibility between public transport services and the scale of housing development throughout the country. This challenge can only be met by breaking the link between the growth in road transport and growth in the economy, which requires a radical shift to bus, rail and cycle use. The State cannot expect to comply with its emissions ceilings for NO_x and GHGs if their contributions from road traffic are not soon brought under control."*

Many of the emissions considered under the heading of long-range transboundary pollutants are also considered under the heading of ambient air quality. (Additionally, a significant percentage of the ambient air pollutant load, even in the vicinity of roads, derives from long-distance transport of primary pollutants and their secondary products.) These pollutants are responsible for both this contribution to ambient air pollution, and also to problems of acidification and eutrophication. (They also contribute to haze although this is an aspect which for some reason receives more attention in North America than in Europe.)

A Strategy to Reduce Emissions of Transboundary Air Pollution by 2010 was adopted in 2005. All the projections in the Strategy envisage a substantial overshoot of the emissions ceiling for NO_x. Emission levels of NO_x in 2010 are predicted at between 94 kilotonnes and 82.2 kt depending on which of the identified measures are implemented. Both of these are substantially above the ceiling of 65 kt. Road transport contributes 31.5 kt to both of these estimates. In essence, as the EPA indicates in the quotation above, it will be impossible to meet the ceiling without substantial additional reductions in predicted emissions from transport.

Ambient air quality

Ambient air quality is the main air pollution/emissions issue considered in EIA of road schemes. This is because of the serious human health impacts of air pollution originating from fossil fuel combustion, especially in motor vehicles.

The WHO Regional Office for Europe's (1999), study entitled "*Health costs due to road traffic-related air pollution*", estimated that long term exposure to air pollution from cars causes twice as many deaths as road traffic accidents in the countries studied.

The EPA (2004) identifies PM_{10}, and NO_x as the pollutants of greatest concern:

> *"Emissions from road traffic are now the primary threat to the quality of air in Ireland. The pollutants of most concern in this regard are nitrogen dioxide (NO_2) and fine particulate matter, expressed as PM_{10}. Results of monitoring indicate that compliance with the stringent new PM_{10} and NO_2 standards may present problems in some urban areas subject to heavy traffic. The EPA will advise local authorities on measures needed to ensure compliance with the standards. The introduction of such measures, in the form of air quality management plans or short-term traffic restrictions, would be a major new challenge for local authorities."*

Habitat loss and fragmentation

Road construction and operation has significant effects in fragmentation of habitat and loss of agricultural and undeveloped land.

Noise

Roads and aircraft cause significant noise nuisance for nearby residents with resultant negative health and social impacts. This factor also has biodiversity implications.

Built Environment

Roads construction and road traffic have significant negative impacts on the built heritage and have been the subject of major controversy as a result.

Water

One significant element missing from *Ireland's Environment 2004* is the impact on water quality including streams and groundwater (ref from Paul Johnston report?). Drainage from roads carries significant quantities of hydrocarbon and heavy metal pollutants, which are liable to contaminate groundwater and surface water. Additionally, the paving of ground and diversion of drainage systems will change the hydrological regime.

Social Impact of Transport

Most people do not readily recognise the important linkages between transport, community planning, and social well-being. Yet all three of these areas are deeply interconnected. The type of transport system chosen profoundly affects the type and character of land-use decisions that follow and the way in which residents end up commuting and attaining their daily needs.

A decision to build a motorway, for example, creates pressures to convert (or re-zone) farm land into housing estates or retail outlets. Recent evidence suggests that when this development occurs in Ireland

it tends to follow a car-oriented form of land development similar to what is currently found in suburbs in the U.S. Much of Ireland's new growth around motorways is largely designed using American style Euclidean Zoning. Euclidean zoning's main characteristic is the segregation or separation of uses. Shops, schools, and other amenities tend to be separated from residential zones and often best accessed by car. Car use is typically a requirement due to distances and the lack of connectivity between housing estates. Zoning regulations or planning guidelines "often favour disconnected cul-de-sac street designs over more connected grid networks." (Frank *et al.,* 2006) In such places children are typical driven to school and all shopping or the enjoyment of amenities is car-dependent.

Car-oriented development that encourages or enables one-off housing or suburban estates that require long commutes to work and to shop have been found to create many unintended consequences. Examples include:

Health Effects

The way authorities decide to design and build transport systems and communities affects human health. Car-dependent designs not only produce greenhouse gases and other pollutants but affect human health in other ways, such as reducing opportunities to be physically active or engaged with others in their communities. Obesity, Depression, Social Isolation, and Car-crashes are common effects of car-oriented transport systems.

Obesity and Air Pollution

Car-dependent development negatively effects health because people walk or cycle less and thus are more likely to be overweight. "A survey of 10,898 people in Atlanta, Georgia (Frank, Anderson & Schmid, 2004) showed that each additional hour spent in a car was associated with a 6% increase in the odds of being obese, while each additional kilometre walked per day was associated with a 4.8% reduction in the odds of being obese" (Frank *et al.,* 2006). A recent article published in the *Journal of the American Planning Association* made the following conclusions based on empirical examination of communities in Washington State in the US:

> "The literature shows single-use, low density land development and disconnected street networks to be positively associated with auto dependence and negatively associated with walking and transit use. These factors in turn appear to affect health by influencing physical activity, obesity, and emissions of air pollutants. We evaluated the association between a single index of walkability that incorporated land use mix, street connectivity, net residential density, and retail floor area ratios, with health-related outcomes in King County, Washington. *We found a 5% increase in walkability to be associated with a per capita 32.1% increase in time spent in physical active travel, a 0.23-point reduction in body mass index, 6.5% fewer vehicle miles travelled. 5.6% fewer grams of oxides of nitrogen (NO_x) emitted, and 5.5% fewer grams of volatile organic compounds (VOC) emitted. These results connect development patterns with factors that affect prevalent chronic diseases.* (Frank *et al.,* 2006)." (Emphasis added.)

Depression and social isolation

There are also empirical linkages between walking, social engagement, and depression. The elderly are particularly susceptible to the corrosive effects of social isolation. Social isolation among the elderly tends to occur in car-dependent housing conditions (where they must rely upon others to get around) or in crime-ridden urban places where the fear of crime acts as a deterrent to walking and community involvement. In addition, healthy communities contain residents of all ages and ideally different economic means. Car-dependent housing estates may very well force the elderly to leave their communities once they find it difficult to drive; families with limited means (or whose economic lot changes) may find they are also forced to move due to the added cost-burdens of car-ownership and maintenance.

Car-Crashes

Ireland has the third highest pedestrian death rate in the EU and the highest level of child pedestrian deaths in Western Europe & the EU. Car crashes are the number one killers of young men (16 - 25) in Ireland according to the National Safety Council. (http://www.nsc.ie/RoadSafety/RoadSafetyIssues/) Building communities that are oriented around the motor vehicle cause significant costs in terms of life, injury and property damage. They also place children at significant risk of death or injury. Many road schemes directly encourage more driving by car and thus place residents at greater risk of injury or death.

Sectoral Policy measures

Policy in relation to climate change

In pursuance of its existing and anticipated obligations, the government published a National Climate Change Strategy in 2000. The Strategy sought to address both the 2008-2012 Kyoto Protocol commitment and the longer-term commitments implicit in the UNFCCC.

The National Climate Change Strategy (2000) says in relation to road-building:

> *"Roads Investment*
> *... a total of £4.7bn is planned in investment in National Roads in the NDP. In the delivery of the investment programme, the assessment of environmental protection will include the assessment of the impact of individual projects on greenhouse gas emissions. The growth in these emissions will be managed through maximising the efficient use of road transport, removing delays in inter-urban journeys, (which, inter alia, will have the effect of increasing efficiencies in fuel use due to improved journey times and reduced congestion), road pricing, an integrated approach to land use planning and transport, including through the achievement of balanced regional development and the proposed National Spatial Strategy."*

It is striking that the role of road-building in facilitating and stimulating road use is not referred to even in the National Climate Change Strategy itself.

In relation to transport, this strategy predicted that business as usual predictions of a 180% increase over 1990 levels by 2010. It included indicative targets for 2010 for transport of 2.67 Mt CO_2 below business as usual emissions, to be achieved by a range of measures as set out below.

Transport measures in National Climate Change Strategy, 2000

Vehicle Efficiency Improvements	0.77 Mt CO_2
Fuel Measures (displace bunkering)	0.9 Mt CO_2
VRT, Taxes	0.5 Mt CO_2
Labelling	0.1 Mt CO_2
Public Transport Measures	0.15 Mt CO_2
Traffic Management	0.2 Mt CO_2
Freight	0.05 Mt CO_2
Total	**2.67 Mt CO_2 per annum**

These measures have variously not been implemented or not been successful. In 2002, the Progress Report on the National Climate Change Strategy claimed that the implementation of the DTO's Platform for Change would "reduce emissions by over 1 Mt of CO_2 per annum by 2016, a 41% reduction on projected emissions." The report contains no further explanation of this figure. The assumptions behind such a calculation relate to inelasticity of demand and the issues of induced and suppressed demand, which are discussed below.

Work by Sustainable Energy Ireland (2003) has quantified potential emissions reductions from a) a shift in car purchasing to more efficient cars and b) from reduced mileage. Its conclusion is that substantial reductions can only be achieved by reduced mileage.

Subsequently SEI (2004) examined greenhouse gases from transport and concluded:

> *"This chapter has presented the current and potential Irish response to greenhouse gas emissions from transport. The transport policy measures currently in place such as vehicle and fuel taxes, public transport measures and road charges have not been designed with the reduction of greenhouse gas emissions as their primary function. Many of the measures described in the National Climate Change Strategy to reduce greenhouse gas emissions from transport have yet to be implemented and the latest projections of CO_2 emissions per year from transport in 2010 are at 14.2 Mt per year. This is significantly higher than the target set in the National Climate Change strategy at 11.4 Mt CO_2 emissions per year from transport."*

Policy in relation to emissions of long-range transboundary air pollutants

The National Emissions Ceilings Directive is implemented into Irish law by the European Communities (National Emissions Ceilings) Regulations 2004, S.I. No. 010 of 2004.

Unlike the Kyoto allocations, there is no provision or allowance in the NEC Directive for trading of emission rights. A breach of the emissions ceilings is a breach of the Directive. This puts the NEC Directive in unavoidable conflict with national transport policy which is facilitating ongoing increases in NO_x emissions and certainly not providing for sharp cuts in such emissions.

The "National Programme for Ireland under Article 6 of Directive 2001/81/EC for the progressive reduction of national emissions of transboundary pollutants by 2010" which the Department of the Environment released in April 2005, deals with this conflict as follows.

> *"The legislative proposal to revise the national emission ceilings and other aspects of the directive by mid-2006 will, as before, be based on integrated assessment modelling and consultations to update the model are due to commence with Member States in April 2005. It seems clear, based on available updated data sets, that the current ceilings for Ireland do not represent the most cost effective route for Ireland to make its contribution to meeting the directive's interim environmental objectives. It is anticipated that this will become evident during the analytical preparations for the new legislative proposal.*
>
> *This National Programme will be updated and revised as necessary in 2006 to take account fully of all relevant policy and legislative developments particularly the proposal to revise the national emission ceilings and other aspects of the directive."*

Demand reduction does not appear to have been considered as a policy measure in this regard nor assessed for cost-effectiveness (for which see below).

Policy in relation to ambient air quality

No specific national policy in relation to ambient air quality has been articulated as such. The EU Air Quality Framework Directive and Daughter Directives apply. Ambient air quality impacts of road construction are intended to be picked up and controlled at the EIA stage. However, this does not happen effectively. Exceedences of EU limits under Directives are required to lead to the adoption of Air Quality Management Plans. One plan has been adopted but the mechanism in the Directive has not been implemented in full.

Direct investment and subsidy

National Development Plan investments (road, rail and regional airports)

Road infrastructure

Emissions and air issues are referred to in the transport-related documents associated with the National Development Plan.

The National Roads Needs Study addresses air pollution as follows:

> *"Air pollution from transport is most effectively addressed by measures to reduce emissions from vehicles at EU and National level. A range of options may also have to be considered, as detailed in the Environmental Resources Management (ERM) Report, to ensure improved efficiency for new vehicles including the use of alternative fuels, improved maintenance of vehicles, etc."*

The concept of limits referred to above is not relied on. Improved vehicle efficiencies are stated to be the most effective means to reduce emissions. No evidence is adduced to support this statement.

In fact, it is clear that improved vehicle efficiencies will not be sufficient to reduce emissions in a situation of high growth in traffic such as in Ireland. Work by SEI shows definitively they will not meet greenhouse gas targets and research on ambient air quality shows increased total traffic levels can easily make up for reduced emission levels from individual vehicles. (SACTRA, 1994, Newman, Kenworthy and Lyons, 1988, Newman and Kenworthy 1989, SEI, 2003)

The entire thrust of the EU Ambient Air Quality legislation made up of the Framework Directive and Daughter Directives is based on a recognition that action in relation to the emission rates of individual vehicles is not sufficient to achieve the targets in the Directives and that therefore Member States need to carry out local air quality management.

National Development Plan (NDP) 1999

The NDP (Chapter 13) contains an excellent analysis of the environmental policy framework of the plan.

Unfortunately, in the sections of the NDP where the detail in relation to the Roads programme and its environmental impact would be expected, the analysis in Chapter 13 is not worked out in a manner to inform or influence the plan itself.

In the Roads section, all reference to both the environmental policy objectives and the framework described in 13.21 for integrating them into the plan is dropped in favour of a discursive and vague approach.

Even more surprisingly, the Pilot Eco-audit of the plan also fails to refer specifically to the key changes identified in Chapter 13. The "Pilot Eco-audit" lacks any detail in relation to the likely impact of the plan or how it measures up against existing environmental policy objectives. The only area where it goes into any level of useful detail is in relation to the mechanisms for ensuring integration of environment/ sustainable development policy in the relevant sections of the NDP. This process of integration set out in the Eco-audit appears not to have happened.

Ports and Airports

The NDP provides for comparatively small levels of investment in ports and regional airports. For some reason the significant investment in Dublin Airport is not included in the NDP. There is no analysis of

environmental factors in relation to these investments in the NDP. We have not found any reports dealing with the environmental impacts of these investments.

Transport 21 investments (road and rail, national level)

The Transport 21 investment programme does not seem to have come from a structured analysis separate from work already done in the Strategic Rail Review and the National Roads Needs Study.

Local road infrastructure and land use decisions

These decisions are made at local authority level. The lack of any local authority control or input into public transport decisions means a predominant focus on roads-based solutions to local transport needs. Similarly, land use designations are generally based on road access. This leads to a failure to avail of significant opportunities to provide public transport-oriented developments. Decisions at plan or programme level since July 2004 have to be subjected to Strategic Environmental Assessment. How effective this will be in practice in integrating environmental considerations remains to be seen.

Road safety information (primarily national level)

Road safety information and enforcement is primarily carried out at a national level, although there are road safety officers in local authorities. Ireland has a poor road safety record, widely ascribed to low levels of enforcement.

Social Capital/Sense of Community/Quality of Life

Social Capital

Harvard Professor Robert Putnam and others have repeatedly demonstrated the importance of social interactions and engagement for community well-being. Social and community ties are key components of a more encompassing concept called social capital. Social capital is defined as the social networks and interactions that inspire trust and reciprocity among citizens (Putnam, 2000). Individuals with high levels of social capital tend to be involved politically, to volunteer in their communities, and to get together more frequently with friends and neighbours. They are also more likely to trust or to think kindly of others and attempt to help solve community problems (Putnam, 2000; Coleman, 1990; and Fukuyama, 1995). Social capital has been found to be linked to the proper functioning of democracy, the prevention of crime, the creation of well-adjusted young people, and enhanced economic development. (See Putnam, 2000 for discussion). Higher levels of individual-level or community-level social capital is also affiliated with better health.

In a survey of the neighbourhoods of Galway, Leyden (2003) investigated the relationship between neighbourhood land-use design and individual levels of social capital. Data were obtained from a household survey that measured the social capital of citizens living in neighbourhoods that ranged from traditional, mixed-use, pedestrian-oriented designs to modern, car-dependent suburban housing estates. Statistically controlling for host of factors, the analyses indicate that persons living in walkable, mixed-use neighbourhoods have higher levels of social capital compared with those living in car-oriented suburbs. Respondents living in walkable neighbourhoods were more likely to know their neighbours, participate politically, trust others, and be socially engaged.

Leyden's study concluded with an appeal to avoid the planning and construction of car-dependent communities. Mixed-use, pedestrian-oriented designs that encouraged access to amenities on foot where recommended as being important for the proper functioning and well-being of a community.

Commuting

According to Robert Putnam (2000) and several other scholars, commuting (especially by private car) has a negative affect on social and community involvement. Long, tiring commutes, tend to take away from the time and energy commuters would otherwise spend volunteering in their communities or with their families.

Culture and Civic Society

Social interaction and conversations between adults, teenagers, and children are an important component of cultural transfer and the teaching of social norms. Car-dependent communities tend to offer less opportunities for the sort of social interactions that are important for culture transfer, and the creation of well-adjusted young people. In the absence of conversation and other forms of guidance and role-modelling many young people are forced to learn cultural values from television or other artificial mediums. Those portrayed via these mediums are often distorted and alien to reality.

Sense of Place and Pride in Community

Most human beings develop a connection with their communities and a sense of pride in the place they are from. It is an empirical question as to the degree this is occurring in car-dependent, cookie cutter, housing estates. Poor connectivity, severance and the inability to walk to anything that resembles a real village or urban place may have a dysfunctional affect on children. At a minimum the inability to walk or cycle to shops, school, or other amenities probably affects their sense of independence and adds to the time burden of parents who must serve as continual family-chauffeurs.

Social Exclusion/Disadvantage/Marginalisation

Transportation systems that rely upon motor vehicles clearly advantage some in society and disadvantage others. Cars are expensive. The Automobile Association estimates that the annual cost of owning a small (under one litre car) worth €12,581 is €2,850. This cost includes depreciation (€1,572), finance and insurance but not the cost of parking or the use of a garage. Maintenance and fuel costs mean that the cost of driving a kilometre is 15.5 cents if petrol is 117 cents per litre. Unlike houses, cars depreciate in value. This makes then a bad use of limited family resources. Motorway-oriented transportation clearly discriminates against those with limited economic means.

Key Issues and Challenges faced for the future, globally and locally

Transport designs must consider a broader range of issues and concerns than they do currently. The way authorities decide to design and build transport systems and communities affects human health and human social interaction. The next National Development Plan should give much more weight to effective public transport designs coupled with the creation of walkable, mixed-use neighbourhoods or pedestrian-oriented villages. Citizens should be provided with a range of transport options and be expected to attain most of their daily needs on foot at nearby shops and amenities. Suburban estates that require the use of a car should not be given planning permission.

There is a growing literature that concludes that active travel modes (walking and cycling) along with safe, efficient, public transportation are vastly more healthy for individuals, their families and their communities than suburban estates that are zoned only for houses and car-dependent. The current car-oriented style growth is a model that became popular in the United Stated in the 1970s and has wrought serious unintended consequences. Almost every major organisation in the US involved with planning, architecture, town-building, the environment, or health has called for a move away from Euclidean zoning, preferring more mixed-use, pedestrian-oriented planning models with public transport options instead. Examples of organisations calling for more enlightened, time-tested land-use and transport practices include:

- The Centres for Disease and Prevention Control (CDC)
- The Robert Wood Johnson Foundation
- American Planners' Association
- National Trust for of Historic Preservation
- US Environmental Protection Agency (EPA)
- American Institute of Architects (AIA)
- Congress for New Urbanism

An example of the sort of planning being promoted can be found on the American Institute of Architects' webpage. It reads in part:

AIA's 10 Principles for Liveable Communities

1. Design on a Human Scale

   Compact, pedestrian-friendly communities allow residents to walk to shops, services, cultural resources, and jobs and can reduce traffic congestion and benefit people's health.

2. Provide Choices

   People want variety in housing, shopping, recreation, transportation, and employment. Variety creates lively neighbourhoods and accommodates residents in different stages of their lives.

3. Encourage Mixed-Use Development

   Integrating different land uses and varied building types creates vibrant, pedestrian-friendly and diverse communities.

4. Preserve Urban Centres

   Restoring, revitalizing, and infilling urban centres takes advantage of existing streets, services and buildings and avoids the need for new infrastructure. This helps to curb sprawl and promote stability for city neighbourhoods.

5. Vary Transportation Options

   Giving people the option of walking, biking and using public transit, in addition to driving, reduces traffic congestion, protects the environment and encourages physical activity.

6. Build Vibrant Public Spaces

   Citizens need welcoming, well-defined public places to stimulate face-to-face interaction, collectively celebrate and mourn, encourage civic participation, admire public art, and gather for public events.

7. Create a Neighbourhood Identity

   A "sense of place" gives neighbourhoods a unique character, enhances the walking environment, and creates pride in the community.

8. Protect Environmental Resources

   A well-designed balance of nature and development preserves natural systems, protects waterways from pollution, reduces air pollution, and protects property values.

9. Conserve Landscapes

   Open space, farms, and wildlife habitat are essential for environmental, recreational, and cultural reasons.

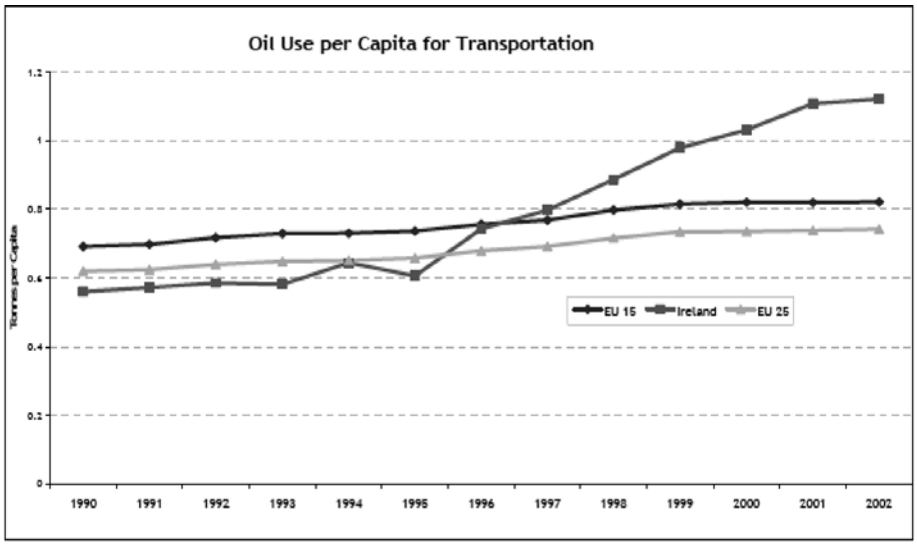
10. Design Matters

    Design excellence is the foundation of successful and healthy communities.

PART 3

Oil depletion, emissions permits and climate change

Figure 17: Oil Use per Capita for Transportation



Source: Amárach Consulting, EU Energy & Transport Figures 2004

Figure 17: *Ireland's transport system uses more oil per person each year than most others in the EU. This makes the country very vulnerable to oil price increases and shortages.* ***Source:*** *Forfás*

Oil dependency

Ireland's transport system is almost completely oil dependent, although coal and natural gas are used for trams and some trains via conversion into electricity. As Figure 17 shows, it is appreciably more oil dependent on a per capita basis than its counterparts in other EU countries. Although there are still differences of opinion, there is a growing consensus[13] among oil experts and consulting companies that world oil production will peak within the next fifteen years and that this will lead to massive price increases. Even organisations like the International Energy Agency which believe that the oil peak is at least a generation away accept that the price of oil will rise in real terms because of the increasing amounts of capital investment required to meet the world's expanding oil demand now that the easiest sources of oil to extract have become exhausted. We can conclude from this that, unless there is a global recession, the price of liquid motor fuels will be considerably higher than they have been in the past.

One of the factors which could push energy prices very high is the fact that the demand for energy is not very price sensitive in the short-term. People need time to adapt, perhaps by insulating their houses better and living nearer their work, while firms need time to adjust their production and distribution

13 *A Baseline Assessment of Ireland's Oil Dependence*, Forfás, Dublin, April 2006. http://www.forfas.ie/publications/Forfás060404/webopt/Forfás060404_irelands_oil_dependence_report.pdf

methods. Indeed, this adaptation process can increase energy demand as the type of investment it involves is more energy-intensive than most consumption spending. As a result, higher energy prices can have the perverse effect of increasing energy demand. Only the availability of other energy sources will control prices and developing these needs a long lead time. It is unlikely that it will be possible to develop them enough rapidly enough not only to meet world oil demand, which is increasing at 2-3% a year, but also to replace the amount of oil lost as world production begins to shrink at a rate of, it is estimated, 4-6% a year.

The result of any failure to meet the world's growing energy demand will be to slow or check global economic growth. This will have a severe effect on the demand for transport, particularly in the freight sector. The potential oil substitutes for transport are: biodiesel, bioethanol and electricity from the wind.

Biofuels

(a) Biodiesel as a diesel substitute

Most attention in Ireland so far has been given to the production of biodiesel from rapeseed oil. A hectare of land can produce 1,100 kg of rape oil which is roughly equivalent to a tonne of mineral diesel fuel. Since the Irish transport system burns over 2 million tonnes of mineral diesel annually, 2 million hectares would be needed to produce enough rape oil to replace it. This is five times more land than the country currently has under arable cultivation. But rape, a member of the cabbage family, cannot be grown continuously in the same place without pests and diseases building up. If a four-year rotation was used, Ireland would have to have twenty times more land under arable crops than it does at present to produce the oil for its diesel-powered vehicle fleet. Even if that amount of land was available, even more land would be needed to grow extra rape oil to power the machinery used to till the rape fields and process the crop. Also, because natural gas is used to make fertilizer for rape, we would still be using a lot of fossil energy to produce the bio-energy version.

The fundamental problem with rape and all the other plants that could be grown in Ireland to produce oil is that they are annuals or biennials and thus take a lot of energy to grow. The Energy Return On Energy Invested (EROEI) is therefore poor. Tropical and sub-tropical trees and shrubs which produce fruits containing oil such as *Jatropha* and *Moringa* offer a much better energy return and Ireland will have to consider importing their oil for its diesel engines.

(b) Ethanol (ethyl alcohol) as a petrol substitute

The production of ethanol from maize, wheat, and sugar beet gives a poor return on the energy invested in the process. However, processes have been developed recently for breaking down the lignocellulose found in all plants into sugars which can then be fermented into ethanol. A demonstration plant was opened in Canada in 2004 which it is hoped will produce 100 million litres of ethanol this year and Sweden has ambitious plans for this technology using wood waste. It opened a plant using sawdust in 2005. These processes are said to have an EROEI of six at present with the prospect of increasing to ten. This would mean that the energy return was better than that for coal mining which, when used to produce electricity, is said to have an energy return of about eight. Ireland could almost certainly meet its petrol needs using this cellulose technology but it has to be remembered that there will be competition

for the biomass from people who wish to use it for Combined Heat and Power systems in large buildings and for domestic heating using wood pellet stoves etc. There will also be a demand for the ethanol itself from other countries seeking a liquid fuel for their transport fleets. The fuel will therefore not be cheap.

Wind electricity

Ireland has the potential to produce much more electricity from the wind than it is currently using. The main problem with this source of energy is its variability but its energy could be stored in batteries, as compressed air or as hydrogen, when the wind was blowing. However batteries are heavy. This effectively limits the vehicle's range since installing a bigger, heavier battery would require more power to move the vehicle, which would in turn quickly exhaust the additional battery capacity. Battery power is therefore likely to be restricted to small, light cars for short journeys and vans for urban use. Compressed air vehicles will have similar limitations because of the limited amount of energy that can be stored in a pressure vessel of reasonable size. Hydrogen, whether from biomass or wind electricity, seems to be required for trucks, tractors and longer-distance cars but its cost will be considerably greater than current petrol and diesel prices. If produced electrically, it takes 4kWh to produce 3kWh-worth of hydrogen. The hydrogen must then be liquefied or compressed. Liquid hydrogen is likely to be required for road vehicles because it requires less space than the compressed form but it takes about 14kWh of electricity to liquefy a kilo of hydrogen, and amount which can deliver about 33.7 kWh when burned. In other words, it takes about 16.24kWh to produce 280 grammes of liquid hydrogen, the energy equivalent of a litre of petrol. In 2003, a German expert, Werner Zittel, prepared the following estimates of cost of providing hydrogen to fuel an Irish fleet of 1.2 million passenger cars and close to 200,000 trucks. He wrote[14]:

> *"A rough calculation indicates that at least 300 fuelling stations should offer hydrogen to achieve public acceptance of the fuel. This corresponds to 10 per cent of all fuelling stations countrywide. If this hydrogen were to be entirely supplied by wind power produced electricity, the total system cost would be of the order of 50 billion Euros or, spread over 30 years, about 2 billion Euro per year. In total about 20 GW offshore wind converters are needed for the power production.*
>
> *"If this hydrogen was completely supplied from biomass via gasification, the total system cost would be in the order of 20 billion Euros, or spread over 20 years, about 1 billion Euro per year. Annually, about 13 million tons of dry biomass would be needed for hydrogen production, or a cultivated area of about 0.7 million hectare. Costs would be similar to those at present but with the difference that a large fraction of the money is now transferred to foreign countries, while domestic fuel production in the countryside would channel the money instead to a domestic labour force."*

So, while Ireland has the potential to get enough energy from the wind and biomass to keep a transport fleet of the present size on the road if it chooses to do so, the cost of the energy would be high and its use would be at the expense of other uses.

Higher energy, food and consumer goods prices will leave the average family with less discretionary expenditure. In Ireland, the first effect of this will be on the housing market, which has been absorbing

14 *Before the Wells Run Dry*, Feasta, Dublin, 2003, p137.

most of the income many families have had left after meeting their living expenses. If this market collapses, as many seem to anticipate, the demand for transport will drop both as a result of less materials being moved and fewer people travelling to work. All other sectors will be affected and joblessness will soar. Two income households hit by unemployment will probably sell one car.

More generally, and as the years pass, people will react to the higher costs of owning and operating vehicles in the following ways:

- Families will try to avoid the cost of operating a second car and, later, if incomes fall or prices rise steeply, the first one. They will wish to live near their work, shops and schools so that they can walk, cycle or use an electric moped. The demand for public transport will increase and services will become more frequent. Badly located houses, particularly those which are costly to heat, will become unsaleable.

- More shops will offer home deliveries of goods ordered via the internet. They will minimise the costs of this in rural areas by using contractors who will combine deliveries from several businesses and only deliver in a particular area once or twice a week. In urban areas, a surcharge will be introduced for deliveries not on the regular day.

- Road freight will become particularly costly. Fresh fruit and vegetables coming from elsewhere in Europe will arrive by sea rather than by truck and a variety of ports around the country will be used to minimise the distances the goods have to travel once landed. Irish Rail will start overnight container trains between the major centres and the ports, offering road haulage firms the option of just handling collections and deliveries. Companies like IKEA, which manufacture in bulk and then truck all over the world to a few depots which the public have to visit by car, will have to change their business model or disappear. Global brands will tend to licence their manufacturing to small, flexible factories in each country to minimise freight costs. Farmers will increasingly supply their local markets, local breweries using returnable bottles will develop and there will be significantly more local production for local use.

- Less construction work will be carried on because the country will be experiencing problems maintaining the stock of buildings it has. What buildings do go up will be made of lighter, lower embodied-energy materials such as timber, field stone from the site itself, hemp and lime. A proportion of any blocks required will be made on site using the soil found there. Lighter buildings will mean that strip and raft foundations give way to piles linked by a ring-beam. As a result, far less cement, aggregate, and steel reinforcement will be needed and the energy used for excavation and site levelling will be reduced. Overall, much less transport will be required.

B. The availability of emissions permits

The European Commission intends[15] to bring aviation into the Emissions Trading System by 2009 or 2010 and other areas of transport will follow fairly quickly. Indeed, they might all be introduced together in 2009-10 or from January 2013 when the post-Kyoto arrangements come into effect as the argument can - and doubtless will - be made that it is unfair to place tight emissions limits on one type of transport and not on the others.

If aviation is brought into the ETS by itself, it will be as part of the present ETS which began in January 2005. However, if it is part of a set of arrangements for the transport sector as a whole, a standalone system as supported by the European Parliament in its vote on 4 July, 2006 would be possible as there would be a big enough pool of emissions permits available to make trading relatively stable. In general, however, more permits would be available for transport, and their cost might therefore be lower, if the sector was part of the present ETS. In the very short-term, it might even be possible for emissions from transport to grow, thanks to emissions savings in other sectors of the European economy. However, as the number of emissions permits was reduced over the years, emissions from the sector would have to fall too. This would mean, almost certainly, that road use fell some time in the next 10-15 years.

Further traffic growth?

The overall conclusion to be drawn from looking at the prospects for the Irish and global economies and the way emissions limits might be imposed has to be that the government should shape its roads policy on the basis that

- emissions restrictions are likely to prevent further growth in road traffic within 15 years, and possibly rather sooner
- the world economy's growth is likely to be restricted and may well contract, even collapse, in the next 25 years as a result of energy shortages
- energy prices and the cost of vehicles are likely to rise significantly in relation to people's earnings, reducing road traffic volumes, and
- in view of the need to act to slow the rate of climate change, the use of fossil fuels for road transport should be phased out over the next 25 years.

If incorporated into the cost-benefit analyses carried out for new roads, these considerations would almost certainly mean that very few projects showed an acceptable rate of return because an increase in traffic volumes could no longer be assumed and that a reduction in volumes was more likely.

15 Peter Zapfel, Environment DG, European Commission, speaking at the EU Emissions Trading 2006 conference, Brussels, July 11, 2006.

Climate impacts and long-range pollution

There can be no effective climate policy without tackling emissions from transport. This requires addressing the growth in transport. The EEA advises:

> *"In spite of the initiatives mentioned above, transport emissions of greenhouse gases are presently growing. The main offender is the growth in transport demand, which is not being offset by the energy efficiency of vehicles. Policy development therefore needs to address transport growth if absolute reductions in greenhouse gas emissions are to be achieved."*

Unfortunately, current policies aim at facilitating and even encouraging growth in transport.

Future trajectory under 'business as usual'

Current transport policy is based on a 'predict and provide' model and consists effectively of the following policy elements:

- Growth in surface transport is a desirable or at least inevitable aspect of economic growth.
- The primary means of surface transport is the private car and will remain so.
- Predict and provide is the basis for road planning except in major urban centres. It is applied in suburban areas, on inter-urban routes and in rural areas.
- Public transport has a significant contribution to make in urban areas. Its contribution is measured primarily by its contribution to reducing congestion on the roads.
- Growth in aviation is entirely desirable and must be facilitated. Policy goes beyond predict and provide in directly subsidising and encouraging aviation.
- Use of non-motorised modes and avoidance of transport are not significant elements of policy.

The emphasis on predict and provide has led to and will continue to lead to significant ongoing increases in road traffic volumes. This has been particularly clearly seen in the Dublin area. This experience is entirely consistent with international experience (SACTRA, 1994, European Conference of Ministers for Transport, 1996, Noland, 1999).

If the scenario envisaged by predict and provide planners is realised, most environmental, social and economic impacts of high levels of road traffic will increase accordingly. Technical improvements will have minor mitigating effects on these impacts. However, as we point out above, there is good reason to consider that the future may not be simply a continuation of current trends.

PART 4

Policy options

A. Promoting greater sustainability

There are two ways in which the resource-cost of the Irish transport system can be cut in order to make it more sustainable. One is to reduce the amount of transport required at any given national income level. This is largely a spatial planning issue for families (where should we live?), companies (where should our next shop be opened?) and the state. The other is to make the transport activities that cannot be eliminated by these locational changes more energy-efficient. We will deal with each way in turn. However, we want to stress that, in a market economy such as Ireland's, the signals to families and firms are given by prices. If the state keeps transport costs deliberately low to "help the hard-pressed motorist" or to "enable companies to compete" there may be short-term advantages but the wrong locational decisions will be made and Ireland will become more energy intensive than it need and thus less sustainable.

We therefore recommend that the government should warn the public that energy prices are going to be very much higher in future in real terms because of the combined effects of measures to slow climate change and oil and gas depletion. Moreover, it should develop its own programmes on the basis that a business-as-has-been-usual-for-the-past-50-years path will not be possible in the near future because energy will be scarce and expensive. We understand, however, that the reality of oil and gas depletion has not been taken on board in the preparation of the next National Plan.

The elements of the price-adjustment programme we would propose are as follows:

a) A statement by the Taoiseach on the future of world oil and gas supplies and on the effects that the drastic measures that will be required to slow climate change will have on the availability and price of fossil fuels, and hence on their non-fossil replacements.

b) The government's acceptance in its public statements that real incomes will inevitably fall as a result of the higher energy prices and that the Irish economy might shrink, although some sectors, especially those to do with energy saving and renewable energy production, will be highly profitable.

c) An announcement by the Minister for Finance that, over a period of years, Vehicle Registration Tax is to be scrapped and that the excise duty on motor fuels is to be increased so that the motorist is paying the full marginal cost of his or her road use. The announcement would make it clear that, as the government expects motor fuels to be brought within the EU Emissions Trading System by 2013 at the latest, the anticipated cost of the emissions permits will be incorporated in the excise duty until the EU system is in operation, in order to give the public the right signals now.

d) The removal of all subsidies on air travel, the introduction of VAT on air tickets and the scrapping of plans to extend publicly-owned airports.

e) The introduction of congestion charging where necessary. (See below).

f) That the annual road tax is to be levied in future according to the maximum load a vehicle is likely to impose on the road surface and hence the damage it is likely to do.

g) That cars will be energy rated in the way they are already are in Britain, as shown in Figure 18. The EU Labelling Directive 1999/94 stipulates provision of CO_2 information in car showrooms and car advertisements but leaves a wide scope for national implementation and only a few countries operate colour-code schemes such as those for fridges and washing machines, and only very few provide information on annual fuel costs.

Figure 18: Fuel Economy

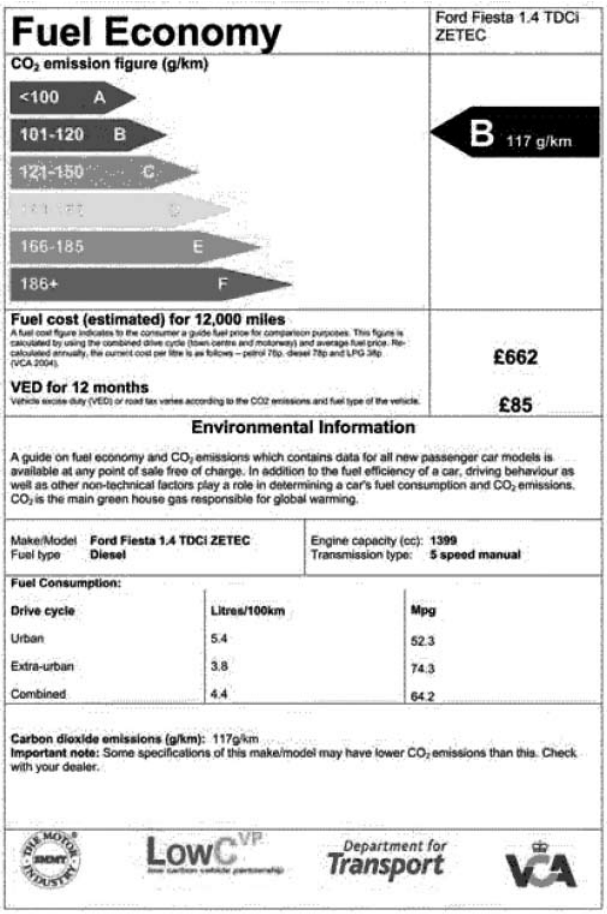


Figure 18: A fuel economy label as used on cars in Britain.

1. Reducing the requirement for transport

The widespread public acceptance that energy, and particularly motor fuels, will be much more costly in future will encourage people to look for houses in places where they can manage without a car, or at least without a second vehicle. Similarly, companies are likely to place their shops, factories and offices where the transport costs are least. There will be a greater tendency for, say, an office to be located near to where people live rather than in a city centre and, rather than having one large office which requires a lot of people to come together each day, an organisation could have several smaller ones with good video and data links between them. Similarly, the average size of shops is likely to fall as they move closer to their customers. Global companies will seek to change their business model, making a much greater range of products in each country and having more local showrooms.

We expect higher energy prices to have another effect on industrial location and thus on transport demand. Most renewable energy sources are located outside the major cities and can only be developed on a small scale. A pattern could emerge similar to that seen in the early years of the Industrial Revolution when textile companies sought out and developed water power sources and built their mills to use them. In the new model, we see communities developing, say, a biomass-fired CHP plant in conjunction with a company seeking a source of electricity and heat at a guaranteed price, rather than one subject to the vagaries of the international market. This distributed production may increase transport use getting the raw materials to the energy source and then the product away, but total energy costs and emissions would fall, and some rural people should have shorter distances to travel to work.

Changing the way our cities are designed could help reduce energy use. People living in dense urban areas use less energy for travel on a daily basis than someone living in a rural or suburban location but they tend to compensate for this by using more energy in their leisure time, particularly on air travel. However, a Norwegian study (Holden and Norland, 2004) has shown that if people in dense urban areas have access to a garden, which need not be attached to their flat or house, they spend more of their leisure there and take fewer flights. There will also be energy and transport savings because they will grow some of the more energy-intensive foods, such as fresh vegetables and salads. So the large areas of small plots with fruit trees and chalets on them within cycling or walking distance of many European cities make energy sense.

2. Making transport more energy efficient

We noted earlier that cheap energy had encouraged the use of energy-intensive transport modes even though less energy-intensive modes can be just as effective. To a large extent, the higher prices produced by the market and by government changing its tax policies will reverse the trend to move to higher energy modes. However, there are things that the state can do to speed the retreat along.

One is the introduction of congestion charging. The government's attitude on this has been that it should not begin until bus services have been improved. Yet we saw that although Quality Bus Corridors are in use in some places, Dublin Bus cannot give a good service because of the congestion, which costs it as much as its government grant. If it puts on more buses, it will worsen the congestion itself. In short,

we have a classic Catch-22 situation from which the government can only escape when it realises that buses and the Luas are not the only transport options and there are even less energy-intensive transport modes. Dublin used to be noted for the number of cyclists and could be again. According to Dublin City Council, 5% of commuters already cycle, which is not surprising since a bike is much the fastest way to move around the city. "It is our objective to double that [percentage] over the next seven years" it says on its website. "In order to achieve this we are constructing 160km of cycleways and significantly increasing cycle parking facilities. We are also promoting cycling awareness and identifying safe routes to school." The Port Tunnel will shortly reduce the number of trucks passing through Dublin and using a congestion charge to reduce the number of cars could make the city much safer and attractive for cyclists. It would also improve bus speeds and thus improve the service. The politicians should not wait, particularly if they follow London's policy and use the revenue from the congestion charge to improve facilities for cyclists and for public transport.

The perceived level of risk seems to be a major deterrent to cycling. In the Netherlands, as the number of cycling fatalities was brought down by two-thirds, the distance cycled went up by 30%. In Denmark between 1990 and 2000, the number of seriously injured cyclists fell by 30% while the distance travelled by cyclist went up by about the same percentage.

Figure 19: Oil Use per Capita for Transportation

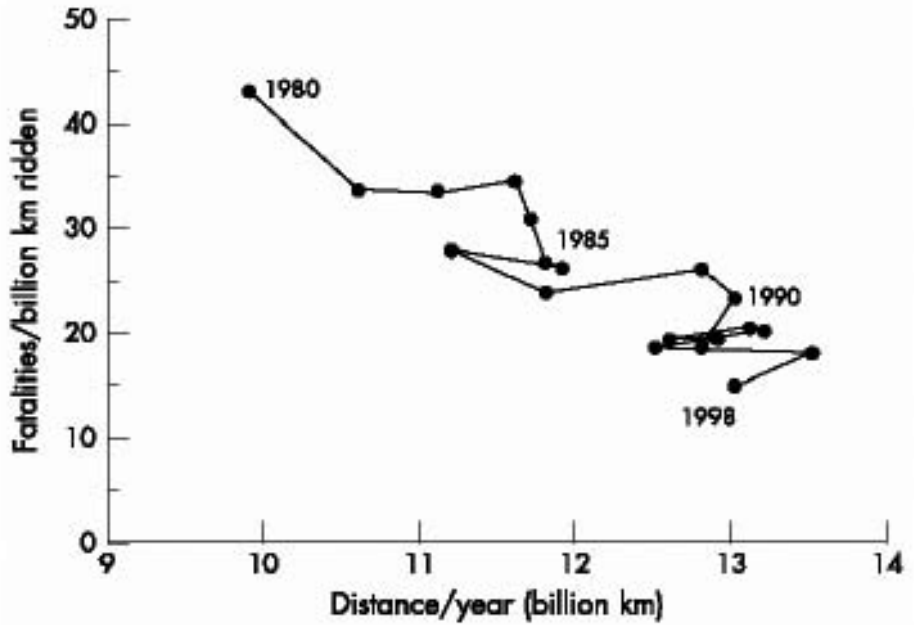


Figure 19: As cycling got safer in the Netherlands, the distance cycled increased steadily. Other countries have had the same experience. ***Source:*** *Ege & Krag, undated*

Two complementary methods of reducing this risk and perception of risk are:

- significant changes in road design practice, discussed below, and
- a presumption that the motor vehicle operator is liable when in collision with a more vulnerable road user, as in Denmark, Belgium, the Netherlands, and France.

In Copenhagen, where 34% of the population cycle to work, speed, exercise and convenience seems to the the main motives.

Figure 20: Oil Use per Capita for Transportation

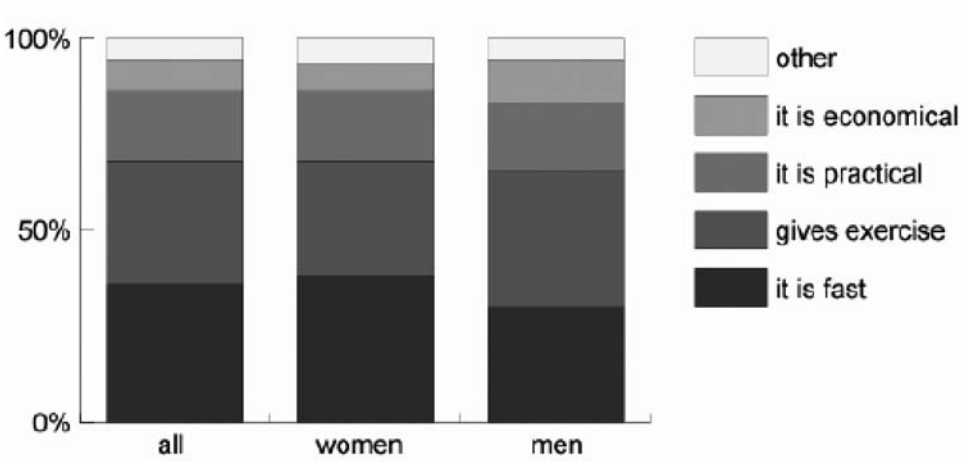
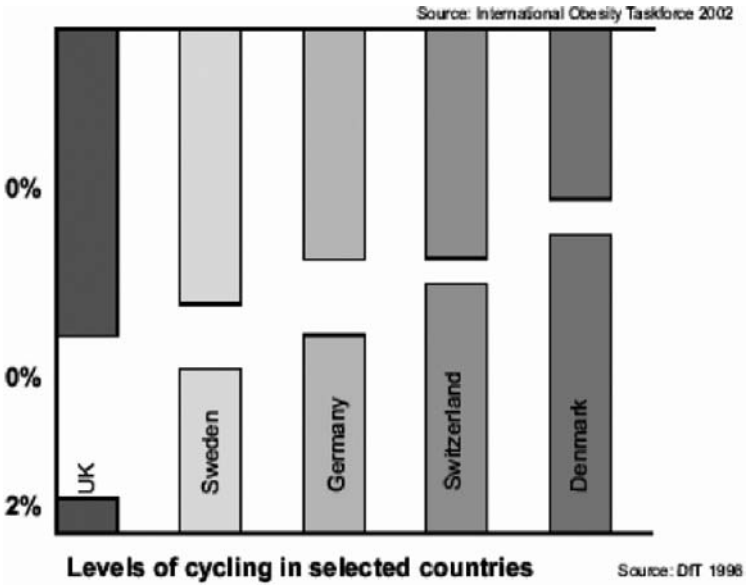


Figure 20: *The reasons given by Copenhagen residents in a survey on why they cycled to work.*
Source: *Ege & Krag.*

There would certainly be health benefits to any increase in cycling. Figure 21 below shows that in societies where more cycling is done there is less childhood obesity. In addition, hypertension, cardiovascular disorders, diabetes, osteoporosis, breast cancer, colon cancer, gallstone, depression and back pain are all reduced by the mild exercise which cycling gives.

Figure 21: Levels of cycling in selected countries



Other areas in which the state could act to speed a modal switch are in meeting Irish Rail's need for capital investment if it is to carry more freight and also in encouraging the ferry companies to provide a better alternative to air travel. For example, it seems to be impossible to use the internet to buy a combined rail and ferry ticket to take one from anywhere in Ireland to a British station. The ferries concentrate their marketing efforts to the needs of passengers with cars.

B. Developing transport infrastructure

Induced traffic

The most important policy change in this area would be a recognition of the operation of induced traffic and demand elasticity in transport planning. An increase in road capacity can lead to an increase in traffic volumes using the routes in relation to which potential time savings have been enabled. This is particularly prevalent in situations of urban congestion.

This phenomenon has been empirically verified in a number of studies and accepted as real by official working groups and review bodies. As a result of the Standing Advisory Committee on Trunk Road Assessment's (SACTRA) report entitled *Trunk Roads and the Generation of Traffic* (1994), all analyses of road proposals in the UK are required to assess the impact of induced traffic which would result from the proposal.

The reason for this is clear from the SACTRA report itself. Among its conclusions (see pp. i to iv) are the following:

> *"Induced traffic can and does occur, probably quite extensively, though its size and significance is likely to vary widely in different circumstances"*

"Studies demonstrate convincingly that the economic value of a scheme can be overestimated by the omission of even a small amount of induced traffic. We consider that this matter is of profound importance to the value of money assessment of the Road Programme"

"Induced traffic is of greatest importance in the following circumstances:

- *where the network is operating or is expected to operate close to capacity;*
- *where traveller responsiveness to changes in travel times or costs is high, as may occur where trips are suppressed by congestion and then released when the network is improved;*
- *where the implementation of a scheme causes large changes in travel costs."*

"Routes should be assessed in their entirety for environmental reasons - decisions on schemes in one part of a corridor should not pre-commit environmentally sensitive decisions elsewhere in the corridor without a thorough economic and environmental appraisal of the overall strategy."

"We recommend that variable demand methods should now become the normal basis of trunk road traffic forecasts, and that these forecasts must be carried through into operational, economic and environmental evaluation of schemes in a systematic way. In particular, where networks are operating close to capacity, suitable procedures must be used to represent the constraint of traffic in the base case and the release of traffic growth in the do-something case as additional capacity is provided."

The European Conference of Ministers of Transport, report on *Infrastructure-induced Mobility* (1996) contains the following conclusions:

"In the case of new road infrastructure, we can expect to see an average increase in mobility of 10 per cent in the short term and 20 per cent in the longer term, although induced traffic can range anywhere from zero to 40 per cent, depending on circumstances.

"It is nonetheless true that even where the additional traffic has the advantage of better conditions (an obvious benefit to the community), it also contributes to congestion and environmental nuisances. This can erode the perceived benefits, sometimes substantially. The net effect depends on the existing levels of congestion - in areas that are heavily congested, the net benefit will be very much less, if not negative, since the new scheme will only add traffic to an area that is already saturated, with consequence that are all too familiar. In urban areas, new road construction to alleviate congestion is unlikely to be successful, although it will improve accessibility."

Noland (1996) of the U.S. Environmental Protection Agency analysed induced traffic within the framework of transport economics, concluding that "these results strongly suggest that induced demand effects are real and need to be considered both by planners for specific projects and by policy makers at both the regional and national level."

Induced traffic results from one or more of the following:

- trips which otherwise would not have been made (or where the demand was previously suppressed by congestion),
- trips now made by private motor vehicle which would otherwise have been made by public transport, foot or bicycle,
- trips now being made at peak times which would otherwise have been made off peak,
- in the longer term, trips resulting from changed land use patterns induced by the road.

The phenomenon of induced traffic means that it is generally impossible to reduce congestion or improve air quality by providing more road space. This conclusion has been extensively demonstrated (Newman and Kenworthy, 1989). Furthermore any improvement in the emission rates of individual vehicles resulting from reduced congestion is less than the increase in emissions resulting from increased numbers of vehicle-miles which are induced by the reduction in congestion. (Newman, *et al.,* 1988)

Induced traffic has implicitly been acknowledged in the shift in transport and traffic policy represented by the Dublin Transportation Initiative Final Report (1995). Unfortunately it has not been incorporated into national road planning and the standard assumption underlying transport planning in Ireland remains that demand for mobility is independent of capacity.

A significant correlation of induced traffic is the fact that providing extra public transport capacity on a corridor will lead to an increase in total travel along that corridor, and that the increase in public transport ridership will not necessarily be matched by a reduction in travel by car or other modes.

C. Integration of transport planning with land-use planning

Although the inseparability of land-use planning and transportation has long been recognised both academically (Newman and Kenworthy, 1989) and in official policy, there is an ongoing lack of integration of land-use planning and transportation. This can be seen both at national level - National Spatial Strategy (2002), National Development Plan (2000), Strategic Rail Review (Booz Allen Hamilton, 2002), - and at local level with some significant exceptions (Cork LUTS, 1978).

Similarly, transport decisions are typically taken on a mode-by-mode basis. The local authorities who are responsible for both land use planning and road planning and provision have no functions in relation to public transport. The Dublin Transport Initiative (1995) represented a significant shift from the division between road planning and public transport planning. However, the Dublin Transportation Office established as a result is primarily advisory. The institutional arrangements for multi-modal transport planning are still not in place in Dublin, although they are planned with the proposed Dublin Transport Authority. There are no similar plans for the rest of the country.

Additionally, walking and cycling as modes are often ignored and their potential disregarded. This is despite the fact that over a 40% of the trips to work of less than 4 miles are made by car and 44% of schoolchildren aged between 5 and 12 again travelling less than 4 miles to school go by car (CSO, 2004).

Integration of land use planning and multi-modal transport planning would be a major shift from the current approach which is a combination of *laissez-faire* and predict-and-provide, wherein transport policy consists primarily of providing roads in an attempt to alleviate congestion.

Design approaches

Road designs which disadvantage any road users (by increasing risk or perception of risk, reducing comfort, directness or speed) act to deter them. (Hillman, 1990) This is particularly the case with cyclists and pedestrians who are more exposed to the outside environment than those in motor vehicles. This is a common problem with walking and cycling in Ireland. Design for walking and cycling is carried out as an add-on to road design, if at all, and some design features which cause particularly severe problems for pedestrians and cyclists are still common. (Galway Cycling Campaign, 2006) Poor designs can also disrupt access to public transport.

Additionally, the creation of a pleasant environment along a route will encourage its use by pedestrians and cyclists, especially if it involves a reduction in the speeds of motor vehicles on the route.

Important information on the priorities and desires of users can be gained by surveying them, which has not traditionally been part of transport planning or road design. (Kipke, 1993)

D. Provision of information, raising of awareness and changing of attitudes

Lack of information about transport options has been identified as a significant barrier to use of public transport in particular. Measures such as journey planning websites can assist significantly. (Transport for London) Such websites can also assist in planning pedestrian and cycle trips. (DTO, TFL) Unfortunately the maps do not always show all possible routes. Significant impediments exist to walking where street signs, maps etc. only show vehicular routes and do not indicate pedestrian-only routes and short-cuts (as is effectively universal in Ireland.) Correct signage can help significantly.(Kraugerud, 1997)

Additionally, advertising to promote walking, cycling and public transport is widely used in other countries. Note that advertising is considered by car marketers to be highly effective in promoting their mode.

References

Berkman LF. The role of social relations in health promotion. *Psychosomatic Med*.1995;57:245-254.

Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. *Soc Sci Med*.2000;51:843-857.

Berkman LF, Syme SL. Social networks, host resistance and mortality: a nine year follow-up of Alameda County residents. *Am J Epidemiol*.1979;109:186-204.

Booz Allen Hamilton, 2004, *Strategic Rail Review*

Brummett BH, Barefoot JC, Siegler IC, *et al.* Characteristics of socially isolated patients with coronary artery disease who are at elevated risk for mortality. *Psychosom Med*.2001;63:267-272.

Central Statistics Office, 2004, 2002 Census, Volume 9, http://www.cso.ie/census/documents/vol9_entire.pdf

Central Statistics Office, 2005, *Road Freight Transport Survey 2004*
http://www.cso.ie/releasespublications/documents/transport/2004/roadfreight04.pdf

Coleman JS. *Foundations of Social Theory*. Cambridge, Mass: Harvard University Press; 1990.

Department of the Environment and Local Government, 2000, *National Climate Change Strategy*

Department of the Environment Heritage and Local Government, 2002, *Progress Report on Implementation of the National Climate Change Strategy*

Department of the Environment Heritage and Local Government, 2003, *Discussion Paper; Strategy to Reduce Emissions of Transboundary Air Pollution by 2010*.

Department of the Environment, Heritage and Local Government, *Irish Bulletin of Vehicle and Driver Statistics 2004*
http://www.environ.ie/DOEI/DOEIPub.nsf/0/daac160e1d73c27d80256f0f003dbc05/$FILE/Vehicle%20Registration%2005.pdf

Department of the Environment Heritage and Local Government, 2005, *National Programme for Ireland under Article 6 of Directive 2001/81/EC for the progressive reduction of national emissions of transboundary pollutants by 2010*

Directive 2001/81/EC of 23 October 2001 on national emissions ceilings for certain atmospheric pollutants

Dublin Airport Authority, 2006, *Annual Report 2005*

Dublin Transport Initiative, 1995, *Final Report*

Dublin Transportation Office, Journey Planner

European Conference of Ministers of Transport, 1996, *Round Table 105 Infrastructure-induced mobility*, OECD Economic Research Centre

European Environment Agency, 2006, *Transport and the Environment: Facing a Dilemma* http://reports.eea.europa.eu/eea_report_2006_3/en/term_2005.pdf

Frank, LD, Andresen, M. & Schmid TL. 2004. Obesity relationships with community design, physical activity, and time spent in cars. *American Journal of Preventive Medicine*, 27 (2), 87-96.Aer Rianta, 2003, Annual Report 2002

Frank, LD, Engelke, PO and Schmid, TL. *Health and Community Design: The Impact of the Built Environment on Physical Activity*. 2003. Washington DC: Island Press.

Frank, LD, Sallis, JF, Conway, TL, Chapman, JE, Saelens, BE, Bachman, W. 2006. Many Pathways from Land Use to Health: Associations between Neighbourhood Walkability and Active Transportation, Body Mass Index, and Air Quality. *Journal of the American Planning Association*. Vol. 72. No. 1

Frank LD, Schmid TL, Sallis JF, Chapman J and Saelens BE *American Journal of Preventive Medicine*, 28(2): 117-125, February 2005

Frumkin, H., Frank, L. and Jackson, R. 2004. Urban Sprawl and Pubic Health: Designing, Planning, and Building for Healthy Communities. Washington DC: Island Press.

Fukuyama F. *Trust: Social Virtues and the Creation of Prosperity*. New York, NY: Free Press; 1995.

Galway Cycling Campaign, 2006, Galway's Roundabouts http://www.galwaycycling.org/roundabout/roundabout01.html

Kawachi I, Berkman LF. Social ties and mental health. *J Urban Health*. 2001;78:458-67

Kawachi I, Kennedy BP, Glass R. Social capital and self-rated health: a contextual analysis. *Am J Public Health*.1999;89:1187-1193.

Kawachi I. Social capital and community effects on population and individual health. *Ann N Y Acad Sci*.1999;896:120-130.

Kipke, Barbara Gruehl, 1993, User Perspective, Marketing and Sub-markets http://www.mobility-consultant.com/literat/preasrep/bl_pre3.htm

Hillman, Mayer, 1990, Planning for the green modes: a critique of public policy and practice in Tolley, Rodney, *The Greening of Urban Transport: Planning for walking and cycling in Western Cities*, Bellhaven, London

House JS, Landis KR, Umberson D. Social relationships and health. *Science*.1988;241:540-545

House JS, Robbins C, Metzner HL. The association of social relationships and activities with mortality: prospective evidence from the Tecumseh Community Health Study. *Am J Epidemiol*.1982;116:123-140.

Kaplan GA. Social contacts and ischaemic heart disease. *Ann Clin Res*.1988;20:131-136.

Kraugerud, Nils Harald, 1997, The unofficial shortcuts for cyclists and pedestrians - how to make them official, *Velo City 97 Proceedings*

Leyden, Kevin M. Social Capital and the Built Environment: The Importance of Walkable Neighbourhoods. *American Journal of Public Health*. 2003;93 1546-1551.

National Development Plan, 2000-2006

National Spatial Strategy, 2002

Newman, P., Kenworthy, J., and Lyons, T., 1988, Does free-flowing traffic save energy and lower emissions in cities?. *Search* Vol 19, pp. 267-270

Newman, P., and Kenworthy, J., 1989, *Cities and Automobile Dependence, an International Sourcebook*, Gower, Aldershot

Noland, R, 1999, Relationships between highway capacity and induced vehicle travel, Paper no. 991096, Paper presented at the 78th Annual Meeting of the Transportation, Research Board, www.epa.gov/trb-rn.pdf

Pearce, F., 1997, False forecasts leave cities choking, *New Scientist*, 8 February 1997

Putnam RD. *Bowling Alone: The Collapse and Revival of American Community*. New York, NY: Simon & Schuster; 2000.

Saelens, BE, Sallis, JF, Black, JB, and Chen, D. Neighborhood-Based Differences in Physical Activity: An Environmental Scale Evaluation. *American Journal of Public Health*. 2003;93 1552-1558.

Scott, S., Bacon, P., Fry, J., (2003), Evaluation of Eco-Auditing in the context of the National Development Plan 2000-2006: Report Prepared for the NDP/CSF Evaluation Unit, Peter Bacon Associates and the Dept of Environmental Resource Management, University College Dublin

Seeman TE, Kaplan GA, Knudsen L, Cohen R, Guralnik J. Social networks ties and mortality among the elderly in the Alameda County Study. *Am J Epidemiol*.1987;126:714-723

Standing Committee on Trunk Road Assessment, 1994, *Trunk Roads and the generation of traffic*, Department of Transport, London

Sustainable Energy Ireland, 2003, *Energy and CO_2 Efficiency in Transport; Analysis of New Car Registrations in year 2000*

Sustainable Energy Ireland, 2004, *Strategies to Reduce Greenhouse Gases from Irish Transportation*

Transport for London, Journey Planner
http://journeyplanner.tfl.gov.uk/user/XSLT_TRIP_REQUEST2?language=en

Walsh, Jim, *et al.,* 2005, Origins, Destinations and Catchments: Mapping Travel to Work in Ireland in 2002, Presented to meeting of Statistical and Social Inquiry Society of Ireland, October 20th , 2005, ESRI Burlington Road
http://www.ssisi.ie/papers/2005/travel_to_work.doc
(note: marked Draft and "not for quotation without permission of the authors", so this will need to be checked with them)

WHO Regional Office for Europe, 1999, *Health costs due to road traffic-related air pollution*

Yen IH, Kaplan GA. Neighbourhood social environment and risk of death: multilevel evidence from the Alameda County Study. *Am J Epidemiol*.1999;149:898-907.

Economic, environmental and social performance of the Irish tourism sector: towards sustainability

Briefing Paper for Comhar[1]

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1 This briefing paper has been prepared to inform the proceedings of the Comhar Conference "Towards Sustainability in the National Development Plan 2007-2013" – 4th to 6th October 2006. Opinions expressed are not necessarily those of Comhar but are intended to encourage debate and greater understanding of sustainability issues.

1.0 Introduction

Ireland is promoted as a clean, green tourism destination, famous for its landscape, environment, natural habitats and biodiversity. However, is this image still realistic and is it an image that can be sustained as Ireland develops post 2006? This question is examined through the course of this paper and relevant tourism policies are drawn on to illustrate this issue further.

Over the past decade, Irish tourism has performed well and has made a strong contribution to the national economy[2]. An efficient government sector, a competitive air and maritime transport sector, a strong partnership between public and private sector, significant investment in public and private tourism facilities and an effective international brand image built through coherent overseas marketing campaigns can be considered some of the major factors which contributed to the successful performance of Irish tourism[3]. It is argued that Irish tourism is now, however, at a turning point and should increasingly focus on delivering a quality value for money experience to the international and resident visitor[4].

In its 2003 Report, New Horizons for Irish Tourism: *An Agenda for Action*, the Tourism Policy Review Group concluded with conviction that Irish tourism is arguably, the most important and successful sector of Irish-owned enterprise since the foundation of the State[5]. The industry possesses the capacity and the capital stock to achieve further growth in the future at a time when many indigenous sectors – particularly farming and traditional manufacturing – face major structural and trading difficulties[6].

All stakeholders in the tourism sector at national, regional and local levels have a role to play in preserving and enhancing the environment that is pivotal to sustaining and developing the tourism industry. Amongst the current tourism mechanisms and policy orientations, the OECD notes that significant governmental efforts have been made to support further sustainable growth in the tourism industry and prolong the good performance registered in the last ten years[7]. Sustainable tourism requires that all stakeholders focus on alleviating the pressures and impacts generated by tourism and that sustainable management policies, practices and schemes be adopted and developed[8]. This paper therefore examines how tourism policy can be strengthened and adequate infrastructure be provided to ensure that further development of tourism can be achieved ensuring economic, environmental and social sustainability.

1.1. Recent economic performance of the Irish tourism sector

Tourism confers four major benefits on the national economy. It adds to the level of consumer spending, thereby creating more business for an array of Irish enterprises. It supports high levels of employment

2 Conclusion of the National Tourism Policy Review of Ireland, OECD (June 2004) page 1

3 Conclusion of the National Tourism Policy Review of Ireland, OECD (June 2004) page 1

4 Conclusion of the National Tourism Policy Review of Ireland, OECD (June 2004) page 1

5 New Horizons for Irish Tourism: *An Agenda for Action* (September, 2003) page II

6 ITIC Submission to NDP 2007-20013 (March 2006) Summary page 1

7 Conclusion of the National Tourism Policy Review of Ireland, OECD (June 2004) page 1

8 'Ireland's Environment', Environmental Protection Agency (2004) page 204

across the economy. It acts to stabilise the balance of payments and it generates new streams of tax revenue for the Exchequer[9]. Therefore, the economic importance of tourism to Ireland cannot be overstated. In 2005, the tourism industry provided direct employment for almost 150,000 workers and it attracted 6.7 million overseas visitors – who accounted for total foreign revenue earnings of €4.3 billion[10]. In 1995, there were 4.2 million overseas visitors – who accounted for total foreign revenue earnings of €2.1 billion[11]. Therefore, since 1995, there has been a 51% increase in total foreign exchange earnings and visitor numbers have increased by 37%. In addition, domestic tourism expenditure also contributes to the economy and in 2005 there was €1 billion generated from domestic activity. Tourism also accounts for 3.9% of GNP including multiplier effects[12].

According to the Irish Hotel Federation (IHF), given the degree of competition and the price sensitivity of the Irish tourism product, Irish tourism is placed at a competitive disadvantage by high tourism VAT rates and non-refundability of VAT on corporate hospitality expenditure. In addition, the failure to halt the large increase in local taxes and charges negates the direct tax benefits[13]. The Tourism Action Plan Implementation Group also discusses this point but highlights that the resolution of the problem is complex because of EU law and certain differences in the VAT regime in Ireland compared to other countries[14].

In a regionally focused future where the exodus from farming is set to continue and where competitive pressures on traditional indigenous manufacturing enterprises are intensifying, tourism is likely to gain in relative economic importance. In these circumstances, the forthcoming National Development Plan (NDP) 2007-2013 should recognise the potential of integrated tourism as a generator for balanced regional economic wealth to a greater extent than in the past[15].

1.2. Recent environmental performance of the Irish tourism sector

A pattern identified in visitor surveys by Fáilte Ireland is that the primary motivation for visiting Ireland on a holiday is the quality of the sightseeing and scenery on offer. For this reason the tourism sector has a major part to play in protecting the environment on which it is so dependent. The targeted increase in visitor numbers to Ireland[16] poses serious challenges for the preservation and conservation of environmental capital and the potential impacts of tourism activity. A large influx of visitors can have negative effects on sensitive ecological areas. For example, the cumulative effective of vehicles, pedestrians and camping, picnicking and caravan use can cause severe vegetative damage to sand dunes[17]. However, insufficient quantitative data is currently available to assess accurately the impact of tourism on sensitive ecological areas.

9 ITIC Submission to NDP 2007-20013 (March 2006) Summary page 1

10 Final Progress Report of Tourism Action Plan Implementation Group (March 2006)

11 New Horizons for Irish Tourism: *An Agenda for Action* (September, 2003) page 30

12 ITIC Submission to Government Budget 2006 (October 2005) page 2

13 IHF Submission to the Minister for Finance on Budget 2006 (September 2005) available at www.ihf.ie

14 Final Progress Report of Tourism Action Plan Implementation Group (March 2006)

15 ITIC Submission to NDP 2007-20013 (March 2006) Summary page 1

16 New Horizons for Irish Tourism: *An Agenda for Action* (September, 2003) page XVI

17 'Ireland's Environment', Environmental Protection Agency (2004) page 202

There are a number of growing pressures on the environment including the increasing amounts of waste being generated, growing energy consumption, rising greenhouse gas emissions which cause climate change, the impact of growing housing demand and associated settlement patterns and threats to water quality, water quality, wastewater treatment, biodiversity and natural resources[18]. Visitors engaging in activities such as hiking, hill-walking and equestrian activities have the potential to harm sensitive areas of high ecological and resource value. Illegal dumping in the countryside, roadways, forested areas and scenic areas blights the rural countryside scenes and can seriously affect Ireland's attractiveness to tourists[19]. The seasonal aspect of tourism coupled with the concentration of tourists in certain regions is also adding pressures on the environment[20]. These elements all impact on the future sustainable development of Irish tourism.

While rising tourism numbers may adversely affect biodiversity and the environment in general, biodiversity and environment are important assets for tourism. Development must not deplete the resource base upon which tourism depends. This is particularly crucial in Ireland because our international branding efforts depend on our 'green image' and the tourism industry is dependant on a quality environment. Socio-cultural and economic growth must find a balance and harmony with protection and development of the area in order to be sustainable. The challenge of working to break the link between economic growth and damage to the environment must be addressed in the NDP 2007-2013.

It is clear, therefore, that tourism impacts on the environment and a very topical issue is traffic congestion and air emissions that are responsible for much environmental damage, linked with climate change and are a result of many tourism activities. The Government has been putting a range of measures in place to achieve emission reductions in the rest of the economy, including increasing the share of renewables in electricity generation, new Building Regulations to increase energy efficiency, grant schemes for renewable energy technologies in homes and commercial buildings, and the major expansion of excise relief for biofuels announced in the last Budget[21]. The National Climate Change Strategy, published in 2000, was the basis of Government policy and action on how Ireland would comply with the Kyoto Protocol and limit its greenhouse gas emissions to no more than 13 per cent above 1990 levels in the period 2008-2012[22]. The strategy review, entitled Ireland's Pathway to Kyoto Compliance, shows that at least 8 million tonnes of greenhouse gas emissions will be removed through policies and measures already in place. But the latest data from the Environmental Protection Agency (EPA) for 2004 showed Ireland was operating around 23 per cent above the 1990 base year emissions, which means we are 10 per cent over our target. The EPA estimates the rise in Ireland's greenhouse gas emissions will be twice what is allowed under the Kyoto Protocol from 2008 to 2012 or, put another way, an average of 7 million tonnes of excess pollution a year[23]. Every tonne of this overshoot will have

18 Making Ireland's Development Sustainable: Review, Assessment and Future Action (2002) page 5

19 'Ireland's Environment', Environmental Protection Agency (2004) page 202

20 'Ireland's Environment', Environmental Protection Agency (2004) page 201

21 "EEA Report Puts Ireland's Positive record on Greenhouse Gas Emissions in perspective" Dick Roche TD (22/06/2006) available at www.environ.ie

22 'Climate strategy is off the rails' (Irish Times, 28/07/2006)

23 Ireland's National Allocation Plan 2008-2012 (July 2006) page 43

to be offset by an emissions permit. The government is assuming permit prices will remain steady at around €15 a tonne giving a total cost to Ireland of €105 million a year or €2 million a week for five years[24]. Although Ireland will be able to avail of the flexible mechanisms in the Kyoto Protocol to buy allowances to meet any shortfall it might face in reaching its target, this is not the best solution for Ireland in the long term.

Ireland also produces more waste per person than any other in the EU and is one of the most car-dependent countries in the world, with carbon emissions from transport having risen a staggering 143 per cent since 1990[25]. The recent surcharge for airlines introduced by the European Parliament addresses in some way the issue of carbon emissions associated with aviation. However, aviation is currently a relatively small source of the emissions blamed for global warming. Its share is growing however, and at the fastest rate[26]. It is estimated that tourism may contribute up to 5.3 per cent of global anthropogenic greenhouse gas emissions, with transport accounting for about 90 per cent of this[27]. By definition tourism is impossible without transport and the general trend in tourism towards more frequent, further-away trips, for shorter periods of time is increasing the problem. Some other adverse impacts that tourism development and operational activities can have include[28]:

- Threats to ecosystems and biodiversity – loss of wildlife and rare species, habitat loss and degradation (examples of which can be seen in areas like the Burren, Co. Clare).
- Disruption of coasts – shoreline erosion and pollution, and fish spawning grounds.
- Deforestation – loss of forests for fuel wood and timber by the tourist industry also impact on soil and water quality.
- Water overuse – as a result of tourism/recreational activities e.g. golf courses, swimming pools, and tourist consumption in hotels.
- Urban problems – congestion and overcrowding, increased vehicle traffic and resultant environmental impacts, including air and noise pollution and health impacts.
- Air Travel – given Ireland's increased accessibility and the availability of low fair airlines the impacts to air quality must be considered.
- Exacerbate climate change/greenhouse effect – from fossil fuel energy consumption for travel, hotel and recreational requirements.
- Unsustainable and inequitable resource use – energy and water over consumption, excessive production of wastes and litter are all common impacts.

24 'EPA plan shows true cost of government inaction on Kyoto' (17/07/2006) available at www.foe.ie

25 Environment is the weak link in social partnership deal', Oisin Coghlan (Friends of the Earth Ireland), Irish Times, 06/07/2006

26 The Sky's the Limit (Economist, 10/06/2006) Vol. 379, Issue 8481, p67-69

27 Making Tourism More Sustainable (World Tourism Organisation) page 13

28 Towards Earth Summit 2002 – Economic Briefing No. 4, 2002

Secondary and tertiary impacts are also caused by activities indirectly related to tourism (e.g. local handicrafts, trade, entertainment, etc.), and by development induced by the presence of tourism in an area, such as second homes, recreation and shopping facilities, transport networks, etc. Therefore, the total impact of tourism on the environment is the result of direct, indirect, and induced impacts, which very frequently are difficult to distinguish from one another.

Although it is acknowledged that the relationships between the host community (whether in the context of its environment, economy, or social fabric), and the visitor, are numerous, complex, and constantly changing, what is clear is that the carrying capacity of natural environments is often exceeded with the addition of tourism demands for resources (land, water, energy, food). Many tourism activities in Ireland such as boating, mountain hiking, motorised water-sports (e.g. jet skies), and trekking represent stress for fragile ecosystems and often tourists lack information and awareness about their impact in a different culture and environment, about their impacts on socio-economic and socio-cultural development, and about the environmental costs of tourism. This is particularly the case for areas not traditionally regarded as 'fragile' environments.

Management policies have been utilised at some tourist sites in Ireland to integrate environmental policies into the tourist product[29]. The visitor centre at Brú na Boinne, Co. Meath uses a quota system to control the number of visitors accessing the sensitive sites of Newgrange and Knowth. Ireland also has a network of National Waymarked Ways that are maintained locally with the support of the Irish Sports Council. For more examples of Irish initiatives integrating the concept of sustainability into the tourism product, please refer to Appendix A.

Although the NDP 2000-2006 went some way towards addressing the issue of negative environmental impacts, awareness of the potential environmental impact of tourism in Ireland is still very much in its infancy. While many documents agree that environmental conservation must become a central element of tourism policy and its implementation, little is presented about the potential spatial and temporal environmental impacts of tourism in Ireland. The challenge for sustainable tourism in Ireland, therefore, is to balance inevitable impacts of tourism with the principles of sustainable development, which can only be achieved through, integrated, cooperative approaches involving all stakeholders and related economic activities in tourism destinations[30]. The expansion of tourism in Ireland has significantly contributed to the country's economic performance throughout the 1990s and will undoubtedly remain a major factor in the Irish economy in the years to come. However, sustainable tourism requires integrating not only economic, but also social and environmental concerns. Moreover, Ireland's traditional 'unspoilt' environment is under serious threat from rapidly increasing tourist numbers and targets, and the potential impacts of this must be given due consideration in future policy documents. The tourism sector needs to take a more proactive role in preserving environmental quality, as its business depends on it.

29 'Ireland's Environment', Environmental Protection Agency (2004) page 204

30 United Nations Commission on Sustainable Development, 13th Session New York, 11-22 April 2005

1.3. Recent social performance of the Irish tourism sector

Over the last decade there has been a continued change in social trends and these have impacted on the tourism sector. For example, visitor's expectations of tourism destination have increased and linked to this host's perceptions are affected by how tourists behave and the number of visitors[31]. A new social element to tourism has also been introduced as a result of an increase in visitors to Ireland from 'new' destinations (e.g. the new Member States). These 'new' visitors and the increasing multi-cultural workforce (25,000 in 2005) in the Irish tourism industry are a relatively new development and have affected how tourism businesses operate and will be a key feature for Irish tourism in the future, as it is anticipated that jobs created as a result of expected increase in tourism demand will be filled by foreign nationals[32]. A further influential trend is the amount of holidays people take. It is now common for people to take second, third and even fourth holidays and this has obvious implications for the tourism industry. This is linked to the fact that people are getting higher incomes, have higher disposable incomes and are therefore cash rich but may be time poor. As a result of this, there has been an increase in the frequency of short breaks and a corresponding decrease in longer holidays. The trend toward short break holidays, which are concentrated in cities like Dublin, has been driven by the resurgence of powerful budget air carriers and has driven the renewed tourism growth post-2001[33].

Tourism is often the main source of income and employment for rural communities and can therefore have a positive influence in regional development[34]. Tourism has become an important instrument of regional development, notably through the development of a vibrant and largely Irish-owned tourism industry, with enterprises and jobs dispersed throughout the island. Some of the key tourism areas are ones which have little or no industrial employment. Therefore, communities and individuals benefit from tourism and are core components of the tourism destination or product. Consequently, an implicit requirement for the achievement of sustainable tourism development is a local community approach which seeks to optimise the benefits of tourism to all stakeholders but according to local needs[35].

1.4. Current key policies and policy instruments in place that bear on sustainable tourism performance

NDP 2000-2006: The NDP 2000-2006 shifted the prime tourism policy objective from job creation to sustained foreign exchange earnings with a growing emphasis on sustainable and spatially balanced development[36]. It was framed taking into account the need for balance between environment and development embodied in the concept of sustainable development. The recognition of the importance of a more sustainable approach to tourism development in Ireland was visible in the NDP 2000–2006 and the National Spatial Strategy (NSS), published in November 2002. It aimed to address infrastructural

31 Influencing Consumer Behaviour to Promote Sustainable Tourism Development, United Nations Commission on Sustainable Development, NGO Steering Committee

32 Fáilte Ireland Cultural Diversity Strategy and Implementation Plan (May 2005)

33 ITIC Submission to NDP 2007-20013 (March 2006) Summary page 2

34 'Ireland's Environment', Environmental Protection Agency (2004) page 201

35 Sharpley, R. (2003) 'Rural Tourism and Sustainability – A Critique', in D. Hall, L. Roberts and M. Mitchell (eds), *New Directions in Rural Tourism*, Aldershot: Ashgate Publishing Limited, p. 38-53

36 A Long Term Perspective on the Policy and Performance of Irish Tourism: Professor Jim Deegan (January 2006)

deficits and to achieve more balanced regional development under the regional Operational Programmes. Approximately €170 million was earmarked for projects involving the development of major attractions outside main tourist areas, special interest pursuits and tourism/environmental management projects. The objective of the funding was to widen the spatial spread of tourism and divert pressures from highly used areas and it should be noted that state-funded projects must comply with planning and environmental regulatory requirements and have regard to environmental sustainability and best practice in relation to environmental protection. The debate of quality versus quantity of visitors also began to emerge in this document[37].

Identifiable investment commitments to tourism in the text of the NDP 2000-2006 amounted to €389 million[38]. Thus, from the outset, explicit planned investments in tourism under the NDP amounted to just over 0.75% of total capital expenditure under the current national plan. It is accepted that expensive capital spending commitments to related areas – particularly the transport components of the economic infrastructure operational programme – conferred positive spillovers on tourism development. Nonetheless, the commitment of just 0.75% of total national planned investment to an industry estimated as responsible for 4.4% of GNP constituted insufficient recognition of the industry's importance to the national economy[39]. According to the Fitzpatrick Associates Report[40], there was slow progress under the Tourism Measure. The Report notes there was a failure to meet expenditure targets and suggest this generally involved a combination of:

a) Initial over-provision in the sense that likely demand was over-estimated in the first place;

b) Lower than expected "demand" for grants from the private sector, in some instances because of external variables such as Foot and Mouth disease and a weak tourism sector in the early years of this period.

Tourism Product Development Scheme (TPDS) 2000-2006: The TPDS 2000-2006, funded under two regional Operational Programmes, was established in with a total budget of €130 million, including €55 in EU funding, to support a range of new product developments, outside the established tourism destinations, with an emphasis on regional spread, cluster development, specialist niche products and environmental sustainability[41].

Tourism Development Strategy (TDS) 2000-2006: Bord Fáilte (now Fáilte Ireland) drew up the TDS for the 2000-20006 period. The essence of the strategy is to ensure development of the tourism product in a sustainable way and it distinguishes between established tourist areas, developing tourist areas and undeveloped areas, and advocates a selective range of product supports in a targeted range of geographical areas. The TDS shows a keen awareness of the issue of sustainability and it realises that

37 *National Development Plan 2000-2006*, Dublin: Irish Government (1999)

38 Estimated from a detailed review of Chapters 4-8, NDP 2000-2006; in ITIC Submission to NDP 2007-2013 (March 2006) page 46

39 ITIC Submission to NDP 2007-2013 (March 2006) page 46

40 Update Evaluation of the Community Support Framework for Ireland 2000-06, Fitzpartick Associates Economic Consultants (January 2006)

41 National Tourism Policy Review of Ireland, OECD (June 2004) page 16

there is a need for consistent vigilance to protect the key assets of tourism and in particular the scenic landscape[42]. The TDS adopts the notion that any developments should be carried out in a sensitive way and the whole theme of the strategy is towards developing a sustainable tourism sector. It provides for a strategy of sustainable development in terms of a quality environment, profitable enterprises and enduring job creation – that is, environmental, economic and social sustainability. This document argues that helping the tourist industry to achieve a wider seasonal and regional distribution of tourism can contribute to sustainable development.

New Horizons for Irish Tourism: *An Agenda for Action* (September 2003): The Tourism Policy Review Group published its report "New Horizons for Irish Tourism: An Agenda for Action" in September 2003. The focus of the Group's strategy is the development of Irish tourism at a national level and it recognises the importance of sustainable development of the tourism sector, particularly in terms of product development and innovation[43]. It also recognises the importance of the distribution of tourism regionally, and the need for policy to facilitate each region in achieving its full potential for tourism development – in a way that enhances the sustainability of its tourism base[44]. The issue of sustainability is a component of this strategy, but it may somewhat contradict this target to revert back to an emphasis of increasing visitor numbers to ten million by 2012[45]. An Implementation Group was set up to drive forward the agenda of the New Horizons Report to ensure the implementation of the seventy plus actions recommended in this report. According to the Final Progress Report of the Tourism Action Plan Implementation Group (March 2006), progress has been made in many ways better than what was anticipated by the Group when they met in 2004. The Group identified sustainability as one of the key themes for consideration in the next phase of the roll-out of the New Horizons for Irish Tourism strategy[46]. Therefore, sustainability remains an important element for future policy documents.

Fáilte Ireland Human Resource Development Strategy – *Competing Through People* (2005): This Report was born out of the Tourism Policy Review Group Report and was developed by Fáilte Ireland in association with a high-level industry steering group. The Report identifies the key to achieving and sustaining a more competitive tourism industry as lying in the development of its people across all levels and all sectors. Many of the larger tourism businesses have recognised this and have led by example. However the Irish tourism industry is dominated by smaller family-run business where pressures of work and rigid training structures hinder staff and management development. This Fáilte Ireland strategy is designed to overcome these difficulties. According to this strategy, SMEs in Ireland can struggle to provide an environment within which sustained and developmental learning takes place. This in turn mitigates against the capacity of the sector to innovate and create new product, marketing and financial opportunities. Such barriers to "learning journey" opportunities have been identified as a major cause of management skills deficiencies and a reason for business failure in the tourism sector.

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42 Bord Fáilte (1999) *Tourism Development Strategy 2000-2006*, Dublin: Bord Fáilte

43 'Ireland's Environment', Environmental Protection Agency (2004) page 203

44 *New Horizons for Irish Tourism – An Agenda for Action*, Dublin: Tourism Policy Review Group, Department of Art, Sport and Tourism (2003)

45 *New Horizons for Irish Tourism – An Agenda for Action*, Dublin: Tourism Policy Review Group, Department of Art, Sport and Tourism (2003)

46 Final Progress Report of Tourism Action Plan Implementation Group (March 2006)

2.0 Key issues and challenges faced for the future of tourism

The resolve of the tourism industry continues to be tested and it is up to those involved in the industry in Ireland to identify how potential weaknesses and threats can be turned into strengths and opportunities. The following section highlights some key issues and challenges faced for the future of tourism, globally and locally. It is vital that theses issues are addressed to ensure the sustainable development of the Irish tourism industry:

Competitiveness; Central to the future success of Irish tourism will be a recovery of the competitiveness that has been lost in recent years and a capability to respond with flexibility and agility to changes in the market place. Previously Ireland was a very cost competitive destination but this is no longer the case. There is an urgency attached to getting our costs and prices back into balance with the rest of the European Union[47]. The competitiveness of the traded sector in Ireland, including tourism, has deteriorated significantly in recent years. High wage costs and high public sector charges for services contribute to the problem. The combined effect of a high inflation rate and a strengthening exchange rate have led to increasing levels of dissatisfaction with the level of Irish prices amongst overseas visitors[48]. The challenge for the tourism industry is to provide high quality products and superior standards of customer service that hold the potential to deliver high yield business. These must provide good value for money and positive visitor experiences. If Ireland cannot do that, it will fail to thrive in the very competitive marketplace in which Irish tourism now operates[49] and this will lead to unsustainable growth of tourism numbers.

Product utilisation, development and innovation; Ireland's tourism product, based around the three pillars of people, place and culture, is the fundamental determinant of the customer experience on which the continued success of the Irish tourism industry rests. While there has been significant expansion in the product base of Irish tourism over the past decade, the investment involved has been largely in the provision of improved accommodation, associated facilities and conventional attractions that provide "passive" engagement and experience for visitors. Such facilities are today taken as a "given" by tourists. In themselves, they do not provide competitive advantage for Ireland – relative to other destinations. This can only come from providing visitors with memorable, positive experiences – particularly those that relate to what is different or unique about Ireland[50]. There is evidence to indicate that the Irish tourism product has, in many ways, become tired and lacking for many tourists. The search for meaningful and authentic experiences has emerged as a significant trend over recent years. A fundamental weakness is that much of the existing product, in both public and private ownership, is not packaged, presented and made accessible or marketed to best effect either internationally or domestically[51].

47 National Tourism Policy Review of Ireland, OECD (June 2004) page 22

48 ITIC Submission to NDP 2007-20013 (March 2006) Summary page 6

49 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 26

50 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 26

51 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 19

Regional development and spread; Despite progress, there are serious regional imbalances in securing an equitable share of national economic growth. Tourism is central to the creation and maintenance of employment and living standards of many people living in the less developed areas of the country; therefore, a dynamic policy for the balanced regional development of Irish tourism is necessary. Traditional industries in the regions are not being replaced by newer, high tech companies, which are mostly established in Dublin and the larger cities[52]. Regional infrastructural weaknesses, including a weak internal transport network, are a barrier to enterprise development. The trends in regional tourism performance reflect, to a considerable extent, the increasing dominance of air as the preferred means of transport of visitors to and from Ireland – now accounting for some 80% of the total – and the concentration of air services between Ireland and Britain and Mainland Europe at Dublin Airport. Clearly, the development of air services between the regional airports in Ireland, to and from Britain and Europe, would make a major contribution to addressing the variation in regional tourism performance[53].

The Report on the Regional Spread of Tourism published by ITIC in 2005, highlights the significant variations in regional tourism performance in recent years. Promoting a greater distribution of tourism across the regions remains a core challenge for national tourism policy[54]. To facilitate the targeted growth as set out by the Tourism Policy Review Group, tourism in the regions will need to be developed because Dublin and other cities will not be able to absorb such an increase alone. The development of tourism in the regions is an obvious advancement as many of Ireland's most scenic location s and holiday destinations are not only located in poorer regions, but in rural areas. As an industry, tourism continues to possess the potential not only to contribute to greater regional balance but also to create new economic activity in rural areas[55].

Access transport; Competitive and convenient air and sea access is a critical determinant of external international demand for Ireland as a tourist destination. While technological and product developments combined with changing strategic approaches in the access transport segment have continued to increase capacity on routes, infrastructural developments have not kept pace. Consequently, while we have seen increased investment by the access transport operatives, facilities and infrastructure to support the increase in capacity and service have not materialised in all cases. Within Ireland, effective and easy access by air, road and public transport is essential if the realistic potential of a greater regional spread of the benefits of tourism is to be achieved[56]. The increased access to additional US cities for Irish-based airline that will result from the Ireland-US Bilateral Air Agreement represents a major opportunity for tourism development. It is essential that these opportunities are fully exploited by the Tourism State Agencies in partnership with the airlines and with the industry. It is also essential that, if the EU-US Agreement is not ratified in 2006, arrangements to implement the US-Ireland element be quickly put in place so that the benefits to Irish tourism can be achieved and growth sustained.

52 Bord Fáilte submission to the Tourism Policy Review Group (2003) page 7

53 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 27-8

54 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 27

55 ITIC Submission to NDP 2007-20013 (March 2006) page 44

56 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 26

Infrastructural requirements[57]; It is imperative that the necessary support infrastructure is in place to facilitate tourism development in Ireland. Economic infrastructure necessary in the forthcoming NDP include: the introduction of new pier facilities for aircraft at Dublin Airport by 2007 and the opening of an additional terminal at the airport by 2009; the implementation of a four-year road signposting programme from 2006; the completion of the inter-urban road network by 2010; the designation of a timetable that would ensure the early completion of the Limerick/Galway section of the Atlantic Corridor, announced in *Transport 21*; the publication of a timetable for the phased development of the proposed Western Rail Corridor; the development of a Transitional Package to support Shannon following the advent of open skies. Finally, to underpin the development potential of marine-based tourism, it is essential that the 'necklace' of marinas around the coastline of the North and West of Ireland be completed. Marine coastal and inland waterways resources form a major component of the overall tourism experience for holidaymakers in Ireland. ITIC believes that water based tourism can become a key factor in tourism growth to the regions[58]. In recent years, the experiences of a great many visitors to Ireland at Dublin Airport have been less than satisfactory. It is vital that long-awaited, essential investments are delivered on time and within budget and that any interim, consequential disruption for visitors and airlines is minimised[59] to ensure that tourism development is sustained.

Environmental requirements; In recent years there has been a growing recognition in the Irish tourism industry that each tourism destination has a number of tangible assets, which are unique. These assets, which may be historic, cultural, linguistic or scenic, represent the essential appeal of that destination for the tourist. As such these resources are part of the area's tourism "capital". Managing tourism to sustain local economies in ways that do not result in damage to the very environment on which successful tourism depends is a central concern for sustainable tourism management.

Marketing[60]; Effective marketing provides the essential link between Ireland's tourism products and potential customers at home and abroad. The understanding of the tourist decision process pre and post purchase requires greater understanding. Marketing is an essential tool in management of the tourism sector particularly in relation to sustainability. Influencing external factors and an understanding of the customer in transition also requires ongoing research. The British market is by far the most important overseas market for Irish tourism, by virtue of its size, location, traditional source of business and for the many links of people, language and culture that exist between Ireland and Britain. Any complacency in relation to the sustainability, retention or growth in Ireland's share of that market should have been dispelled by the relatively poor performance in recent years. Tourism marketing objectives can also assist the tourism industry to achieve a wider seasonal and regional distribution of tourist business, contributing to sustainable development goals.

57 ITIC Submission to NDP 2007-20013 (March 2006) Summary page 12

58 ITIC Submission to NDP 2007-20013 (March 2006) Summary page 12

59 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page v

60 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 27

Cultural diversity[61]; In the emerging Irish multi-cultural society there is a need to develop and implement a strategy and detailed implementation programme to provide for the integration of international employees within the work-place and more widely in our society in a way that recognises and supports cultural diversity and enhances their personal and professional development and their potential to add a new and valuable dimension to traditional Irish tourism values. This issue is fundamental to sustain future success, as ambitious growth targets require significant additional labour. This labour must be of high quality to ensure that visitors can enjoy a quality product and value for money.

Countryside Access[62]; In Ireland there is a need to establish clear guidelines and codes of practice on rights of access for visitors to the countryside, hills, mountains, coast and State-owned forestry and bring clarity to the legal position in relation to public liability. A countryside council, Comhairle na Tuaithe, was established in January 2004 to address the issue of countryside access for recreational and leisure purposes. The Comhairle published its Countryside Code in 2005 and is currently working on a National Countryside Recreation Strategy. While the Comhairle has made good progress on these issues the more thorny issues surrounding "rights of ways", the unilateral closure of areas which have enjoyed traditional long-term public access and addressing situations where voluntary codes established by Comhairle are rejected or ignored by land-owners or recreation users, remain to be resolved and are a barrier to sustainable tourism development.

Increasingly, Ireland does not stand comparison with other areas competing for the same walking/hiking market, such as Scotland, the Lake District, the Pyrenees, the Alps and elsewhere in the near Continent[63]. Walking is centrally associated with tourism in Ireland but was badly hit by the restrictions following the outbreak of Foot and Mouth Disease in 2001[64]. During 2004, there were 259,000 people who visited Ireland for hiking holidays – which is still short of the 325,000 who came here in 1999[65]. Visitors who engage in walking and hiking stayed on average 16.6 nights in Ireland in 2004 and the walking market is worth around €113 million. Walking is the silent performer of Irish tourism, attracting more people here than golf or angling; therefore it is a phenomenal opportunity[66]. However, countryside access is a key issue challenging this form of tourism development.

Agency development arrangements; A serious constraint impeding optimal performance in the tourism sector is the lack of coherency in the structural arrangements underpinning tourism activity in Ireland. There is a lack of cohesion among stakeholders, which leads to a fragmented industry. As a result of the recent restructuring of the Regional Tourism Authorities, the functions and resources of the regions will expand to encompass all key aspects of tourism development, including the product innovation, enterprise support, training, marketing, infrastructure and environmental management needs of tourism. This will go some way to addressing the issue but as with all new departures, comment should be deferred until success or otherwise is proven. There is still a need to improve linkages between the tourism institutions operating at different levels to improve the flow of information throughout the system.

61 First Progress Report of Tourism Action Plan Implementation Group (August 2004) page 64

62 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page vi

63 Submission from Keep Ireland Open, available at www.keepirelandopen.org (accessed 28/07/2006)

64 Walking in the West (July 2005) page 3

65 Fáilte Ireland Hiking/Hillwalking fact cards (2004)

66 Paddy O'Mahony, Fáilte Ireland 'New plan to walk and cycle back to tourism prosperity' (Irish Times 18/04/2005)

Complex structure of Irish tourism; The Irish tourism industry embraces a wide range of diverse small and medium sized enterprises that are predominantly Irish-owned, which brings about its own challenges and issues[67]. Some issues that face small business are: burdensome and costly administrative regulations; rising local authority charges; poor access to information and advice; inadequate infrastructure; difficulty in accessing finance; weak management capability; lack of innovation, both technological and non-technological; and under-exploitation of Information and Communications Technology (ICT)[68].

Statistics, research and planning; A review of both historical and statistical literature highlights the importance of both market research and the need to target certain groups as the most viable means of extending tourism in Ireland. Irish tourism cannot control external issues, but resources must be committed to understanding relevant trends, anticipate key trends and ensure that they are factored into strategic planning. This further underlines the critical role of structured research and its use and highlights the need for more access to research funds, which appear to favour other industries in the science and technology sectors. Research and development is necessary to facilitate growth in this knowledge economy. There is also an issue with the comparability and flow of tourism information and there is a need for a qualitative approach to complement the traditional quantitative approach that has been traditionally employed[69].

Security and safety; Increasingly, travellers have concerns about crime, political problems and terrorism. This leads to a marked increase to search and visit areas that do not have security and safety issues. Ireland is considered a safe and welcoming destination and we are well positioned to secure the business that is out there[70]. Ireland needs to convey this position to visitors in order to sustain the growth in tourism numbers.

Social issues; As a result of demographic changes, consumer behaviour will in future be more strongly determined by the age factor. The ageing of the population of the European countries and North America in the coming decades, and the trend towards smaller families, play the prime role here. According to RMNO (the Advisory Council for Research on Spatial Planning, Nature and the Environment, Netherlands) short, more frequent city trips, taking breaks further away and for shorter periods of time will be more common for childless families than for families with children[71]. Recent decades have shown a trend towards people stopping work earlier. This means not only that they are then reasonably fit, but apparently that they also have sufficient financial means to retire earlier. The market for the over fifty-fives is becoming an increasingly interesting segment for tour operators and estate agents[72]. Workers in the tourism industry, as well as those in other industries, are also under increasing pressure to achieve a suitable work-life balance, which will impact on both supply and demand of tourism activity. All of these issues must be considered if tourism is to be socially sustainable in the future.

67 National Tourism Policy Review of Ireland, OECD (June 2004) page 22

68 Report of the Small Business Forum (May 2006) Executive Summary, page X

69 Submission to the Tourism Policy Review Group, DIT/TRC (March 2003) page 9

70 Tourism Ireland updates local tourism industry on UK market Wednesday (23/07/2003) available at www.tourismireland.com/corporate/

71 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 25

72 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 46

3.0 Future trajectory under 'business as usual'

The World Tourism Organisation (WTO) has forecast that the number of international passenger arrivals will double over the next twenty years to reach almost 1.6 billion. International tourism has exhibited a sustained capacity to grow very rapidly in the past and it is forecast to continue expanding swiftly for the foreseeable future[73]. The available evidence points to continued robust growth in the global tourism industry over the period of the next national plan. Moreover, short-term forecasts point to a revival in demand conditions in the major European economies from which most overseas visitors to Ireland are drawn. Ireland has already developed and sustained a position in this global market, accounting for some 1.5% of total international arrivals in Europe[74]. On the basis of the industry outlook, this is a market in which Ireland should be seeking to reinforce and strengthen its position. The new accession countries also represent a market that Ireland has potential to attract.

China is another prospective market for Irish tourism and the recent opening of Tourism Ireland's first office in Shanghai (June 2006) is recognition of this potential. With a population of over 1.3 billion and a rapidly expanding economy, China has the potential to exert greater influence over the development and marketing of tourism destinations worldwide over the next decade than perhaps any other country on the globe. Ireland was granted 'ADS' Approved Destination Status in May 2004 providing a framework to establish organised group tourism from China to Ireland[75]. 28.85 million Chinese travelled overseas in 2004. 50 million people are projected to travel from China in 2010, soaring to 100 million by 2020. This will make China one of the world's major top 3 outbound tourism markets[76]. Ireland also has an opportunity to attract friends and relatives of international workers, many of who are working in the tourism industry.

The long-term strategic framework for the development of Irish Tourism is set out in the *New Horizons for Irish Tourism* report, published in September 2003. This strategy emphasises the utter importance of retaining flexibility and developing a capability for rapid response to changing market circumstances within Irish tourism, at both the level of policy formulation and implementation and at enterprise level. The importance of this flexibility must be reemphasised on the road forward, as past lessons (e.g. Foot and Mouth crisis and 9/11) have taught us that major events can occur to stifle tourism growth in terms of number of visitors and revenue.

The Implementation Group, set up to monitor the progress of recommendations identified in the Report considers that, while clearly under pressure, the overall targets set by the Tourism Policy Review Group remain attainable provided the challenges and actions identified by the Group and widely endorsed by the industry are addressed and the tourism development strategy is implemented effectively. These targets include increasing overseas visitors to 10 million and overseas visitors spend to €10 billion by

73 ITIC Submission to NDP 2007-20013 (March 2006) Summary page 5

74 ITIC Submission to NDP 2007-20013 (March 2006) Summary page 5

75 Minister opens Tourism Ireland office in Shanghai (03/06/2006) available at www.tourismireland.com/corporate/

76 Kerry and Shannon welcome their first organised tourism group from China (03/02/2006) available at www.tourismireland.com/corporate/

2012[77]. The Group highlights that underlying trends in areas such as regional spread, length of stay and visitor spend are less positive and a cause of some concern and the rate of progress required to meet the revenue targets are challenging – especially when viewed against the background of changing consumer preferences, tougher international competition and a deterioration in Ireland's relative competitive positioning. Ireland's best prospects will continue to lie within its traditional high performing markets – Great Britain, the United States, Germany and France. Together these markets account for 84% of total incoming visitors. The Irish tourism industry must continue to perform strongly in those markets if the overall growth targets for the industry are to be achieved. In particular, far stronger performance in the British market than has been achieved in recent years is essential if achievement is to get back on track across the range of targets set out by the Review Group[78].

Looking to 2006[79], the overall growth target for overseas visitor numbers is a further 5%. Achieving this target would see Ireland attracting over seven million visitors for the first time – slightly ahead of the target set by the Tourism Policy Review Group. The 2006 revenue target set by the Tourism Policy Review Group, which was based on 2002 values, would require a 20% increase in revenue in the year. This is not now regarded as achievable as the Tourism State Agencies have set a growth target of 6.6% in foreign earnings in 2006. The revised revenue forecast of 6.6% growth is ambitious, given that visitor numbers are estimated to increase by 5% and that the short break market represents the fastest growing segment. Achieving this target will require an increase in average per capita spending by overseas visitors, which is against the trend of recent years. In the light of increased capacity in the industry, revenues and margins in individual enterprises are likely to remain under pressure. The overall growth target for domestic holiday trips in 2006 is 9%. Given the strong performance in recent years (7% growth in 2004 over 2003), this is achievable but will require determined effort. Again the revenue target for domestic holiday spend is ambitious. To reach the interim target of €800 million in 2006 would require a 28% increase over the 2005 receipts (at 2002 values) which, at this stage, appears unattainable. The lagging performance of real revenue to date requires an even faster rate of revenue growth in the years to 2012 if the Review Group's 2012 targets are to be met.

The annual growth required in overseas visitor numbers over the period 2005-2012 if foreign visitors are to reach the 10 million target by 2012 is 5.8%. The required growth rate does not deviate significantly from the Review Group's projection in 2003. However, the relatively weak growth in real overseas visitor revenue between 2002 and 2005 necessitates an upward revision in the annual growth in overseas visitor revenue – adjusted for inflation – to 9.2% each year for the period 2005 through 2012 if the €6 billion earnings target is to be attained in the latter year. Given that real overseas tourism revenue advanced at a rate of only 1.2% annually between 2002 and 2005, the required acceleration of this growth rate to 9.2% annually in the remaining seven years of the 10 year development programme cannot be anticipated without a step change in tourism performance[80].

77 New Horizons for Irish Tourism: *An Agenda for Action* (September, 2003) page XVI

78 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 5

79 ITIC Submission to NDP 2007-20013 (March 2006) page 48

80 ITIC Submission to NDP 2007-20013 (March 2006) page 49

The future trajectory has been set out corresponding to targeted visitor numbers and revenue, however, unsustainable trends in relation to climate change and energy use, threats to public health, poverty and social exclusion, demographic pressure and ageing, management of natural resources, biodiversity loss, land use and transport still persist and new challenges are arising. Since these negative trends bring about a sense of urgency, short-term action is required, whilst maintaining a longer-term perspective. The main challenge is to gradually change our current unsustainable consumption and production patterns and the non-integrated approach to policy making[81].

4.0 Review of policy changes likely to make trajectory more sustainable

The challenge facing tourism organisation is to have appropriate policies and funding in place to facilitate the development of a sustainable and spatially balanced tourism industry. There are two prime motives for regarding tourism from the perspective of sustainable development. In the first place, transportation to and from tourist destinations causes environmental pollution, and, in the case of holiday venues, which are inundated with tourists in the peak season, the local area suffers a disproportionate degree of environmental pressure. Secondly, the natural environment is the prime attraction for the tourist sector. Purely from considerations of self-interest and continuity, therefore, the tourist industry would be well advised to make its business activities more sustainable. Future generations will then be able to enjoy the same location(s)[82].

The fact that the tourist sector is predominantly demand-driven is important in terms of the right choice of policy instruments, and in making choices in the research into tourist movements and how these change from year to year, sometimes radically. In this respect, the tourist sector is different from some other sectors of economic activity, which are mainly supply-driven, such as, for example, the sector in which software is developed[83].

A clause on tourism has recently been included in the treaty on the establishment of a European Constitution and the fact that tourism is numbered among these issues is an indication of the growing status of tourism as a theme for future policy. Tourism is in many aspects unsustainable; both as a result of tourist trips and the use of the tourist destination, damage is incurred to the environment, to nature, to the cultural heritage and to the local social structure. Addressing the problems – promoting the sustainable development of tourism – by no means appears to be easy but arising from the review of policy and collaborating suggestions from such documents, recommendations are made to make the trajectory more sustainable:

81 Review of the EU Sustainable Development Strategy (June 2006) Council of the EU, page 2

82 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 7

83 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 31

- The Irish People and the Government have gained substantial benefits from tourism in recent years and the industry has the potential to do even better. But high levels of investment are needed if the tourism sector is to develop its full potential to contribute to the Irish economy. This is the principal conclusion of a submission from the Irish Tourist Industry Confederation (ITIC) to the Department of Finance in advance of the preparation of the National Development Plan 2007-2013. The submission argues that a further €1billion investment in tourism, over the life of the NDP, is essential for its further development and that such investment is likely to earn a substantial return for the economy[84]. Such investment is necessary in order to ensure the sustainable development of tourism in Ireland and ITIC outlines how investment in tourism should be allocated within the NDP over the course of the Plan: International Marketing, Product Development, Human Resource Development, National Conference Centre and a Regional Conference Centre.

- Tourism not only suffers from a lack of policy, which is surprising given the enormous economic and social significance of the industry, the sector is also decidedly under-researched. In order to prevent developments becoming irreversible, it is important to know where the limit is and how this can be safeguarded. Setting limits to the capacity of the natural and built-up environment, whereby investments in the tourist infrastructure do not cause more pressure than the environment can support, is a question which research has to answer[85].

- The different problem perceptions of the various players make it difficult to determine unanimously agreed limits to the social, economic and ecological capacity and to decide who should set such limits. Further analysis is required here. Specific instruments will have to be developed in order to objectively determine the capacity of an area. Each destination is unique and has its own limits. For example, there are those cultures, which are vulnerable, and others that have enormous resilience[86].

- One fears that when we say sustainable development in Ireland we really mean development, which keeps on going. A quarter of a century ago the nation was told, "we are living way beyond our means". What was true fiscally in 1980 is equally true environmentally in 2006. Then our unsustainable borrowings were from the financial reserves of international banks. Now they are from the ecological reserves of future generations[87].

- Ultimately, a destination is not static, but dynamic. It is not sufficient to look at the current limits; one has to also consider the future situation. Scenario development can play a significant role here[88].

- Because governments are reticent to take action, and social organisations struggle with the question whether tourism is a relevant issue, it is a conceivable option that a voluntary break in the trend by

84 ITIC Submission to NDP 2007-20013 (March 2006) Summary, page 2

85 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 51

86 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 52

87 'Environment is the weak link in social partnership deal', Oisin Coghlan, Irish Times, 6th July 2006

88 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 52

market parties has to be initiated: either from the demand or the supply side. As has been shown in other economic sectors, the tourist industry is willing to make its contribution, but is waiting to see whether the consumer is sensitive to initiatives, which can lead tourism in the direction of sustainability. Given the assumption that the emphasis in the tourist sector lies on the demand side of the market, the crucial question is whether the consumer is interested in the sustainable development of tourism and is prepared to adapt his choices accordingly. Researchers maintain that this is the case, but this assumption has to be thoroughly tested through research[89].

- RMNO (the Advisory Council for Research on Spatial Planning, Nature and the Environment, Netherlands) identifies a number of keys to achieving a sustainable, environmentally efficient economy, namely[90]:

  - Environmentally friendly products and services which meet the diverse requirements of consumers, whereby the environment is an accepted quality aspect;
  - Sustainable entrepreneurship in all sectors;
  - Environmentally efficient technology in products and production processes, in the mobility and energy sector, and knowledge as a production factor;
  - Efficient use of space, spatial quality and investments in the infrastructure (in a broad sense) for sustainable economic development.

- Research suggests that more visitors could be attracted to Ireland by the high quality and uniqueness of the natural product. The Implementation Group notes the recent establishment by Fáilte Ireland of an Environmental Unit and urges that it be adequately resourced to ensure that it can both deliver the fundamental supports required by the industry and also set the best standards to ensure the sustainability of the tourism product[91]. Action has already been taken in this regard, by the Unit via the initiation of a tender process to engage consultants to research environmental best practice and policy. The results of this research will identify industry benchmarks and policy recommendations for the future.

- Although transport is sometimes the "forgotten link" in the tourism product offering, access transport is essential and this needs to be enforced through the support and development of transport infrastructure as an integral part of the tourism industry. Transport pollutes, and more transport pollutes more. There will only be a favourable improvement in this if transport is curbed on a large scale, or more sustainable means of transport are developed. More sustainable methods of transport include the bicycle, the sailing boat and the hot air balloon. There are no indications that these means of transport will gain in importance. It is also not yet clear when and to what degree the car, train and aircraft will become 'cleaner'[92].

89 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 56

90 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 15

91 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 28

92 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 26

- Attracting domestic tourism may be a more sustainable strategy environmentally as it reduces the level of transport usage because as mentioned earlier, aviation is how the majority of overseas visitors arrive in Ireland and this has deleterious environmental impacts.

- When planning for the future sustainable development of Irish tourism attention must be paid to the issue of clustering. The importance of this concept was recognised in the NDP and TDS 2000-2006, but this idea of firms working together and creating an environment which is innovative, supportive of the development of new firms and proactive in the search for new customers must continue to be harnessed not only as an aspiration but also in terms of practical policy development and implementation. Such policy must not only support clusters that have been identified, in both products and regions, but also attempt to develop policies appropriate to encourage the development of new clusters especially in the less developed tourism regions and among products at early stages of the life-cycle.

- The trends in regional tourism performance reflect, to a considerable extent, the increasing dominance of air as the preferred means of transport of visitors to and from Ireland – now accounting for some 80% of the total – and the concentration of air services between Ireland and Britain and Mainland Europe at Dublin Airport[93]. Clearly, the development of air services between the regional airports in Ireland, to and from Britain and Europe, would make a major contribution to addressing the variation in regional tourism performance, which in turn will address the issue of sustainability.

- According to RMNO, there is a need to change the way tourists think in order for the development of tourism to be sustainable. Although it is the special forest or the historic castle, which attracts the tourist to a particular area, the tourist himself makes the forest a bit less special and the castle a bit less attractive. The prime attractions – nature, environment and cultural heritage – suffer damage from tourism above a certain frequency and a certain volume. At the same time, it is possible that the supplier of the attraction may pay more attention to maintaining or even improving its quality in order not to devalue its attractiveness. The suppliers will be encouraged to do this if the tourist himself develops preferences whereby he only considers those objects attractive, which encompass the greatest possible concern for maintenance or improvement. If enough tourists visit the historic castle, the local authority, possibly encouraged by the hotel and restaurant businesses in the area, will then ensure the castle is well maintained. There are no indications that this as yet applies to any sizeable percentage of tourists[94].

- From the point of view of sustainability, it is important that the use of second homes and business travel fall within the definition of tourism[95]. When people are on their way to their second homes, in Ireland or abroad, this usually also involves at least one night's accommodation. Also, the second house does not belong to the normal place of residence, so when the person is staying in the second house, this is also tourism.

93 Final Progress Report of Tourism Action Plan Implementation Group (March 2006) page 27

94 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 26

95 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 21

- There needs to be an element of spatial planning and development control to ensure that policy options tie in the work of the Heritage Council on Landscape Character Assessment and Fáilte Ireland's work on mapping of scenic landscapes to provide for the protection and sustainability of these scenic areas that are vital for tourism.

- There is a need for rigorous strategic environmental and sustainability impact assessment. This may be a role that the Environmental Unit of Fáilte Ireland can oversee as a policy measure to address the environmental impact of tourism.

- According to Keep Ireland Open (KIO), the voluntary organisation campaigning for the right of recreational users to reasonable access to the Irish countryside, firstly there must be a distinction made between freedom to roam and rights of way[96]. For low value or rough grazing country freedom to roam allows recreational users to wander at will, except near houses, over growing crops etc. It is the norm all over Scotland and the Scandinavian countries and in parts of England and Wales. Ireland has no areas covered by freedom to roam except in the National Parks. In heavily cultivated areas rights of way are the norm. These are linear paths or tracks from which the walker should not deviate. They are normally marked on the maps and signposted. There are very few stretches in Ireland but 225,000 km in England and Wales and about 200,000 km in France. KIO are looking for a legal right to allow freedom to roam in mainly remote rough grazing land, that is about 7 per cent of the total land area in the State. KIO are also campaigning for severe restrictions on intrusive barbed wire fencing in those areas. Areas covered by freedom to roam should be marked on the maps and indicated on the ground. It would never be allowed in close proximity to dwellings or across growing crops, or in areas of persistent vandalism. For other areas, mainly lowlands, KIO propose rights of way both to get to areas covered by freedom to roam and to form looped walks or walks to areas of interest, such as amenity areas or archaeological sites. Landowners can benefit directly from rights of way. Instead of walkers wandering blindly through farmed areas at random they could be channelled into rights of way and so avoid unnecessary disturbance.

- While the larger portion of greenhouse gas emissions is emitted by transportation, the accommodation/catering sector is also a large contributor. Examples of energy efficiency campaigns are run in Great Britain (Hospitable Climates) and also in Germany. In these schemes, by means of an internet-based interactive programme participating hotel owners are guided towards energy savings on their premises simply by implementing technical and organisational improvements in different sections. The schemes monitor the performance of the participant in terms of energy consumption and monetary savings and calculate CO_2 emission reduction. Such schemes are a step in the right direction to ensure the environmental sustainability of the tourism industry and Ireland is doing its bit through the Irish Hospitality Institute 'Greening Irish Hotels Programme'. The main objective of the Programme is to encourage hotels throughout Ireland to strive towards a higher standard of environmental performance by adapting processes and services in order to minimise negative impacts on the environment, whilst maintaining quality, productivity and competitiveness. However, there are

96 Information sourced from www.keepirelandopen.org

presently only 57 hotels in the programme, which represents approximately 10% of the Irish Hotel bed stock. It is important that all businesses in the accommodation/catering sector are involved in such schemes to ensure the environmental sustainability of the Irish tourism industry.

- The provision of environmental training for professionals in the sphere of management and business studies in the Irish tourism industry is a recommended approach. The importance of such training to Irish tourism professionals is necessary to harmonise tourism development with environmental protection and conservation.

- Increased awareness and education together with activity management, such as the provision of pathways in Killaun Bog Reserve, Co. Offaly, are necessary to protect sensitive areas.

- Continued economic prosperity in the tourism industry very much depends on a litter-free environment. It is vital that local government maintains the quality aspects of Ireland's ecology and environment, particularly through the enforcement of litter controls. Campaigns such as the Tidy Towns competition, the National Spring Clean and the IBAL Anti-Litter League run by An Taisce aim at actively eliminating litter pollution in Ireland. The Tidy Towns competition encourages local communities to improve the appearance of participating Irish towns and villages, and results in a knock-on-benefit of increased tourism. Despite these initiatives, Ireland remains a littered area[97].

- As the development Authority dedicated to the needs of tourism in Ireland, Fáilte Ireland need to place a continued emphasis on environmental issues as they relate specifically to tourism. This emphasis is manifest through the execution of responsibilities as a prescribed body, particularly in the planning process. This is necessary to ensure the protection of scenic landscapes and historic properties, mentioned earlier.

- Planning policy must be sensitive to the conservation of the rural environment, including preservation of natural beauty spots and natural habitats. Tourism and visitor-related development must be planned for in order to maintain and enhance an area. The EU Directive on the assessment of the effects of certain public and private projects on the environment stipulates that an environmental impact assessment is mandatory before certain tourism and leisure establishments can be built[98].

97 'Ireland's Environment', Environmental Protection Agency (2004) page 205

98 Schmidt, H. -W. (2002) Tourism and the environment. In: Statistics in Focus. Theme 4-40/2002. Eurostat, Luxembourg

- The term sustainable development is still perceived as a concept, which is totally pro-environment, and sometimes it is criticised as stifling development opportunities. Sustainable development, as the term implies, encourages development but applying certain principles, which relate to social and environmental resource preservation and management. Therefore, as a form of economic development the principles of sustainable development should seek to offer long-term employment opportunities. Traditional forms of tourism development, particularly those based on mass tourism, have often resulted in job losses. Such situations are experienced during the low seasons when the inflow of tourists is not that high, and therefore, some jobs have to be lost. Sustainable development should seek to offer permanent employment opportunities, even though the seasonal nature of tourism places some constraints on attaining this goal[99].

- In addition to the new funding for the "super regions" (Ireland South, Ireland East and Ireland West), a €1 million local area marketing fund has also been established. This is to encourage the tourism industry to develop attractive promotional packages aimed at boosting revenue in rural areas. There is also a €1 million innovation fund to support new developments and stimulate investment[100] and it is essential that sustainability is a key consideration when these funds are being distributed.

Conclusion to review of policy changes to make trajectory more sustainable

The sustainable development of tourism will not happen automatically. A persistent problem is that the chain of tourist activities operates across national borders and therefore has to take account of different legal regimes. This hampers consistency of policy and offers players countless escape routes for behaviour calculated to achieve its own goals and its own short-term advantages. The (international) tourist industry balances between more turnover and quality, whereby the balance is currently in favour of turnover. Although the tourist industry has as one of its prime objectives the sustainable development of tourism, the sector itself, in order to survive as a business in the short term, cannot be expected to set and enforce growth limits, even if this is in the interests of long term business policy[101].

Numerous national and sub-national organisations involved in tourism have endorsed the principles of sustainable tourism. The main challenge however, is to develop and promote a product that is environmentally sustainable within the context of a rapidly expanding sector and that is appropriate to the resources in the region. The translation of the principles of sustainable tourism into practical policies are, of course, much more challenging and difficult.

99 Sourced from http://www.coe.int/t/e/cultural_co-operation/environment/nature_and_biological_diversity/publications/SN116-E.pdf

100 'Regions receive €5m in new marketing push' Martin Wall Irish Times, 22/02/2006

101 Knowledge Agenda: Sustainable Development of Tourism, RMNO (January 2006) page 53

5.0 Summary

In Ireland, the traditional tourism is possibly gone for good. It can be argued that it is no longer valid to call Ireland a clean, green tourism destination, and its landscape, environment, natural habitats and biodiversity are not as clean as it is sold as being and in some cases may be getting worse. It can also be disputed the place is not tranquil, unless you are expert at knowing where to go. People are friendly, but there is valid concern that an element of the "Frosty Fáilte" creeping in. Ireland has a reputation for being expensive. It has to compete with countries that are perceived to offer better value for money and have a more attractive climate. Ireland does not compete well against these measures. One suspects that even the Dublin success is based on a transitory image and needs to be replaced by something more sustainable and marketable. Marketing should indeed be better than it is, but it only goes so far. There can be new tourism in Ireland but it will be for new customers of new products. Therefore there is a need to cultivate such new products to ensure sustainable tourism development in Ireland.

It is generally agreed that tourism will continue to be a successful industry only if further growth is managed in a sustainable manner. The principles of sustainable tourism development are gradually finding an important role in the tourism policy formulation and there is the opportunity to integrate these principles, as new products are developed and new customers are targeted. There needs to be a greater commitment at the political levels and this should filter down to all levels, although at the local level there seems to be more commitment to sustainable tourism development. It is only in the long term that the success and effectiveness of sustainable tourism development can be measured and possibly achieve results. However, at the local and in some cases the regional levels various actions are being implemented and showing signs of success stories. Certainly, the consciousness towards sustainable tourism development has increased, however, there is still the threat of short-term interests in this sector, which may undermine any efforts to implement sustainable tourism development principles. The concepts of prevention should strongly apply.

Tourism is recognised at both national and EU levels as a key economic sector in need of more sustainable management. Targeted policy measures and funding to promote and develop sustainable tourism will continue to be essential, particularly where high growth targets for visitor numbers are set. At present, there are few attempts in the tourism industry that combine the three dimensions of sustainability in an integral way. The task is to re-integrate ecological claims with social and economic ones in a more inclusive, more reflexive perspective on development processes. If this is done correctly the sustainability of tourism can be delivered over the course of the NDP 2007-2013.

Please see below for examples of how the concept of sustainability has been integrated in to the Irish tourism product focussing specifically on the environmental aspects of the industry:

The Green Box[102]

The Green Box, which is Ireland's first area-based integrated ecotourism plan, was an initiative produced by the Western Development Tourism Programme (WDTP). It encompasses the area of Leitrim, West Cavan, Fermanagh, North Roscommon, North Sligo and South Donegal. The product offered is a holistic holiday experience; a combination of locally produced organic foods, quality local arts and crafts, low impact outdoor pursuits, a geo-park, holistic therapies and education features. The Green Box is an example of a local project that has taken the theory of sustainability and put it into practice to have minimal impact on the surrounding environment. It is a relatively new initiative and its success is still to be measured, but it possibly offers a model for further local initiatives if it is deemed to be successfully sustainable.

Greening Irish Hotels[103]

The Irish Hospitality Institute officially launched the Greening Irish Hotels Programme in April 2005 and is due to run until September 2006. This is the largest and most comprehensive review and research into the environmental practices of the Hotel Industry in Ireland. The main objective of the Greening Irish Hotels Programme is to encourage hotels throughout Ireland to strive towards a higher standard of environmental performance by adapting processes and services in order to minimise negative impacts on the environment, whilst maintaining quality, productivity and competitiveness. The Greening Irish Hotels Programme identifies Environmental Best Practice for the Hotel Industry concentrating on three key areas: Energy, Water and Waste Management and to develop a model for application for every hotel in Ireland. The Programme seeks to promote environmentally friendly activities through the application of increased resource productivity, waste reduction, reuse of materials, energy management and a change of eco-culture within the hotel industry. The results will develop Performance Standards and Best Practice for the Irish hotel industry and will aid in ensuring the sustainability of Irish tourism in the future.

Blue Flag Beaches[104]

In Ireland, in 2006 the jury awarded Blue Flags to 81 beaches and 3 marinas from a total of 88 beach and 4 marina applications. To gain a Blue Flag, beaches have to meet 29 criteria and marinas 22 criteria covering; water quality, beach/marina management, safety, services and facilities, environmental education and information. Each year, local authorities put forward beaches and marinas in their jurisdiction, for the award and must prove compliance with criteria. Private marina operators also put forward marinas as applicants. The Blue Flag for beaches is only valid during the official bathing season and for one season at a time and the season coincides with the official bathing season (June 1 to August 31). Only bathing areas designated as such by the Irish Government are eligible for the Blue Flag. Each summer in Ireland a team of assessors inspects all Blue Flag beaches and marinas to ensure compliance with criteria. If there is a breach of criteria local authorities are contacted and asked to act to ensure compliance. The increasing number of Irish beaches and marinas seeking and securing this award is a welcome step forward in ensuring the environmental sustainability of one of Irelands key tourism products.

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102 'The Green Box' Ireland's First Area-Based Integrated Ecotourism Plan (Western Development Tourism Programme), Executive Summary, page1

103 Sourced from http://www.greeningirishhotels.ie

104 Sourced from http://www.antaisce.org/projects/blueflag.html

Shannon Estuary – Bottlenose Dolphins[105]

The Shannon Estuary is one of the most important sites in Europe for bottlenose dolphins. In 1999, the Irish Marine Institute supported the development of sensitive special-interest marine tourism on the West Clare Peninsula with a new niche eco-tourism market of dolphin watching. In response to the recognised potential of whale watching to the Shannon region the Shannon Dolphin and Wildlife Foundation (SDWF) was formed in March 2000 to formulate and implement a plan for the development of sustainable whale watching. The SDWF is committed to developing sustainable tourism, which ultimately benefits the dolphins and their habitat, as well as bringing economic benefit to the region.

A critical element in creating the framework for sustainable development was the designation of the Shannon estuary as a Marine Protected Area for bottlenose dolphins. The site and species involved fulfilled the appropriate criteria for nomination as a Special Area of Conservation (SAC) under the EU Habitats Directive (1992) and thus inclusion in the Natura 2000 network as bottlenose dolphins are listed under Annex II – species whose conservation requires the designation of SACs. All boat operators offering dolphin-watching tours subscribe to a monitored accreditation scheme and abide by a strict code of conduct so as not to disturb the dolphins or degrade their habitat. This project represents a valuable reference tool for further development of marine tourism, particularly in relation to the partnership approach generated between local tourism enterprises and key development agencies.

Rural Environment Protection Scheme[106]

In response to European regulation, the Irish Government introduced the Rural Environment Protection Scheme (generally known as REPS) in June 1994. It is a Scheme designed to reward farmers for carrying our their farming activities in an environmentally friendly manner and to bring about environmental improvement on existing farms. The regulation provides for programmes to compensate participating farmers in recognition of the private cost of environmentally benign practices.

The objectives of the Scheme are to:

- Establish farming practices and production methods which reflect the increasing concern for conservation, landscape protection and wider environmental problems;
- Protect wildlife habitats and endangered species of flora and fauna;
- Produce quality food in an extensive and environmentally friendly manner.

The overall design and objectives of the scheme lend themselves to environmentally sustainable development and the product at hand is fundamentally associated with tourism.

105 Sourced from 'Ireland's Environment', Environmental Protection Agency (2004) page 204; and Berrow, S.D. 'Developing sustainable whale watching in the Shannon estuary', (March 2003) International Whale watching Conference, Tenerife, Canary Islands, 14-15th March, 2003 (available at http://www.shannondolphins.ie/downloads/Berrow_TenerifeShannon2003.pdf)

106 'An Analysis of the Rural Environmental Protection Scheme', Stephen Hynes & Eithne Murray, (April 2002) Department of Economics, NUIG; and http://www.agriculture.gov.ie

Economic, social and environmental performance of Irish households and communities, and how to influence it

Comhar Briefing Paper[1]

Prepared by Dr Peter Doran
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> *"The ancient rhythms of the earth have insinuated themselves into the rhythms of the human heart. The earth is not outside us; it is within: the clay from where the tree of the body grows. When we emerge from our offices, rooms and houses, we enter our natural element. We are children of the earth: people to whom the outdoors is home."* (John O'Donohue, 2004)

> *"In the same way as the Muslim world orientates itself towards Mecca, the entire fabric of Irish society faces the totem of the sun-god property and its various minor deities, kitchens, bathrooms, hardwood flooring, expansive utility rooms, maple decking or walk-in dressing rooms. Nothing defines you more than your house."* (David McWilliams, 2005)

1 This briefing paper has been prepared to inform the proceedings of the Comhar Conference "Towards Sustainability in the National Development Plan 2007-2013" – 4th to 6th October 2006. Opinions expressed are not necessarily those of Comhar but are intended to encourage debate and greater understanding of sustainability issues.

1. Introduction

This briefing pa*per se*ts out the major trends and issues influencing the sustainability of household consumption and communities in Ireland. It concludes with a series of recommendations on possible approaches to investment and policy decisions on infrastructure and services in the forthcoming National Development Plan, with a view to supporting and enabling **sustainable household consumption** and enhancing the **sustainability of communities**. There is a particular focus on energy, food, mobility and travel.

The discussion is framed within the academic and policy literature on sustainable consumption in households. This approach facilitates a comparative approach, embeds local issues and challenges within an increasingly well-defined set of categories, and brings some clarity to policy recommendations. However, **the time-frame for the new National Development Plan will coincide with an intensification of debates of particular strategic importance for Ireland, including those on 'energy security', the prospect of 'peak oil', and national responses to climate change**. The discussion note will therefore stress the critical cross-cutting theme of energy in its treatment of infrastructure and services investment in support of sustainable consumption. It is no exaggeration to suggest that, **in the context of Ireland's oil and energy demand profile, sustainable consumption sits within a crucible of critical choices about the future of national development, energy security and the strategic future and competitiveness of the Irish economy**. In a world of globalisation and intimate distance, the geopolitics of energy[2] are coming home to communities throughout the country.

These choices will also define citizenship in the 21st century. The Taoiseach's Task Force on Active Citizenship could make a considerable contribution to the demand-side debates on responsible consumption.

Households and communities can play a proactive role in embracing sustainable consumption – given an appropriate voice and support in strategic decision-making. New bodies such as the National Consumer Agency could be given a statutory role in advancing sustainable consumption and sustainable household consumption. The restoration of a fair balance of power and interest, between consumers and producer interests, is an agenda shared by advocates of sustainable consumption and champions of consumer rights.

2 The European Commission Green Paper on security of energy supply (November 2000) drew a sobering picture of the EU's energy situation. If no action is taken, it predicted, the EU's energy dependency will climb from 50% in 2000 to 70% in 2030. The particular situation for the main imported fossil fuels was described as follows:
Oil:
- 45% of EU oil imports originate from the Middle East;
- by 2030, 90% of EU oil consumption will have to be covered by imports.

Gas:
- 40% of EU gas imports originate from Russia (30% Algeria, 25% Norway);
- By 2030, over 60% of EU gas imports are expected to come from Russia with overall dependency expected to reach 80%.

Coal:
- By 2030, 66% of EU needs is expected to be covered by imports.

A recent report[3] on sustainable consumption in the UK found that consumers are ready and willing to act on climate change and the environment, but sometimes can't see the point, because they feel their efforts would be isolated and in vain. If sound economic, social and environmental decisions at the level of the household and the local community are to be encouraged, they must be matched by macro-economic commitments, including intelligent investment decisions that deliver the infrastructure and services to match. **One of the keys to greater responsiveness to consumer demand is provision for consumer advocacy** and input to strategic investment and infrastructural decision-making. It is appropriate, therefore, to consider the prospect of incorporating sustainable consumption (and production) into current discussions on the development of consumer advocacy platforms in Ireland.

An important debate that is taking hold, and must come to inform policy and investment decisions, including those on the design of the new National Development Plan, is the challenge to the entrenched notion that increased consumption is automatically linked to enhanced well-being. Increasingly, there will be an expectation that Government supports individual and household decisions to **re-articulate the link between consumption and quality of life** (e.g. use of the private motor car versus less commuting distance/time).

Opportunities for decoupling economic activity from energy intensity are available, for example, within the context of transport provision in Dublin. Contrary to the mythology that the city's traffic chaos is the inevitable result of the Celtic Tiger and rising levels of affluence, recent research in forty cities has shown a slightly negative relationship between wealth and the use of private cars to travel to work (Wickham 2006).

At the heart of an intelligent debate on sustainable development (including sustainable consumption and production), are significant opportunities in areas such as public transport (social inclusion), new energy solutions (fuel poverty, energy security), and waste management (eco-efficiency) to harness environmental 'problem-solving' to the State's responsibilities in areas such as economic development, energy security and social inclusion while maintaining economic competitiveness. **The debate on linkages between sustainable development and competitiveness is, nevertheless, complex and all too vulnerable to rhetorical re-statements of entrenched, habitual and unreflective positions – environmental, social and economic**. Even at the EU level the quality of this debate has come in for harsh criticism[4] due to ambiguous attempts to clarify the relationship between the EU's "Lisbon Agenda" on competitiveness and its Sustainable Development Strategy (2006).

1.1. Sustainable Consumption

Conventional economic and political understandings hold that consumption is one of the cornerstones of social welfare and important part of people's lives, serving not only as a means of meeting human needs but also serving as a measure of success and a way of defining identity. Modern patterns of consumption in the developed parts of the world are also increasingly recognised as a threat to sustainable development. The Swedish Environmental Protection Agency has articulated the challenge succinctly:

3 *If you will, I will*, report by the UK Sustainable Consumption Roundtable (2006).

4 See URL: http://www.euractiv.com/en/sustainability/european-leaders-renew-sustainable-development-commitments/article-156183

> *…developing socio-economic systems ensuring high quality of life and sustaining environmental impacts in line with nature's carrying capacity should be perceived as the contemporary societal goal. The ultimate question facing today's society in developed countries is whether consumerism actually contributes to human welfare and happiness….Strategies are missing that would conceive ways of shifting from a current culture of limitless consumerism to a society with less materialistic aspirations.* (EPA, Sweden, March 2005)

The Swedish EPA document calls for strategies that would target both the supply (production) and demand (consumption) sides through the propagation of eco-efficiency in production and by embedding a notion of 'sufficiency' in consumption. Confronting the energy challenge, the Swedish Government has recently embraced an ambitious plan to radically reduce its oil dependence by 2020.

1.2. Background

While concerns over environmental problems at the end of the last century have substantially risen among private consumers (Dunlap 1991), changes in pro-environmental behaviour have lagged behind. One of the main reasons is that consumers do not readily understand or observe the direct impacts of their purchasing choices (Mont 2001). Under conditions of globalisation, this problem has become all the more acute as we are more and more removed from the social and environmental consequences of our local actions and choices.

Moreover, **private consumers often have a rather constrained capacity to change their behaviour, which is strongly influenced by existing institutional settings and infrastructures and by other societal factors** e.g. the relative freedom afforded to the media and advertising industries to promote unsustainable consumption. Private consumers act within social, technological and market boundaries, as well as the boundaries of their own knowledge and cultures.

Jackson (2003) has noted that the current institutional consensus has tended to settle for a position, which implies consuming differently rather than consuming less, and in which this is to be achieved primarily by the production and sale of more sustainable products. He sees a risk in this approach, insofar as it appears to collapse the distinction between sustainable consumption and production. It also fails to address important questions about the scale of consumption, the nature of consumer behaviour and the relevance of lifestyle change.

Arguably, the emphasis on sustainable production (e.g. eco-efficiency) has been driven by the institutionalisation of "ecological modernisation"[5], which, historically, has had less to say about consumption and consumerism than on production, with the exception of Spaargaren's (2006) work. Jackson (2003) attributes the institutional reticence or reluctance to tackle consumption to three concerns. In the first place, addressing them properly would involve questioning fundamental

5 Ecological Modernisation has become a dominant social science and policy framework for industrial society's transition to sustainable production, incorporating concepts such as 'polluter pays', 'green technology' and 'ecological rationality'.

assumptions about the way modern society functions. In the second place, any attempt to address consumption quickly becomes reflexive and challenges us at the level of personal change. Finally, questioning consumption appears to threaten a wide variety of vested interests.

The relationship between consumption and well-being is highly contested. Consumption is often presented, in conventional economic discourse, as a straightforward attempt to provide for individual and collective well-being. A contrasting view, drawing from theories of human needs, holds that human desires are far from insatiable but that true needs are finite, few and universal. Human needs theorists have developed the notion of 'false satisfiers', raising the question of whether some material commodities are true or false satisfiers of social and psychological needs (See Annex l).

Table 1: Some Definitions of Sustainable Consumption

The use of goods and services that respond to basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the lifecycle, so as not to jeopardize the needs of future generations. (Ofstad, 1994)
The special focus of sustainable consumption is on the economic activity of choosing, using, and disposing of goods and services and how this can be changed to bring social and environmental benefit. (IIED 1999)
Sustainable consumption means we have to use resources to meet our basic needs and not use resources in excess of what we need. (Participant definition, Kabelvåg, IIED 1998).
Sustainable consumption is not about consuming less, it is about consuming differently, consuming efficiently and having an improved quality of life. (UNEP 2001)

In his principal conclusions on mechanisms through which consumption patterns can change, Jackson (2003) highlights some of the important characteristics of "post-traditional" society including the accelerated questioning of values and culture, led by networks of groups and organisations exploring alternative lifestyle options. Clearly, projects such as the planned eco-village in Clough Jordan, and the Global Action Plan (GAP) programme, among others, suggest that such developments are also taking place in Ireland and – as in the UK – these can offer a model for change, demonstrating sustainable lifestyles. Projects such as these need government policies designed to establish a more supportive context. Moreover, in this "post-traditional" transition, the role of government is also shifting from one of control to a "change management" approach, which encourages learning. Successful leadership in the learning process requires government to be willing to listen to others, and to question its own assumptions and practices. Jackson concludes that an effective government strategy for sustainable consumption will need to be developed on a collaborative basis with stakeholders.

Table 2: Possible components of a sustainable consumption strategy

(Jackson 2003:62)
1. Alignment of strategic vision, rhetoric and practice
2. Shaping the cultural context of consumption
3. Supporting non-governmental initiatives and innovation
4. Establishing programmes and networks to nurture successful initiatives and encourage their replication
5. Monitoring and learning from outcomes

1.3. Between Efficiency and Sufficiency

Sustainable consumption – including household consumption – has been the "Cinderella issue" since 1992. When government delegations packed their bags in Rio de Janeiro on the final day of the 'Earth Summit' (UNCED), the sustainable consumption agenda was – for all intents and purposes – left behind. Civil society organisations continued to lobby at local, national and international fora to reinstate 'consumption' as an issue alongside sustainable production i.e. the supply side of the equation, which is more amenable to 'ecological modernisation' and 'eco-efficiency' drives. Sustainable production discourses are more easily embraced by governments, business and international organisations such as the OECD, because the call to 'consume differently' is less of a threat to traditional notions of economic growth. Indeed, ecological modernisation advocates will argue that greening the economy opens up a new world of innovation and investment opportunities for business. This is a legitimate but incomplete rendering of the challenge facing our economies.

Sustainable consumption lies at the provocative end of the sustainable development debate, insofar as it forces a return to some of the formative questions that drove Governments to convene the World Commission on Environment and Development (1987) and the UN Conference on Environment and Development (1992) in the first place. To paraphrase Thomas Princen (2002), sustainable consumption invites us to go back to the origins of the neoclassical economic model and ask what model would have been most useful given the inability to find a technical substitute for everything from petroleum to the ozone layer. The consumption question not only allows for consideration of "full world", ecologically constrained conditions, but places ecosystem functioning upfront and central. It does so by generating questions that ask – What is consumed? What is put at risk? What is lost?

The sustainable household consumption debate exposes what Sachs (1999) has described as the 'blind spot of efficiency', upon which many appeals to sustainable production and eco-efficiency[6] rest. Sachs (1999:183) has argued that eco-efficiency advocates tend to exaggerate the extent to which numerous cases of less resource use on the micro level can translate into less resource use on the macro level – if the economy is ruled by a dynamics of expansion. He cites three economic effects – rebound, volume and growth – which appear to counteract the specific reductions achieved on the level of products or companies once eco-efficiencies are introduced:

6 Eco-efficiency refers to the environmental and energy efficiency gains from reducing inputs (e.g. energy) while increasing outputs (e.g. industrial products).

a. **Rebound effects** are those that arise directly from efficiency gains and stimulate new expansion. For example, as we have experienced in Ireland, more fuel- and cost-efficient heating systems may induce people to utilise more heat, not less, if it can be had at the same price. This has been the story of economic development for decades. Efficiency has been the driver of new rounds of economic expansion.

b. **Volume effects** arise from expanding demand for an eco-efficient product. All rebound effects are also volume effects. Demand may grow independently of higher per unit efficiency: when more is asked of less, the net saving effect may be reduced or cancelled out entirely. Cars, for example, are more fuel efficient today but the increase in the numbers of vehicles (and increases in their size and power) together with increases in mileage travelled swallow up the gains from eco-efficient adjustments to the technology.

c. **Growth effects** arise from the expansive tendencies of the economy as a whole. Dwellings might be better insulated and refrigerators might use less electricity, but energy consumption rises with market penetration anyway because of the 'stand by' functions of devices such as television sets, video recorders, cordless telephones and hand-held vacuum cleaners. Sachs (1999) believes that globalisation also exhibits conflicting tendencies of a similar kind. On the one hand, free trade stimulates the diffusion of more efficient technologies; on the other hand free trade is meant to boost economic growth worldwide, thus boosting global resource use – both private and public – in any case.

For Sachs (1999) and Princen (2002, 2006) and others, the efficiency perspective that dominates discussion on the 'sustainable production' side of the equation must be accompanied by a *sufficiency* debate on the consumption side. The transition towards sustainability can only be achieved through a twin-track approach, which brings about an intelligent reinvention of the means as well as a prudent moderation of ends. The question of 'ends' and 'What the economy is for?' takes us into new territory in the debate. Is it possible, for example, to imagine flourishing communities where an appreciation of limits and self-restraint has been deeply embedded or re-covered in our culture and society?

1.4. Sustainable Consumption and the Household – An Introduction

Sustainable household consumption is now on the European and national agendas, following agreement at a meeting of the European Council (March 2003) on a "timely elaboration at both international and EU level of a 10-year framework of programmes on sustainable consumption and production".

Household consumption is the consumption of goods and services by households. It includes the selection, purchase, use, maintenance, repair and disposal of any product or service.

Household consumption across Europe is a major cause of increased environmental pressures, including climate change, air pollution, water pollution, land use and waste. The negative impacts do not stop at our national borders. Goods and services consumed in Europe, together with travel and tourism pressures, also impact on other regions of the world as a result of resource extraction, production, processing and transportation.

The National Economic and Social Council (NESC) has observed that the contribution of Ireland's household sector to Ireland's environmental problems reflects patterns of development, consumption and commuting. The Council adds:

> *To some degree, this is an inevitable result of strong growth of population, employment and incomes. This expansion of the household sector has created heavy demand for land, energy and water. Household waste is also on the increase, with every household of three persons in Ireland producing, on average, one tonne of waste per annum.* (NESC 2005:62)

The Environmental Protection Agency believes that the challenge is to ensure that future development of the household sector happens in a manner consistent with the principles of balanced and sustainable development, prioritising a break in the link between economic growth and environmental degradation. The Agency has urged Government to continue to play an active role in directing household action by reinforcing existing policies and implementing additional ones, ensuring the provision of infrastructure, applying fiscal instruments where necessary, and promoting education and awareness.

1.5. Globalisation

The phenomenon of globalisation influences sustainable household consumption in a number of ways, some positive and some negative. For example, food consumption is influenced by global trade, shifts in political power between the State and multinational corporations, capital concentration, the acceleration of technological innovation, and the diffusion of information and values (Fuchs and Lorek 2000).

The internationalisation of consumer tastes is an obvious example of the direct influence of globalisation on sustainable consumption behaviour in households. Another direct influence of globalisation on household consumption decisions results from the impact of capital concentration, or the dominance of multinational corporations in marketing and advertising.

From another perspective, Princen (2006) notes the increasing ease with which actors can export the risks associated with some forms of production and consumption:

> *Globalisation, privatisation, and diminishing state capacity conspire with technological innovation and market manipulation to skew the benefits and costs of economic activity to create the illusions of environmental progress (e.g. local pockets of pristine and healthy environments, especially among those who can buy their way out of degraded environments), while vast areas around the world are degraded and huge waste sinks such as the oceans and atmosphere are filled.* (Princen 2006:44)

The impacts of European household consumption, for example, are worked out in other regions of the world as a result of resource extraction, production, processing and transportation. Studies by the European Environmental Agency have shown that Europeans increasingly use resources extracted from abroad for consumption within Europe. Resource extraction within Europe has decreased, while imports of resources, especially fossil fuels and metals, have increased.

1.6. Sustainable Communities

The experience of community can influence patterns of consumption in a number of ways. At the most basic level, there is a recognition that a protected environment is a significant contributor to our quality of social and individual life. The natural and man-made environments, including the state of local neighbourhoods, impact hugely on the quality of family and community life.

The National Economic and Social Council (December 2005:174) has described its vision of a sustainable neighbourhood:

> *With increasing population and increasing housing demands, a neighbourhood which is sustainable, in both social and environmental terms, must embrace significantly higher densities, have a consolidated footprint rather than being allowed to develop as urban sprawl and with rapid communication links between settlements.*

The Council's vision calls for compact, centred, diverse and walkable neighbourhoods that have sufficient populations to support the development of high quality services and have a diverse mix of housing suitable for all people at all stages of the family cycle. The Council draws attention to the risk, however, that new core principles in support of sustainable neighbourhoods i.e. sustainable urban densities, consolidated urban areas, compact urban satellites, and rapid communications – "may not be adequately reflected in actual developments." (NESC 2005:174)

Rural Housing – The Tragedy of the Irish Commons?

Dispersed rural housing is possibly one of the most contentious challenges to the sustainability of local communities and their environments. Isolated single dwellings – and their demands on infrastructure and services – can impact significantly on the national heritage in a number of ways:

- Landscape and seascapes (inc. geology);
- Biodiversity (incl. flora, fauna and wildlife habitats);
- Archaeological Heritage (incl. vernacular heritage); and
- Built Heritage (incl. architectural heritage, vernacular heritage, inland waterways, heritage parks and gardens). (Heritage Council 2005)

Modern housing in rural areas is – for the most part – unconnected to the agricultural economy, to which it was previously tied. Such housing today supports a wide variety of needs arising from a more diverse rural employment structure and comparatively high house prices in urban areas. Of course, the sale of rural sites and dwellings provides a vital supplement for farming families, many of whom have experienced a dramatic collapse in farm-related incomes. On the demand side, improved transport links in many areas and increasing opportunities for people to work from home using the internet, the possibility of living and working in the countryside is viewed as a real opportunity for growing numbers of people.

The dilemma around rural housing is an age-old one. In many ways, it reflects the problems addressed in the parable of 'the tragedy of the commons' described by Garrett Hardin (1968). If we consider the rural landscape a 'commons' to which all have access, then the tragedy arises because each individual involved in procuring a new detached dwelling in the countryside calculates that her positive benefit always exceeds her share of the collective negative fallout e.g. strains on infrastructure, impacts on biodiversity etc.

The Heritage Council (2005:9) has pointed out that planning authorities and the prescribed bodies, in their assessment of planning applications for single houses, require accurate and high quality data pertaining to the national heritage if they are to be expected to deliver decisions that guide new rural houses to locations where they will not result in significant negative impacts. Moreover, the accuracy by which impacts on the national heritage can be assessed is only as good as the baseline data available on each of the heritage topics. The Council has observed that the principal gaps in heritage data relate to landscape character and to biodiversity value outside of those areas which are designated as being of national (NHA) and European importance (SAC and SPA).

One of the ways to overcome this dilemma is to facilitate the identification of the common or collective interest and ensure that this is reflected, in a transparent and rigorous way, in local planning controls. Landscape Character Assessments (LCAs) are one of the tools that can facilitate this process.

Other community-based consensus and community engagement mechanisms available to local stakeholders, for example Community Development Boards, include:

- 21st Century Town Hall Meetings (Dialogues)
- Consensus Forums
- Citizens Juries
- Deliberative Surveys
- Multi Criteria Analysis Conferences
- Open space meetings

These innovative mechanisms are designed to assist communities address complex issues, and resolve potential conflicts between stakeholders. They could be used more widely to generate debate on innovative responses to pressures for the further development of dispersed housing in rural areas e.g. criteria to be included in local development plans. Donegal County Council, for example, has adopted a quota system to limit the number of dispersed dwellings in any of the County's townlands to 20 per cent.

Responses to dispersed rural housing

Other responses that might be considered by communities could include anything from a Rural Housing Sustainability Index to the incorporation of sustainable building specifications in local development plans.

Gray and Carton-Kenny (2004) have proposed that – in the absence of a realistic prospect of placing an absolute ban on dispersed rural housing – one potential solution to the dispersed rural housing outbreak might be to allow more sustainable and sensitive housing in areas where normal housing would be inappropriate. Such a policy could be facilitated using a sustainability index[7] to facilitate planners in their evaluation of planning applications for new housing in rural areas. In other words a flexible approach to housing would be linked to an overall improvement in housing quality, with a focus on sustainable building design and energy specifications.

Similar to the web-based Building Sustainability Index (BASIX) used in Australia, the model set out by Gray and Carton-Kenny (2004) for Ireland, has been designed for use before planning permission is sought. The objective would be to ensure applications of the highest standard by supplying optimum design and management guidance to ensure that applicants understand both the requirements and cost of constructing the most sustainable home for the site in question.

A Rural Housing Sustainability Index could be used in deciding whether to grant permission for a new home on a particular site, and also more effectively audit sites to ensure conditions are fair and effective. An Index could also encourage more responsible stewardship of the environment and help educate stakeholders about the importance of sustainability issues.

Fingal's leadership and the promotion of sustainable communities

In a landmark decision in 2005, Fingal County Council has already set the pace for the integration of sustainable building criteria into local area plans. Local Area Plans for Cappagh, North Ballymun and North Balgriggan include a range of sustainable building requirements, including a requirement that 30 per cent of the energy requirement be met from renewable sources.

Colley (2006) has noted that Fingal's forward thinking policy will impact on the design and construction of thousands of buildings in Fingal and will provide local authorities across the country with a template to bring in similar requirements into both County Development Plan and Local Area Plans, with "benefits too numerous to take in".

These benefits will be obvious to home owners and communities wherever they live. But, as Gray and Carton-Kenny (2004) propose – with their Sustainability Index – there are particularly forceful arguments for high specification sustainability design buildings in rural areas – where, for example, technologies to minimise impacts on the local environments, are particularly critical.

The leadership shown by Fingal councillors, with the support of local developers, has demonstrated the scope for imaginative use of the Planning and Development Act 2000, which obliges local authorities to have regard to sustainable development. The Act also provides local authorities with generous latitude when it comes to how they implement this obligation.

7 Gray and Carton-Kenny (2004) have developed a set of 70 indicators covering environmental specifications for the dwelling site (21 indicators), design (28), building construction (15), and social criteria (6).

Colley (2006: 23) adds:

> *Properties built under the sustainable building requirements in the three Local Area Plans are bound to prove an attractive investment in a rapidly changing property market, where poorly conceived and executed buildings are destined to become a liability, exposed to exponentially rising oil and gas prices, the imminent introduction of energy ratings for buildings and the ever approaching Kyoto CO_2 emissions reduction deadline.*

Community-based energy production

Support for decentralised renewable and low carbon energy production is one of the most far-reaching contributions that NDP investments in infrastructure design can make to the sustainability of local communities in the near term.

The arguments for a decentralised model[8] include:

- Bringing energy generation closer to the point of consumption, with active local management to improve inefficient and wasteful lower voltage distribution networks;
- The potential to engage communities, in a more immediate way, in addressing energy issues and climate change;
- Promoting local entrepreneurial activity in the energy sector;
- Enhanced community ownership of energy efficiency and conservation issues.

A decentralised approach could deliver multiple benefits in the context of sustainable development, including dividends in terms of national energy security, environmental benefits, economic activity, innovation, more consumer choice, and community empowerment in every sense.

The Natural Step for eco-municipalities

Describing the role of eco-municipalities and other regional initiatives in Sweden, Torbjörn Lahti (2005) has highlighted the importance of a strong environmental movement combined with initiatives taken at the municipal level as a source of change. Both are informed by an understanding of sustainable development derived from the *Natural Step* concept[9].

8 Technologies that lend themselves to a decentralised approach include gas-fired Combined Heat and Power (CHP); biomass CHP; hydrogen fuel-cell CHP; wind turbines, including micro-turbines; photovoltaics; small-scale hydro; and wave or tidal energy.

9 The 'Natural Step' concept defines four system conditions for the realisation of sustainable development: a. Concentration of substances extracted from the earth; b. Concentration of substances produced by society; c. Degradation by physical means; and d. people are not subject to conditions that systematically undermine their capacity to meet their needs.

The *Natural Step* defines four system conditions that must be fulfilled for sustainability:

i. **What We Take From the Earth:** Avoid "**systematically increasing concentrations of substances extracted from the earth's crust**." Simply, we need to use renewable energy and nontoxic, reusable materials to avoid the spread of hazardous mined metals and pollutants.

ii. **What We Make:** Nature must not "**be subject to systematically increasing concentrations of substances produced by society**." Simply, we need to use safe, biodegradable substances that do not cause the spread of toxins in the environment.

iii. **What We Do to the Earth: Biodiversity and Ecosystems** – Nature must not "**be subject to degradation by physical means**." Simply, we need to protect our soils, water and air, or we won't be able to eat, drink or breathe.

iv. **Meeting Basic Human Needs** – "**Human needs are met worldwide**." Simply, we can use less stuff and save money while meeting the needs of every human on this planet.

One quarter of all Swedish municipalities are eco-municipalities. In each, local leaders from business, other organisations and the non-profit sector cooperate in the implementation of the Natural Step concept. The pioneer was a small municipality called Övertorneå in the far north of Sweden, once an area of high unemployment and outward migration where people decided to take responsibility for their own community development and helped create hundreds of new activities and jobs.

Power Down in Kinsale and Tipperary

Working closely with a local Further Education College, Kinsale has begun to map out a pathway to a lower energy future, as set out in their report, 'Kinsale 2021 – Towards a Prosperous and Sustainable Future Together'.

Using 'Open Space' methodology[10] the townspeople and students have developed a vision, with bold, achievable annual steps, to reduce the town's energy requirements by a quarter by 2021. The report, containing information that will support the community's implementation, has received support from Kinsale Town Council and Kinsale Environment Watch.

Davie Philip, one of the founders of the Sustainable Ireland Co-operative and the Cultivate Centre in Dublin, believes that communities can meet 'peak oil' and climate change in ways that will enhance cooperation and local economies. He has written:

10 Open space sessions are facilitated meetings, designed to enable people to address complex issues and reconcile the interests of individuals with those of the community or an organisation. There is an open-ended approach to agenda setting and the identification and approach to problems.

> *During the coming energy 'power down', true individual and family security will come only with community solidarity. Neighbourhood scale and sustainable communities could act as models for peak oil-forced decentralisation and the regeneration of villages and towns in the approaching post-cheap oil world.* (Cultivate 2005:12-13)

Philip is a member of Ireland's leading experiment in developing a low carbon community, 'The Village'. Located on a 67-acre farm adjoining the small town of Cloughjordan in North Tipperary, 'The Village' comprises 132 fully serviced sites where members are planning to build homes designed to high ecological specifications. With natural waste disposal and district heating systems, shared community facilities, woodlands and an organic farm on site, the development will form part of an ambitious local redevelopment based on sustainable development in action.

A unique feature of 'The Village' is the strong link that has been established with the existing town of Cloughjordan via a new street featuring apartments and shops, leading into a small landscaped market square. The project is aiming to support local business, develop community-controlled power systems, and encourage local public involvement in decisions on public transport, energy and food provision. In all of this, the project is developing a template that will almost certainly be adopted in other parts of the country where there is a desire to combine local regeneration with the principles of sustainability.

Sustainable community and the 'economy of regard'

In a paper that brings together our interests in community and sustainable consumption, Stagl and O'Hara (1999) have pointed to the importance of opportunities for face-to-face interaction as a prerequisite for the success of community based agriculture and therefore the availability and purchase of regional products. In a significant study, which supports this picture, Sage (2001) looked at 'Good (Agro-) Food Networks in South West Ireland'. He looked at the way in which perceptions of quality, and appreciation of regional food specialities, are influenced by its association with socially embedded alternative food networks. Social embeddedness refers to social connectivity, reciprocity and trust, which have also been associated with initiatives such as local exchange trading systems (LETS), community development banks and farmers' markets. Sage posits that this quality of social embeddedness helps to mediate self-interest and encourages a concern for the wider common good:

> *So, for example, small-scale food producers are imputed with being profit sufficers rather than profit maximisers and who are often strongly motivated by environmental considerations.* (Sage 2001:2)

Sage (2001) draws on Offer's (1997) work on "the economy of regard" to underline the significance of his own observations in Ireland. Offer explores the transfer of goods and services in the absence of markets or prices as a means by which to extend an understanding of the exchange of gifts. Offer writes that the preference for reciprocal exchange:

> *Arises out of the intrinsic benefits of social and personal interaction, from the satisfactions of regard….[and is]…preferred when trade involves a personal interaction, and when goods and services are unique, expensive, or have many dimensions of quality.* (Offer 1997:450)

Increasingly, observes Sage (2001:6), good food in Ireland is strongly associated with spaces that are sites of transaction; where food changes from the hands of the person who produced it to the person likely to be party to its consumption. Small food producers, growers and retailers have sprung up in a number of regions, especially the South-West. West Cork, in particular, enjoys a reputation marketed by An Bord Bia and the local LEADER programme as a place now renowned as a place of culinary excellence, artistic expression and quality endeavour, reflecting positive local characteristics such as environmental quality as well as the richness of its landscape, heritage and tradition.

1.6.1. Communities of practice

With the rise of 'dormitory' towns, the use of information and communications technology, and the encroachment of the 'bowling alone' phenomenon, it may be useful to think outside the box when it comes to supporting 'community'. Szerszynski (1998) has noted that people's notions of human fulfilment are increasingly shaped and sustained not by the communities into which they are thrown by accident of birth [or perhaps by dint of the generosity of their mortgage lender] but by the communities to which they choose to belong. Given this, he believes, it is not surprising to find that when you bring people together in such chosen or intentional social groupings, rather than in the more 'accidental' ones thrown up by demographic criteria, that a richer picture of the 'good life' emerges.

Spaargaren (2006:2) has underlined the importance of practices in the context of sustainable consumption. He writes:

> *Theories of practice direct attention to the pragmatic, routine character of everyday consumption. From these theories it can be concluded that strategies for environmental change should address issues of (new, greener) technologies, meanings and identities not at the level of isolated products or individuals but first and foremost at the level of practices.*

What sort of groups count as 'lifestyle communities' or 'communities of practice'? Some – such as tennis clubs, reading groups, slow food groups, community wind farm collectives, credit unions or animal rights groups – are generally very local in flavour. Others, by contrast, are far more dispersed, such as e-mail discussion lists and, increasingly, friendship networks. A wholly different set of dispersed communities such as pressure groups, ethical shoppers, and hobbyists, might be made up largely of people who are actually strangers to one another. Some communities of practice may come together for self-help motives e.g. child minding circles, users of alternative medicine; while others are gathered around shared practices such as direct action, charitable work or ethical lifestyles, and are driven chiefly by ethical or political considerations. The point here is that regardless of the original intention, the nature of people's involvement in local or dispersed communities of practice can change in ways that have some significance for our theme of sustainable consumption. Szerszyniski (1998:151) explains:

> *Someone might join a self-help group as a means of finding ways to cope with a chronic illness, but become more interested in the intrinsic pleasures of organising a civic group, or in the sheer experience of political agency, of being able to effect changes in wider society. Such changes, I suggest can be understood in terms of how people's picture of the good and fulfilling life can be shaped by the experience of belonging to 'communities of practice' such as these.*

So how can people's membership of chosen communities such as lifestyle coalitions, associations and movements actually deliver a sense of living a good and rewarding life? How might membership of such communities produce people who seek a richer and more sustainable set of goods, goods which accumulate not as a store of physical possessions, but as a deepening life narrative and set of human capacities? Szerszyniski (1998) posits two kinds of answer. On the one hand, membership of a community of practice can serve as a means by which people can acquire particular quality-of-life goods which are difficult if not impossible to obtain as an individual. An obvious example is 'sociality' itself or the sheer pleasure of interacting with other human beings. Belonging to a community of practice can also deliver less obvious classes of 'associational goods'. One consists of the skills and knowledge that can be acquired through membership. Some of these skills and knowledges are transferable from their original associational origin to the wider civic realm e.g. organisational and communication capacities. Another group of associational goods is connected with issues of identity, agency and virtue. The local community that organises itself to oppose the construction of a new landfill site or incinerator may fail in its overt objective, but nevertheless emerge with increased self awareness and purposefulness as a community.

An outstanding example of this is the extraordinary work of men and women in Donegal who have directly or indirectly experienced the trials of cancer, and who have successfully led the Donegal Action for Cancer Care (DACC) campaign for 'equal access for equal need'. The campaign has not only witnessed some significant success in achieving its objectives in terms of enhanced access to local cancer services in Donegal, but, has provided access to an empowering and – perhaps therapeutic – experience or political agency for those involved.

Szerszyniski (1998) links these associational goods derived by communities of practice to research into human happiness conducted by the psychologist Csikszentmihalyi (1990) on the experience of 'flow'.

As Szerszynski (1998) points out, the 'flow' experience, identified as possibly the peak of human happiness, is one that is characteristically achieved during the absorbed, proficient performance of shared human activities. The gaelic football players, climbers, and traditional musicians that experience such 'flow' do so as individuals – but do so overwhelmingly in the context of shared sets of practices, rules and meanings which are sustained over time by a wider community of practitioners. For Szerszynski (1998:153) it is clear that membership of communities of practice can deliver a broad range of quality of life goods in a way that can make them highly pertinent to any transition to a more sustainable society. These 'softer' goods are capable of providing happiness and fulfilment in ways whose side effects are more in the form of increases in human and social capital than decreases in natural capital. But associations and lifestyle communities also play a second, subtler role in the fostering of alternative versions of the good life. They can serve not just as instruments for the delivery of quality of life goods to individuals but as communities that provide and sustain a view of life in which 'softer' goods appear desirable in the first place.

2. Sustainable Consumption – Key influences and trends in household consumption: homes, food, mobility and travel

The United Nations Economic Commission for Europe's economic report on *Trends in Europe and North America 2005*[11] notes that household consumption expenditures in Western countries have developed steadily since 1995. In Western Europe and North America, an average of 50-60% of Gross Domestic Product (GDP) goes into household consumption and, in most countries, there has been an increase in household consumption expenditure per capita of between 10-20 per cent over the period 1995-2001. However, the highest increase in spend was in Ireland, with an increase of 44.5 per cent, owing to the high GDP growth rates.

Eighty per cent of our environmental impact as consumers comes from just four everyday decisions – how we **run our homes,** what **food we eat,** how **we get around,** and **holiday travel**. Individually and collectively, solutions need to start here.

A complex range of social, economic, demographic and other lifestyle-related factors influence household consumption. In the sections that follow, we set out the main influences on the household consumption of: a) Energy, b) Food, c) Mobility together with consideration of oil dependence and a number of social and environmental factors. The literature review draws on the work of Fuchs and Lorek (2000).

2.1. Irish Households, Consumption, and Sustainable Development – Residential Energy Sector

Sustainable Energy Ireland's Energy Policy Statistical Support Unit have, for the first time, compiled comprehensive data on *Energy Consumption and CO_2 Emissions in the Residential Sector* 1990-2004 (December 2005). A number of the headline findings are reproduced and discussed here.

Energy use in the **residential sector** includes energy for heating, cooking, cleaning, washing, drying, lighting, cooling and for entertainment (TV, DVD, game consoles etc.). The sector accounted for 26 per cent of Ireland's primary energy consumption in 2004. As the SEI authors point out, given that the sector is responsible for a significant proportion of the country's energy requirement and, in turn, energy related emissions, there is a clear incentive for policy makers to implement programmes that improve energy efficiency.

The impact of existing energy efficiency measures has begun to show up in the data e.g. the amount of energy consumed per permanently occupied dwelling decreased by 7.7 per cent during the 1990-2004 period. A wide number of factors contributed to energy efficiency gains, including fuel switching (e.g. to gas), implementation of building requirements, and changing occupancy patterns.

11 See URL: www.unece.org/stats/trends2005/economy.htm

The headline statistics make for remarkable reading, including a 43 per cent increase in the number of permanently occupied dwellings, which represents an annual increase of 2.6 per cent over the 1990-2004 period. The SEI report sets out a number of headline underlying factors driving energy consumption in the residential energy consumption:

- There was a remarkable increase in dwelling completions over the period 1990-2004, from 19,139 completions in 1990 to 76,954 in 2004, representing an increase of 300 per cent.
- The most common house type in Ireland in 2002 was the detached house, which accounted for no less than 46 per cent of the total. A significant proportion (33 per cent) of all dwellings are located in open countryside.
- Average household size declined from 3.34 persons per household in 1991 to 2.81 persons in 2004.
- The estimated average floor area of new houses grew from 130 square metres in 1990 to 149 square metres in 2004 (an increase of 13.6 per cent).
- A significant proportion (25 per cent) of the total housing stock has been built since 1996. By contrast 53 per cent of the stock was built before the first building requirements came into force in 1979.
- The percentage of dwellings with central heating increased from 52 per cent in 1987 to 90 per cent in 2002.

In 2002, Ireland's house building rate was the highest in Europe, with 17 units per 1000 of the population.

There has been a significant change in the residential sector fuel mix over the 1990-2004 period. Solid fuels (coal and peat) accounted for 53 per cent of energy use in the residential sector in 1990 whereas in 2004 their share had declined to 15 per cent. Oil and gas accounted for 59 per cent of the fuel mix in 2004 compared with 21 per cent in 1990.

Residential Energy Consumption

Ireland had the highest average energy consumption per dwelling when compared with the EU-15 during the period 1990 to 2003. According to SEI (2005), Ireland was 35 per cent above the EU-15 average in 2003, and some 42 per cent above in 1990.

Over the period 1990-2004, the residential sector's Total Primary Energy Requirement (TPER) increased by 32 per cent. There has been an average annual increase of 2.0 per cent. Trends in residential energy consumption and related CO_2 emissions have not grown in line with the growth in personal consumption of goods and services. While the TPER grew by 31 per cent, personal consumption over the 1990-2004 period grew by 202 per cent (an 8.2 per cent increase per annum).

Fuel Mix

Over the 1990-2004 period, there has been a significant shift in the household fuel mix. As illustrated in the Table (No.1) reproduced from the SEI report, gas experienced the biggest growth rate over the period (12 per cent per annum on average), followed by oil (8.5 per cent per annum) and to a lesser extent electricity (4.2 per annum). Solid fuels (coal, peat and briquettes) all declined.

Overall, the energy use in the residential sector has become increasingly less CO_2 intensive.

Table 3: Growth Rates and Shares of Final Energy Consumption in the Residential Sector

	Growth %	Annual Average Growth Rates %		Shares %	
	1990-2004	1990-2004	2004	1990	2004
Oil	211.7	8.5	5.6	15.9	37.7
Gas	405.7	12	10	5.4	20.6
Electricity	77.6	4.2	5.4	16.2	21.9
Coal	-56.5	-5.8	-9.2	27.4	9.1
Peat	-69	-8	0	26	6.1
Briquettes	-42.2	-3.8	-4.1	7.1	3.1
Renewables	2.2	0.2	0	1.9	1.5
Total	31.7	19	3.2		

A switch to "cleaner" fuels used to generate electricity e.g. gas, combined with more efficient equipment has led to a reduction in the CO_2 intensity of electricity supplied. The overall drop in intensity over the 1990-2004 period was from 918 g CO_2/KWh in 1990 to 624 g CO_2/KWh in 2004.

Decoupling and Energy Efficiency

Significantly, there has been a decoupling in TPER from GDP at the economy level since 1992. Economic growth levels increased by 140 per cent over the 1990-2004 period (or 6.5 per cent per annum on average) while TPER increased by 59 per cent (or 3.4 per cent per annum). The SEI has attributed this decoupling to changes in the structure of the economy and improvements in energy efficiency. A decoupling in CO_2 emissions and energy consumption is also evident from 2001.

Household Expenditure on Energy

While the overall energy bill has increased over the 1990-2004 period, energy costs decreased as a proportion of total personal consumption. The total spent on energy by the residential sector in 2004 was €2.2 billion. The average spend on energy per permanently occupied dwelling in 2004 was €1,513. This represented an increase of 12 per cent on 2003 and 45 per cent on 1990.

Household Formation

Trends in direct energy use have moved continuously upward due to a range of factors. Two of these factors are of particular contemporary significance in Ireland. International studies have attributed increasing per capita energy demand to the increasing number of 'single' dweller households, and to the increase in per capita living area (van Diepen 1998). A contributory trend is a preference for detached houses. The proportion of one person households in Ireland increased from 13 per cent in 1961 to 22 per cent in 2002. Average household size in Ireland declined by 29 per cent over the period 1961-2004 and by 16 per cent between 1991 and 2004.

Studies focus primarily on economic and socio-demographic factors in analyses of direct and indirect energy consumption by households as well as on the characteristics of homes. Disposable income appears to be one of the most important determinants of energy consumption, with higher income earners consuming more energy (Coenen, Fuchs, and van der Peppel 2000). The availability of credit, ownership structures, and spending patterns also influence consumption. Among the most important of socio-demographic influences is household size. One study has shown that a move from a one-person to a two-person household can result in a 20 per cent reduction in direct energy use (Dürrenberger and Patzel 1999). Other influences are household composition and age, and behavioural factors, lifestyles, attitudes and the availability of information.

Household Appliances

Studies have also shown a 50% rise in income-price ratio for energy since the 1950s, which, combined with higher efficiency and quality of products, has helped to deliver a decrease in the price *per se*rvice unit of domestic appliances (Linderhof and Kooreman 1998, Van der Wal and Noorman 1998). Income and price are key determinants of energy consumption. In 2002, Sustainable Energy Ireland (SEI)[12] attributed a "massive hike" in energy demand over the preceding 10 years to the penetration of "labour saving" devices, including washing machines, dishwashers, driers, fridges, computers and multiple televisions.

Table 4: Penetration of Electrical Appliances 1987, 1994/1995, 1999/2000 (Source: CSO)

Application	1987 (%)	1994/1995 (%)	1999/2000 (%)	% increase over the period
Vacuum Cleaner	79.4	88.4	94.2	18.6
Clothes Dryer	21.8	26.6	42	92.7
Washing Machine	77.1	86.8	93.4	21.1
Dishwasher	7.6	18.6	32	321.1
Refrigerator/Freezer	26.4	50.4	61.4	132.6
Separate Deep Freeze	15.7	22.8	29.2	86.0
Microwave Oven	6.3	47.2	71.5	1034.9
Video Player	20.5	66.2	86.9	323.9
Stereo	42.6	52.2	66.2	55.4
Home Computer	6.1	16.2	29.3	380.3
TV – One or more	14.0	29.2	49.1	250.7
Index	28.9	45.9	59.6	106.4

A rebound effect – "running to stand still"

Some of the gains from energy efficiency and new technologies e.g. central heating, are offset by what is known as the "rebound effect". Levett (2004) has explained how homes have, on average, become much more energy efficient over the last 30 years. However, energy consumption per household has stayed relatively constant because people have responded to the efficiency improvements by heating more rooms to higher temperatures for more of the time, rather than reducing energy use.

12 See URL: http://archives.tcm.ie/irishexaminer/2002/09/21/story573784255.asp

This phenomenon has been observed in Ireland (SEI 2005) in 1995. Between 1987 and 1995, an increase in the penetration of central heating showed up as an increase in energy efficiency, with a decrease in thermal unit consumption. The dip in energy consumption was reversed in 1995 when the increase in the penetration of central heating, and associated increase in comfort and energy use, cancelled out the energy efficiency gains. In other words, the convenience of automated controls, whole house heating, larger homes and decisions to run higher internal temperatures overtook the earlier efficiencies from lower energy consumption achieved from the installation of the central heating units.

The Influence of Household Design and Characteristics

The determining characteristics of dwellings have also been studied. The most fundamental of determinants are per capita floor space, dwelling type and age, and the structural surroundings of the dwelling. The presence of insulation, and government regulations have also been found to be significant. Schmoranz (1994) has argued that the efficiency of energy provision can also be a factor. Climatic conditions confronting households also influence energy consumption.

Policy Drivers

A number of policy drivers are associated with the current household energy consumption patterns and related CO_2 and air pollution profiles.

- **European Council Decision 2002/358** stipulates the national targets for individual Member States according to the European Burden Sharing Agreement, designed to deliver on the EU's obligations under the UNFCCC Kyoto Protocol.

- **Energy Performance of Building Directive (EPBD)** (Directive 2002/91/EC) on the energy performance of buildings will address the key role buildings play in the consumption of energy. This requires Ireland to set minimum energy performance standards (both for new build and major refurbishment) using an agreed methodology. For almost all buildings, an energy performance certificate (energy rating) is to be supplied by the owner to any prospective buyer or tenant when constructed, sold or rented. The Certificate will carry recommendations for remedial action.

- The EC's **Minimum Efficiency Requirements** are designed to lower the energy consumption of household appliances, by encouraging improvements in product design.

- The European Commission's Framework Directive for **Labelling** residential appliances was introduced in 1992 to encourage consumer awareness of the energy impact of household appliances. Since the introduction of the Framework Directive, a number of separate product specific Directives have been introduced, covering refrigerators, freezers, ovens, oil and gas boilers, air conditioning units, lamps, dishwasters, washer-dryers, tumble dryers, and washing machines.

- An **EC Green paper on energy efficiency** indicated that further appliances will be covered by labelling directives. The P*aper s*ets out measures for discussion with the objective of achieving cost effective energy savings of 20 per cent by 2020. Some 32% of the savings are expected to come from the build environment, which includes the residential sector.

- The **EU Emissions Trading Directive (Pilot) (Directive 2003/87/EC)** is designed to facilitate cost-effective compliance with the UNFCCC Kyoto Protocol.

- The EC **National Emissions Ceiling Directive (2001)** sets ceilings for four air pollutants that cause acidification and the formation of ground-level ozone: sulphur dioxide, nitrogen oxides, volatile organic compounds, and ammonia. Emissions from the residential sector (mostly from the burning of fossil fuels) accounted for a small proportion of Ireland's total emissions in 2003 (See Table 2):

Table 5: Sulphur Dioxide and Nitrogen Oxide Emissions and NEC Directive Ceilings for 2010

	1990 (kt)	2003 (kt)	2010 Ceiling (kt)	Residential Sector Emissions in 2003 (kt)
Nitrogen oxide	115	120	65	5
Sulphur dioxide	178	76	42	12

- The **National Climate Change Strategy** (2000) has set a target of a 0.9 Mt CO_2 reduction in emissions to be achieved by the build environment sector through energy efficiency (Building Regulations), energy efficiency improvements in existing stock; and fuel switching to cleaner fuels.

- **Building Regulations** (as revised) impose requirements relating to energy efficiency in new residential buildings, extensions and material alterations.

2.1.1. Planning

In a range of issues of relevance to sustainable energy consumption, from residential energy requirements through to sustainable mobility options, the question of planning looms large.

The Consumer Strategy Group has pointed out that planning for the physical environment affects the consumer in a variety of ways – it affects the supply and choice of goods and services that are available, the level of competition, and, ultimately, the final price that the consumer pays. For example, planning decisions affect:

- The location of housing
- The location and scale of shopping facilities
- The location and scale of consumer services, such as medical services and crèches
- Other facilities on which the consumer is indirectly dependent, such as supply chain infrastructure.

The Group has observed that in all the most important and current debates planning debates (e.g. sustainable development, public and private transport, pub licensing, and Retail Planning Guidelines), groups representing manufacturers, retailers, small businesses and environmentalists are able to make themselves heard, **but an organised consumer voice is missing from the process**. As a result, consumer interests are not considered to the same extent as other relevant issues. The Group has proposed that:

> *If consumer issues are to be adequately taken into account and represented in the planning process Government must ensure that views of consumers are sought and taken into account and a consumer representative structure must be established to input into the planning process.* (Consumer Strategy Group 2005)

2.1.2. Community participation in harnessing the wind

In the context of renewable energy generation, energy consumers and communities have begun to seek a greater economic role in harnessing Ireland's wind. It was for this reason that, early in 2002, the Renewable Energy Partnership, with representation from seven counties, came together to commission a study of the barriers that currently prevent viable community ownership of wind farm projects.

The REP believes that residents of areas in which wind farms are going to be constructed should be offered the opportunity to invest in those farms. At present, wind farm developments sometimes bring very few benefits to communities hosting such developments. This has contributed to some objections to planning permissions for some rural wind farms.

The REP study identifies a number of important fiscal and regulatory barriers and calls for the establishment of a Renewable Energy Advisory Group to provide support to small investors in wind energy.

2.2. Irish Households, Consumption, and Sustainable Development – Oil Dependency

Energy security issues have shot to the top of the international political agenda as oil prices respond to growing demand, threats to supply and geopolitical instability. A review of energy policy, underway in the Department of Communications, Marine and Natural Resources, will provide the Government with an opportunity to set out a strategy to address some of these challenges.

With no indigenous sources of oil and a need to import all of our oil requirement, Ireland's economy and consumers are particularly vulnerable to rising oil prices feeding through into a rising cost of oil imports. Oil consumption has grown alongside economic growth: Ireland consumed 9 million tonnes of oil in 2004 – approximately 180,000 barrels of oil per day – compared to four and a half million tonnes in 1990 (Forfás 2006:12).

In April 2006, Forfás published a set of related findings and recommendations in *A Baseline Assessment of Ireland's Oil Dependence*. In particular, the study, conducted by Amárach Consulting and US energy expert, Dr Robert L Hirsch, addresses the country's acute vulnerability – given its level of oil dependence

– in the face of 'Peak Oil', a scenario in the not too distant[13] future whereby world liquid fuel (oil) production is expected to reach a point where it can no longer be increased and demand will no longer be satisfied at current prices. Peak oil describes a situation in which world oil production reaches a point where it can no longer increase any further, giving way to a declining level of production for some time afterwards. Each year since 1981, the world has consumed more oil than is discovered. As the Forfás (2006) study underlines, the relatively poor volume of discoveries in recent years, against a backdrop of rising oil consumption[14], means that the gap between demand and supply is widening. The Forfás study also sets out a number of uncertainties in the arguments about peak oil e.g. the rate at which additional oil can be recovered from non-conventional oil sources, such as shale.

The scenario, supported by a growing body of evidence, has immediate implications[15] for Ireland's economic competitiveness, its ability to attract mid- to long-term FDI, and for vulnerable sectors such as transport and homes using oil fired central heating. The study cites a near global consensus that the potential consequences of peak oil for governments, economies, businesses and indeed individual consumers should be considered now as it will take at least ten years to prepare for its onset.

The Forfás study is blunt in its assessment of the problems Ireland and other oil importing countries will face as we encounter the peak in oil supplies:

> *As peaking is encountered, liquid fuel prices and price volatility could increase dramatically and governments, businesses and economies at large could face significant economic and social change. The rapid rise in world oil prices in recent times could well appear modest in comparison to the price escalations and oil shortages that would arise.* (Forfás 2006: 3)

The Forfás study illustrates Ireland's particular vulnerability[16] with a set of key observations:

- Ireland consumed 9 million tonnes of oil in 2004, an amount that has doubled since 1990. In 2002, Ireland ranked 3rd highest among the EU-25 countries in terms of oil consumed per capita.

- Electricity generation and transportation are the two main contributors to Ireland's high oil dependence. Ireland has relied considerably more on oil for electricity generation than most other EU countries and, as of 2002, had the 6th most oil dependent electricity generation system of the EU-25 countries.

13 The Forfás study cites a range of projections for the oil peak, with some predicting that it could happen as early as 2012 and others predicting that it will not take effect until 2030 at the earliest.

14 Demand by the Chinese and Indian economies is expected to continue growing.

15 The trebling of oil prices over the past three years and the prospect of further price rises – together with interest rates – are already feeding into projections of a global economic slow down.

16 The onset of peak oil is not expected to have immediate consequences for gas supplies, apart from indirect impacts on pricing. In this sense, peak oil is not so much an energy challenge as a liquid fuel challenge.

- The amount of oil used for transportation in Ireland tripled between 1972 and 2002, leaving Ireland consuming at least 50 per cent more per capita than the average of the EU-25 by the end of the period. In the early 1990s, Ireland used less oil per capita for transportation than the average of the EU-25. By 2002, Ireland had consumed at least 50 per cent more oil per capita for transportation purposes.

- Taking into account the Irish economy's relative dependence on imported oil and the relative share of oil in total Irish energy consumption, Ireland is among the most sensitive to rising oil prices and therefore among the most vulnerable to a peak oil scenario.

2.3. Irish Households, Consumption, and Sustainable Development – Mobility and Travel

In many ways Ireland's transport and mobility challenge is a paradigm case for the debate about sustainable development, sustainable consumption, and infrastructure planning.

Nearly 80 per cent of all households in Ireland now have at least one car. As James Wickham (2006) has observed in *Gridlock: Dublin's transport crisis and the future of the city*, individual choices are not exercised in a vacuum:

> *At one level people are of course 'choosing' to buy cars and to use them. However these choices can create a situation where the choice not to have a car becomes more and more difficult. As cars become more widespread, so more and more activities become based on the assumption that all participants have cars.* (Wickham 2006:14)

While Wickham (2006) focuses on Dublin, it remains to be seen whether lessons from the capital are to be applied in other parts of the country, notably via a strict adherence to the intention of the National Spatial Strategy. He scotches the myth that there is a rigid connection between prosperity and car ownership or usage, citing the example of Dublin City itself, where household car ownership is the lowest for any county or city in Ireland[17]. Rather, the extent to which people own cars, and the extent to which they use their cars, also depends on factors such as population density and access to public transport options. He cites the work of Kenworthy *et al*., (1997) to show that, in 15 European cities, there is a simple negative relationship: the richer the city, the less people use cars to travel to work. An important reason for this, of course, is that rich cities also choose to spend money collectively on public transport. Because of this collective decision, people are able to spend less time in their cars.

Household mobility contributes a substantial share of the environmental burden of energy use and emissions from households. While the rapid growth of mobility consumption during the 'Tiger' years in Ireland is not untypical of trends found elsewhere, transport issues contribute significantly to the country's vulnerability when viewed alongside our level of dependency on imported oil.

17 Car ownership in Dublin City is 58 per cent, in contrast with South Dublin where household car ownership is 84 per cent, somewhat above the national level of 78 per cent. (Wickham 2006:16).

A number of relevant trends have been identified in the international literature on mobility including a significant increase in the use of the private car, and falling numbers of passengers per vehicle. In addition to an increase in average distances travelled, the reasons for driving have also changed. Individuals tend to travel more for miscellaneous purposes, such as social contacts or shopping. Carlsson-Kanyama and Linden (1999) reports that more than 50% of all travel today is related to leisure time activities. This change in travel objectives reflects a significant lifestyle change.

Empirical studies designed to establish the most important determinants of household mobility generally converge around socio-demographic and economic variables, living situation, and transport options and infrastructure. In terms of socio-economic variables, most studies have identified gender, age, education and household composition as important variables. Lifestyle factors, values, and attitudes are also important. The most significant of economic variables is disposable income.

An important cluster of variables in the context of the National Spatial Strategy and planning considerations in Ireland, relates to questions of living situation, in other words the house and its structural surroundings. Studies have found that households in city centres, and urban versus peripheral, or urban versus rural and inner city neighbourhoods, are important determinants of household mobility (Hoyer and Holden 1999, van Diepen 1999). Urban form and size, such as the availability of services in proximity to the dwelling, building density, the amount of open space, and general administrative spatial planning are also significant.

Infrastructure, including the efficiency and availability of public transport plays a pivotal role. Presumably, issues such as the independent and reliable provision of public transport information services also play a role, as highlighted by the Irish Consumer Strategy Group (2005). The Group has pointed out that there is no independent source of structured information on available transport options. Nor are routes and schedules of different modes of transport devised in an integrated way for optimum consumer benefit. This must impact on the ease with which choices in favour of public transport, for example, can be made.

Irish Lessons

While focused on Dublin's traffic problems, Wickham's (2006) work addresses important issues for consideration in the National Development Plan. These lessons are:

- Where people have to use the car for the most basic journeys, then traffic jams proliferate and mobility slows. This also affects the business environment and makes a city unattractive for new investment. Public transport is not just a "consumption good"; it is also an investment.

- The relationship between car usage and population density is not straightforward. Dublin and Helsinki have a similar population density but offer two very different case studies on car usage i.e. very high in Dublin, very low in Helsinki. Helsinki combines low population density and high public transport use because land-use and transport planning are linked. So much of Helsinki's suburban housing, suburban employment and suburban shopping facilities are concentrated at public transport nodes, where the metro line links with local bus services.

- In Europe, car ownership has tended to grow more slowly than in the United States, where suburban development is car-based. Car ownership and car usage do not increase in a one-to-one relationship with economic growth and to some extent car usage can become *uncoupled* from economic growth. This is entirely consistent with the sustainable objectives of the European Union.

Wickham (2006) uses the concept of *technological trajectory* to explain how decision-makers lock travellers into making limited choices. Technological change is not random but occurs along a given path – it is 'path dependent'. This path dependency is a function of ideas and skills and influences how problems are understood and how they are solved. It is also a function of interests and even power as participants in the decision-making process on infrastructure and policy will have made careers by developing particular expertise and knowledge. The same is true of approaches to waste management. Wickham explains:

> *Applied to transport, this suggests that confronted by a traffic jam, the obvious solution is to build more roads. All sorts of people and all sorts of institutions have an 'interest' in this solution to the problem. Transport planners, motorists lobby groups, construction companies etc. all support the roads solution and all are in turn beneficiaries. Alternative lines of development (e.g. new public transport) become seen as impossible, implausible, naïve.* (Wickham 2006:25)

Wickham (2006) explains that a European trajectory took hold in the 1970s: a *switching point* when development took a new direction following opposition to the old ways. And alongside the new trajectory, new ideas, skills and interests have also emerged. New interest groups develop that support and benefit from the new trajectory. Other groups reconfigure their alliances e.g. property developers start making their profits from developments around transit nodes identified in national spatial strategies and promote public transport infrastructure.

The NESC summed up an essential insight here: "transport not only connects existing places, it makes new places." (NESC 2004:134)

Finally, our **heavy reliance on road transport has contributed to high prices in Ireland**. The Consumer Strategy Group[18] has reported that approximately 85 per cent of goods in Ireland are moved by road compared with only 45 per cent in Germany and 60 per cent in France. As road transport is more labour intensive than other modes of transport, high labour costs affect the transport costs of most goods. The quality of the transport infrastructure also impacts on the effectiveness of the distribution system, and Ireland ranks lowest out of 8 countries in terms of the average speed of business deliveries in the capital and principal cities.

Air travel

The emergence of low cost air travel and the revolution in air travel availability from Ireland has also contributed to the increasing consumption of oil in transportation. Between 1990 and 2002, the number of passenger kilometres generated by Irish air travellers to other EU-15 countries more than doubled, while the volume of total EU traffic rose by 78 per cent over the same period.

18 Reference to the NCC, *Competitiveness Report* 2004, in the Irish Consumer Strategy Group, *Make Consumers Count* 2005.

2.4. Irish Households, Consumption, and Sustainable Development – Food

The consumption of food has been the focus of a large number of studies, due to its particular impacts on the environment. Jongen and Meerdink (1998) have suggested that close to half of all human impact on the environment, such as loss of biodiversity, is directly and/or indirectly related to food production and consumption. The adverse impact of the agricultural sector on the environment may exceed the impacts of all other sectors, even manufacturing and industry in many countries, according to Goodland (1998). This is true for Ireland when it comes to greenhouse gas emissions.

The forthcoming *Material Flow Analysis for Ireland*[19] will show that, in terms of the economy's Total Material Requirements, 'Food and Beverages' is second (24 per cent) only to construction (36 per cent). To meet final consumption demand by households, the highest amounts of Direct Material Inputs were required by food and beverages (29%), followed by agriculture, forestry and fishing (21 per cent), real estate services (12 per cent), hotel and restaurant services (8 per cent) and petroleum and other manufacturing products (7 per cent).

Studies show a range of influences on consumers' food choices. As consumers have a considerable influence over the total energy consumption and emissions associated with food production (Lorek and Spangenberg 1999), it is important to understand some of these influences. Empirical research has identified economic factors such as income, expenditure patterns, and prices as a strong determinant of food consumption choices. Socio-demographic factors such as age, education and knowledge, household size, the increasing presence of women in the workforce, and time constraints are also significant (Wielting and Biesiot 1998). Changing values also impact on food consumption, including the increasing value of ecological aspects and consumption habits in terms of health and lifestyle concerns. Scholars have found that behavioural changes have the potential to lead to larger reductions in energy consumption than technological improvements (Dürrenberger and Patzel 1999).

Lifestyle choices, including those associated with higher rates of disposable income such as choices in terms of dining out can have a marked influence on the sustainability of household food consumption. Moll (1999) has argued that dining out sometimes requires ten times the energy compared to dining at home, due to transport, high space consumption requiring heating and lighting, long operation times of kitchen appliances, and the waste of food ingredients. Keelan, Henchion and Newman (2005) report that Food-Away-From-Home (FAFH) is an increasingly important part of Irish food consumption expenditure. Throughout the 1990s, the share of total food expenditure allocated to FAFH increased while the proportion of total expenditure on food overall fell from 23 per cent in 1995 to 20 per cent in 1999/2000.

19 *Island Limits. A Material Flow Analysis and Ecological Footprint Analysis of Ireland*, research in progress commissioned by the Environmental Protection Agency.

2.5. Irish Households, Consumption, and Sustainable Development – Greenhouse Gas Emissions

Household emissions of greenhouse gases (GHGs) are published in the annual *Environmental Satellite Accounts* published by the Central Statistics Office. The latest *Accounts* were published in May 2006 and present data for the years 1997-2004.

Under the Kyoto Protocol to the UN Convention on Climate Change, EU Member States agreed to reduce greenhouse gas emissions in the EU as a whole to 8 per cent below 1990 levels in the period 2008-2012. As a contribution to this overall EU target, Ireland agreed to a target of limiting its increase in emissions to 13% above 1990 levels.

In 2004 residential sector energy-related CO_2 emissions were 11,376 kt CO_2 , representing 27 per cent of the total attributable to energy. The residential sector was the second largest emitter after transport which was responsible for 32 per cent of emissions. Over the 1999-2004 period CO_2 emissions from the residential sector increased by 7.3 per cent (an average annual increase of 0.5 per cent).

In 2004, the "average" dwelling was responsible for emitting approximately 8.2 tonnes of CO_2. A total of 5 tonnes of CO_2 (61 per cent) was from direct fuel use and the remainder was generated by other forms of electricity use.

The GHGs examined in the *Environmental Satellite Accounts* are:

Carbon Dioxide (CO_2)
Nitrous Oxide (N_2O), and
Methane (NH_3)

The relative contribution of each gas to the greenhouse effect can be expressed in terms of global warming potential. This is measured in tonnes of CO_2 equivalents. The *Accounts* published in May 2006 set the results in the context of the significant growth of the Irish economy, which has driven a large increase in the consumption of raw materials and energy inputs.[20] While the aggregate emissions of carbon dioxide (CO_2) over the period 1997-2004 show an increase of 17 per cent from approximately 38.6 to 45.2 million tonnes, emissions from the residential sector have hardly changed. The most significant increase occurred in transport (private and business), where emissions increased by 62 per cent. In the services sector there was a 38 per cent increase.

When the three greenhouse gases (CO_2, N_2O, and NH_3) are combined as a single emissions estimate in terms of carbon dioxide equivalents, high emissions of Nitrous Oxide and Methane from the farming sector contribute to agriculture, forestry and fishing being the sector with the highest level of greenhouse gas emissions. Transport in particular changes from having the fourth highest level of emissions in 1997 to the second highest in 2004.

20 Measured in TOE '000 (Tonne of Oil Equivalent), the Total Primary Energy Requirement has risen from 11,870 in 1997 to 15,008 in 2004. Source: *Environmental Accounts for Ireland 1997-2004*, Central Statistics Office, May 2006.

Residential greenhouse gas emissions were stationary at approximately 10 million tonnes per annum between 1997 and 2004. Over the same period the housing stock increased by approximately 31 per cent suggesting that emissions per household declined. Residential electricity demand per household decreased by over 4 per cent between 1997 and 2004[21] while greenhouse gas emissions per household declined by 22 per cent during the same period. The *Accounts* conclude that the modest decrease in per household electricity demand in tandem with a large decline in per household emissions was influenced by factors such as cleaner electricity generation, a decline in the use of solid fuels and changing patterns of occupancy.

Summary of residential CO_2 Emissions Data (SEI 2005)

- In 2004 residential sector energy-related CO_2 emissions were 11,376 kt CO_2, representing 27 per cent of the total attributable to energy. The residential sector was the second largest emitter after transport which was responsible for 32 per cent.

- Over the period 1990-2004 CO_2 emissions from the residential sector increased by 7.3 per cent (0.5 per cent on average per annum) while transport, services, industry and agriculture respectively increased by 133 per cent (6.3 per cent per annum), 62 per cent (3.5 per cent per annum), 6.1 per cent (0.4 per cent per annum), and 12.6 per cent (0.9 per cent per annum).

- In 2004, the "average" dwelling was responsible for emitting approximately 8.2 tonnes of CO_2. A total of 5 tonnes CO_2 (61 per cent) was from direct fuel use and the remainder arising indirectly from electricity use.

2.6. Irish Households, Consumption, and Sustainable Development – Environment

Households exert significant direct and indirect pressures on local and distant environments. The expansion of the household sector has created heavy demand for land, energy and water. Household waste production is also on the increase, with every household of three persons producing, on average, one tonne of waste per annum.

Data on the local environment and environmental policy are provided by the Environmental Protection Agency's periodic reports, *Ireland's Environment* and the OECD's report, *Environmental Performance Reviews* (OECD, 2000). The EPA has emphasised that the challenge facing Ireland is to ensure that future development of the household sector happens in a manner consistent with the principles of sustainable development, including the prioritisation of a break in the link between economic growth and environmental degradation.

Air Pollution

Emissions from road traffic are now considered the most important threat to air quality. Greatest concern is focused on emissions of nitrogen dioxide and fine particulate matter (PM10).

21 Source, Energy Balances, cited in Environmental Accounts for Ireland 1997-2004, p.16.

Inland Waters

The EPA has estimated that, in the 1998-2000 period, 70 per cent of the total river channel surveyed (13,200 kilometres) was in a satisfactory quality condition, 17 per cent was slightly polluted, 12 per cent was moderately polluted and 1 per cent seriously polluted. This represented a slight improvement compared to the previous two assessment periods, which had shown an increasing spread of slight and moderate pollution. Data up to 2002 indicate a reduction in serious pollution.

Considerable threats to surface waters from sewage remain.

Estuarine and Coastal Waters

Water quality in most estuaries and bays is high, while some areas experience serious deoxygenation and a number of areas, mainly in the east and south, have been classified as eutrophic.

The quality of bathing waters and shellfish waters is generally very good, although naturally occurring harmful algal blooms are a significant threat to the Irish shellfish industry. Coastal litter remains a problem, but there is evidence that the 2002 levy on plastic bags has diminished their occurrence on beaches.

The Terrestrial Environment

The rural environment is an increasingly important location for recreation and tourism, including the pursuit of quiet, natural places for relaxation. It has experienced loss of population, urbanisation, suburbanisation, industrial development and afforestation.

Waste

In line with the rest of Europe, household waste production is also on the increase, with every household of three persons in Ireland producing, on average, one tonne of waste per annum.

In a benchmarking report launched in June 2006, Forfás found that in spite of its importance, particularly for some of Ireland's key strategic sectors such as pharmaceuticals and life sciences, waste management is the area of the National Development Plan (NDP) where least progress has been made. The investment target for waste management infrastructure in the current NDP was €825 million, including €571 million of private investment. Martin Cronin, the Chief Executive of Forfás commented on lengthy delays in rolling out planned waste infrastructure and business concerns about the impact on competitiveness.

Other key points in the Forfás report:

- Waste Generation: Ireland has the highest municipal waste generation per capita of the countries surveyed with a figure of 777 kg per capita. The next highest is Singapore which generates 710 kg per capita.

- Waste Treatment: Ireland has made significant progress in the area of municipal waste management in recent years, with the share being recycled increasing from 13 per cent in 2001 to 33 per cent in 2004. However, Ireland performs relatively poorly with a recovery rate of 35 per cent for industrial waste, highlighting Ireland's dependence on landfill as a waste management solution.

- Waste Costs: Of the countries benchmarked, Ireland has the highest waste management costs for non-hazardous landfill and biological waste treatment. Recycling costs and hazardous waste treatment costs are also higher than most competitor countries because of Ireland's reliance on export markets for the treatment of recyclable materials. The vast majority of Ireland's recyclable materials are exported for further treatment. Additional transport costs are directly impacting on the waste costs for the enterprise sector.

- Waste Capacity: Shortfalls in capacity have been identified for both municipal waste and hazardous waste – Ireland exports 30 per cent of municipal waste and 70 per cent of hazardous waste.

2.7. Irish Households, Consumption, and Sustainable Development – Other household economic and social trends

In a timely discussion on linking the growth in Irish incomes with improved environmental quality, the NESC (December 2005) has pointed out that Ireland has reached a decisive stage of economic development and income levels.

The NESC (December 2005: 106) report notes that:

> At the early stages of economic development, people place more priority on jobs and income than on protecting the environment. As income continues to grow, the relationship between economic development and the environment eventually changes. At higher incomes, people begin to place greater priority on protection of the environment and environmental regulation becomes more effective.

Researchers have estimated that the income level at which attitudes shift towards a positive appreciation of the role of environmental protection is in the range $5,000-8,000. This implies that Ireland's current income level is well into the range at which income growth should be positively associated with improved environmental quality.

Demography and household formation

Overall population trends have had major implications for the number and types of households being formed. There is a concentration of population growth in the age groups at which households are formed and the level of gross inward migration to the State have contributed to making Ireland's population growth increasingly intensive in household formation.

Between the Census of 1981 and that of 2002, the population increased by 14 per cent, but the number of private households increased by 41 per cent. The types of households driving this growth were those formed by childless couples (up 108 per cent), older people living alone (up 87 per cent), lone parents (up 83 per cent) and people of working age living alone (up 67 per cent). These trends help to explain the downward tend in average household size, which, by 2002, had fallen below 3 persons to 2.94.

The role and constitution of the family is undergoing profound changes as society becomes more affluent and diverse, and individuals assert greater autonomy.

Living standards

The cumulative growth in real take-home pay (i.e. after tax and inflation) for a single person on average manufacturing earnings over the *Sustaining Progress* years (2002-2005) is estimated to be 8.3 per cent (an annual average growth of 2.7 per cent). The growth in real take-home pay for a single person on the minimum wage over this period was 14.9 per cent (an annual average growth of 4.7 per cent).

Quality of life

Several critical trends have emerged for health in Ireland. During the past decade, alcohol consumption rose by 41 per cent and illicit drug use levels rose to become the highest in the OECD. The levels of obesity and overweight have increased, particularly in children, and Type 2 diabetes, a preventable form of the disease linked to obesity, has become a major concern. Ireland also has a poor record in the area of road safety, and while the absolute numbers of deaths and injuries on the roads declined up to 2005, the country has failed to make the type of substantial gains in safety now being enjoyed by other European countries. Recorded levels of suicide have grown fourfold for those under 25.

Work – Commuting – Workplace

Workers now work fewer hours than they did a decade ago. This is in line with international trends, through the Irish figure is ahead of the trend, with workers now working 14 per cent less than they did.

Commuting is one of the distinctive features of Ireland's emerging spatial patterns. Over the decade from 1991 to 2002, the average distance travelled to work doubled to 13.3 miles. The average distance for urban areas in 2002 was 7.8 miles and for rural areas 13.3 miles. The 2002 Census collected commuting times for the first time. The results show that the average commuting time was 27 minutes, in both urban and rural areas, the average commute time was under 30 minutes for more than half the population (excluding 10 per cent not stated). In urban areas, 10 per cent had commuting time of over one hour while the corresponding figure for rural areas was 8.3 per cent.

Stress appears to be a significant factor in many workplaces. In a survey of employees experience of work, 82 per cent considered that their work required them to work hard, 51 per cent considered that they worked under a great deal of pressure, while 47 per cent agreed or strongly agreed that they often had to work extra time to get their word done.

Poverty

It is a major feature of Ireland's recent social development that the percentage of persons classified as being 'at risk of poverty' has risen significantly since the mid-1990s, despite improved employment conditions, higher social welfare payments in real terms, and significant increases in the real level of disposable incomes available to each person at the lower income deciles.

Inflation

There was a sharp fall in inflation rates over the period 2002-2005. The annual increase in the Consumer Price Index (CPI) fell from 4.6 per cent in 2002 to 2.2 per cent in 2004. There was some upward pressure in 2005 when the annual increase was 3 per cent. The pressure came from oil prices and mortgage payments. If energy prices are excluded, the increase in the CPI in the year ended October, 2005 was just 1.7 per cent. The influence of mortgage resulted from people taking out larger mortgages; in fact, mortgage had fallen.

Housing

Alongside the spectacular growth in Ireland's housing market is a related set of problems which have led to the exclusion of a significant minority of consumers from the prospect of home ownership. Drudy and Punch (2005) have described how house prices and private rents have risen beyond the reach of many, while the State provides far too few dwellings for those who can neither buy nor rent. They describe a housing system distinguished by deep inequalities and a clear-cut division between winners and losers: those who have profited hugely from the housing-for-profit boom, and those who are struggling to find or sustain a suitable roof over their heads.

Table 6: Winners and Losers in the Irish Housing System

Winners	Losers
Speculators and investors	Property-less
Developers and Land Owners	Homeless
Financiers (e.g. banks, building societies)	Low income/temporary employed
Estate agents	Unemployed
Solicitors	Ethnic minorities, those with disabilities
Landlords	Others in housing need
Home owners	Tenants
Government finances	First-time buyers
Newspaper Property Supplements	

For Drudy and Punch (2005:14), the question facing policy-makers is this: "Do we see housing as yet another commodity to be bought and sold, or is housing to be regarded first and foremost as shelter and a home – a not-for-profit necessity – and a right to be claimed by all, irrespective of ability to pay?" Their conclusion is that housing provision and policy have been heavily influenced by a market-driven philosophy, affording dominant status to market provision for owner-occupation, de-prioritising public-rental options and further weakening the role of state intervention, whether through direct provision or regulation of the private rental sector. They describe, for example, the lack of regulation over the quality of housing in the market sector and an absence of consumer protection, while control over land allocation and supply rests in the hands of a small number of land owners, developers and speculators.

While the rate of home ownership in Ireland (77 per cent) is now one of the highest in Europe, Drudy and Punch (2005) note that the proportion of accommodation provided for rent by private landlords has declined significantly. In addition, the number of dwellings rented from local authorities has fallen so that the local authority rental sector now represents 7 per cent of total housing.

Fuel Poverty

Fuel poverty has been defined[22] as the need to spend more than 10 per cent of net household income on fuel to achieve an acceptable level of comfort and amenity. Levels of fuel poverty in Ireland are among the highest in Europe, and the phenomenon is often linked to the use of solid fuels and other inefficient forms of heating fuel. Poor thermal heating efficiency in older dwellings is one of the chief contributory causes. The National Anti-Poverty Strategy (NAPS) (2002-2007) set a target of the end of 2010 to ensure the provision of adequate heating systems in all local authority rented dwellings and an interim 2007 target to ensure adequate heating systems are provided in local authority homes occupied by older people. The National Development Plan (2000-2006) provided funding for SEI's Low Income Housing Programme.

2.2. Irish Households, Consumption, and Sustainable Development – Health and well-being

"Irish society is undoubtedly now challenged by certain 'diseases of affluence'". (NESC, 2005)

There is a consensus among the social partners in favour of fundamental reform in the health sector[23]. The reform drive presents opportunities in the context of sustainable development, including moves towards greater 'consumer' or user representation and a shift towards a greater focus on a **public health** and **well being**[24] approach, incorporating more preventive strategies, and focusing on lifestyles, environmental health and a holistic approach to well being.

22 See URL: www.irish-energy.ie/uploads/documents/upload/publications/Fuel_Poverty_Report.pdf

23 See NESC Strategy 2006: *People, Productivity and Purpose*, NESC Report No.114, December 2005.

24 This is to imply the wide meaning of health as set out by the World Health Organisation (WHO): "*Health is a state of complete physical, mental and social wellbeing not merely the absence of disease or infirmity*".

The rise in affluence for many has been accompanied, for many, by the predictable symptoms, sometimes collectively described as 'affluenza'. The NESC includes a call for a deeper understanding of these 'diseases of affluence' in its Strategy document, *People, Productivity and Purpose* (2005). The major new threats to health which grown in line with rising incomes and changing lifestyles include:

- Rising levels of obesity. 39 per cent of Irish adults are overweight and 18 per cent obese. Some 2000 premature deaths will be attributed to obesity in Ireland in 2005, a number expected to grow (DHC, 2005);

- Excessive alcohol consumption. The increase in disposable, discretionary income during the 1990s saw alcohol consumption per capita increase by 41 per cent, by far the highest increase in an EU 15 where 10 member states recorded decreases (DHC, 2004. It is conservatively estimated that alcohol is the primary cause of 25 per cent of all road collisions and 33 per cent of collisions resulting in fatalities;

- Significant drug abuse. The prevalence of drug abuse in Ireland (use of cannabis, amphetamines and ecstasy) is among the highest recorded in the OECD (OECD, 2005);

- A dramatic rise in the suicide rate. While an element of the recorded increase is due to a greater willingness to record it, the rate (per 100,000 persons) has almost doubled for the general population since 1980 and risen almost fourfold among those aged under 25. These rates of increase are among the highest recorded in the OECD and the level reached among young people in the year 2000 was the third highest of countries for which data was returned (OECD, 2005).

The NESC (2005) recommends that these new health challenges associated with affluence require strategies that strongly integrate prevention and cure. There is a role for enhanced awareness of the health risks associated with individual behavioural choices, increased social pressures to avoid behaviour damaging to one's own health, and improved access to a wide range of health services and new procedures for attaining maximum coherence across all types of concerned organisations.

Curiously, as David McWilliams (2005:12) has observed, many people in Ireland are not only immersed in "full on" consumption, including alcohol intake, but are also in the grip of a health kick:

> *We are fussier about what we eat, flocking to nutritionists and homeopathic practitioners, taking more Echinacea, devouring advice on healthy options, taking more Prozac and spending €21 million on L'Oreal skin cream.*

We may need to view these – apparently conflicting trends – in the light of studies that have begun to demonstrate that the traditional assumption that consumption *per se* is a proxy for welfare is deeply problematic. There are indications that welfare and economic growth are not so closely correlated as the traditional equation supposes.

Jackson and Marks (1998) conducted a study in the United Kingdom, which set out to assess the effectiveness of increasing personal consumption in improving quality of life. In other words, how successful is our consumer expenditure in satisfying the underlying needs? In particular, they wanted to know if a dramatic rise in expenditure in recreation and entertainment – observed in the UK between 1954 and 1994 – corresponded with an equally dramatic rise in the satisfaction of non-material needs[25] such as participation, identity and creativity. The writers suggest that we may be failing to satisfy our non-material needs and, subsequently, suffer from alarming poverties of identity, participation, affection and creativity. To explain this, psychologists have invoked a 'mismatch theory' to account for the emergence of symptoms of these gaps in fulfilment, noting an epidemic of irritability and aggression, of depression and paranoia, of obsessions, panics, addictions, compulsions, relationships that are not working, and careers that no longer satisfy. For Jackson and Marks (1998) the mismatch is between economic consumption and the very nature of human needs satisfaction. And therein, they observe a paradox:

> *Even consumption sectors such as recreation and entertainment, which cater to non-material needs such as idleness and participation, are dominated by expenditure on material goods. What this picture indicates is that we are consuming more and more in our attempt to satisfy needs which are, by their very nature, non-material.* (Jackson and Marks 1998:32)

The writers conclude that our burden on the natural environment is increasing, in spite of the fact that many consumers have long since satisfied their material needs for subsistence and protection. Indeed, as the new health dilemmas associated with the new affluence in Ireland suggest – the success of attempts to satisfy non-material needs is highly questionable in many instances. Two lessons may be drawn from the work conducted by Jackson and Marks in the UK context. Whereas the necessity to reduce our material impact on the ecosystem is normally seen as a threat to our 'standard of living', there is a counter argument and analysis, which suggests that it is some *existing patterns of consumption* that compromise our prospects for achieving the 'good life'. Revisioning the way we satisfy our needs is not necessarily the bitter pill of austerity. It is merely a necessary experiment in renewing and deepening our notion of human development, with a greater focus on non-material needs.

25 Jackson and Marks (1998:31) draw a distinction between two different sets of needs. The need for subsistence and protection can be thought of as 'material needs' as by their very nature they require some minimal level of material throughput to be satisfied. The other needs can conversely be considered 'non-material', as they do not, *per se*, require material satisfaction. Indeed, their satisfaction has more to do with processes than with objects.

3. The Consumer/Citizen is Sovereign – Conclusion

Stakeholder participation in decision-making is a persistent theme throughout this paper. Transparent decision-making, access to information, and participation can enhance the decision-making environment for policy makers and citizens alike.

Informed and empowered consumers are a powerful social and economic force. That is one of the conclusions of the Consumer Strategy Group set up by the Minister for Enterprise, Trade and Employment in March 2004. A number of the sectors that will be targeted by the new National Consumer Agency will have a direct influence on the prospects for sustainable development e.g. planning, transport, health, housing and the utilities, including the energy suppliers and telecommunications.

The period of the forthcoming NDP will be marked by consumer-led campaigns to champion the case for more balanced representation of interests in the face of the privileged position occupied by producers (and developers) in strategic decision-making.

While conflicts can sometimes arise in the pursuit of sustainable development between the short-term interests of consumers, and their long-term interests as citizens[26], steps could be taken to ensure that sustainable household consumption is recognised as an important platform for the advocacy of consumer rights and protections, in pursuit of quality of life and environmental justice.

The preparation of the new NDP also coincides with the mandate of the Taoiseach's Task Force on Active Citizenship. Missing from the terms of reference for the Task Force is any reference to the environment or sustainable development.[27] This is a serious omission, given the new challenges that will confront citizens and their communities in the context of sustainable development and the potential role of community-based organisations in awareness raising and delivery. Active Citizenship in the 21st century will be inseparable from our responsibilities to the environment and our contribution to the new strategic

26 Statement by Deirdre Hutton, Chairperson of the Scottish Consumer Council, which has embraced sustainable development. Monday 24 January 2000.

27 The Taoiseach announced the terms of reference for the Taskforce during parliamentary question time in Dáil Éireann on 15 November 2005 which are as follows:

- review the evidence regarding trends in citizen participation across the main areas of civic, community, cultural, occupational and recreational life in Ireland;
- examine those trends in the context of international experience and analysis;
- review the experience of organisations involved in the political, caring, community, professional and occupational, cultural, sporting and religious dimensions of Irish life regarding influences, both positive and negative, on levels of citizen participation and engagement; and
- recommend measures which could be taken as part of public policy to facilitate and encourage (i) a greater degree of engagement by citizens in all aspects of Irish life and (ii) the growth and development of voluntary organisations as part of a strong civic culture.

imperatives of the Republic, notably energy security and, by extension, our international responsibility to exercise responsible choices supportive of stability and peace in international relations.

Informed and empowered consumers can be a powerful force for the social, economic and environmental rights of citizens. Active Citizens can become a powerful force for the transformation of our communities, in pursuit of sustainability and quality of life. A quality of life dignified by local claims on the world's energy and natural resources, which do not deprive others of their fair share – wherever they reside.

Annex I

Recommendations:

The Consumer/Citizen Advocate – A new champion for sustainable consumption

- Invite the new National Consumer Agency to consider its role in supporting sustainable consumption.

- Invite the Taoiseach's Task Force on Active Citizenship to consider extending the terms of reference or incorporating consideration of the role of the active citizen in embedding sustainable development, notably through the adoption of and promotion of sustainable consumption patterns.

3.1. National

Energy

- Ireland's consumption of imported oil per capita increased by over 50 per cent between 1990 and 2002. While some of this high dependence on oil is inevitable given the island nature of the economy, Forfás has noted that some of our dependence has been a matter of choice as Ireland has adopted patterns of transportation, spatial development and energy production that are oil intensive.

- Preparations for the National Development Plan should take account of the *Green Paper* on medium- to long-term national energy options, currently being prepared by the Department of Communications, Marine and Natural Resources.

- Ireland needs to develop a national strategy to prepare for the challenge of 'peak oil'. Sweden has taken the lead, with its Commission on Oil Independence and subsequent strategy to radically reduce oil dependence by 2020. Similar steps could be considered for Ireland.

- Preparation of the National Development Plan should include provision for a risk assessment to take account of 'peak oil' and related energy issues, including energy security and projected energy/oil prices.

- The National Spatial Strategy provides an ideal platform to address a number of energy and energy-related challenges (e.g. combining energy and planning considerations; decentralising energy generation etc.). Compliance with the NSS should be monitored more forcefully, given the heightened strategic and economic importance of its potential to complement a sustainable energy strategy.

- The National Development Plan should include provision for a 'step change' in our approach to domestic energy generation. More consideration needs to be given to the infrastructure required to support "distributed generation" (e.g. combined heat and power, solar, micro-generation). This has the potential to take significant pressure off the electricity generation capacity, through encouraging homes and communities to provide more of their own electricity requirements and even to resell energy back to the national grid when not required. Distributed energy can work with renewables such as wind, solar, biomass and to a lesser extent gas.

- Ireland should undertake a number of initiatives to reduce the usage of oil in transportation, for example, by bringing about the replacement of the existing stock of vehicles with more fuel-efficient vehicles and the provision of alternative mode of transport, particularly public transport, that run on electricity rather than petroleum related fuels (e.g. electrified trams, trains and buses). The potential of using biofuels for transportation should also be investigated, in the first instance, in the public sector fleet.

- Ireland should consider a massive increase in the use of renewable energy sources for electricity generation (such as wind, wave, tidal energy etc.).

- Ireland should adopt a proactive approach to energy efficiency, seeking to place the country at the leading edge of energy efficiency practices.

- The EU Energy Performance Building Directive (EPBD), which came into effect in January 2006 will provide a basis for assessing and improving energy usage in commercial and residential buildings that is intended to result in a more efficient use of electrical energy.

- Social Housing construction should incorporate renewable energy technologies and the highest specification for energy efficiency.

- The National Anti-Poverty Strategy set targets to address fuel poverty in local authority dwellings, for 2007 and 2010. The new NDP should set aside funding to ensure that fuel poverty targets are met, and ensure continuous review of efforts to eradicate fuel poverty by, *inter alia*, supporting energy efficiency and renewable energy measures.

Transport

- Current spatial strategies and planning in Ireland militate against the development of an efficient and effective public transport system. The NSS outline provision for the development of regional gateways and hubs can play a key part in enabling urban communities to respond to the challenges of 'peak oil' and other energy-related challenges, including climate change. Those communities that are adequately resourced in terms of public transport infrastructure will have a greater choice in relation to how they respond.

- Controlling car dependency in Dublin (and to various degrees in other cities throughout Ireland) will depend on three things identified by Wickham (2006): 1) The *box* – or the framework of land use planning that reduces the overall need for journeys and which ensures that 'traffic generators' such as workplaces are located near public transport; 2) the *sticks* – measures that manage the demand for car travel by traffic calming, parking controls and road pricing; 3) the carrot – a public transport system that people can use.

- The NESC (2004) has called for the selection of programmes and projects on the basis of thorough, broad, cost-benefit analyses. A narrow cost-benefit approach to public transport investment decisions, which measure current demand and usage, would miss a fundamental aspect of urban development: transport not only connects *existing* places, it *makes* new places.

- Other NESC recommendations in support of sustainable transport, include:

    - Internal, as well as external, connectivity is vital to support a vibrant economy in which both business and consumer services play a dominant role in employment and an increasing role in competitive advantage;

    - Infrastructure to strengthen the gateways and hubs identified in the NSS should figure strongly in the new NDP;

    - Infrastructural plans for regional development need to be accompanied by, and related to, more articulation of the kind of economic engine that can drive and support more balanced regional development, including a prosperous rural economy and society;

    - The changing global market and the close link between energy policy and environmental policy should be reflected in the new NDP.

Construction

- During the period of the 2000-2006 NDP, the State was the largest single buyer of the output from the construction sector, accounting for some 30 per cent of total construction output. This level of support for the construction industry suggests that the State should be using a green public procurement programme to stimulate best practice in the construction industry e.g. energy efficiency, low impact construction design etc.

Housing and Social Exclusion

Issues to be addressed:

- Dispersed rural dwellings.

- A significant imbalance in policies and supports for the housing market has led to the exclusion of a significant minority of citizens from the immediate prospect of securing shelter in the private rented sector or through public housing.

- While local authorities and other non-for-profit organisations built 33 per cent of all residences in 1975, this figure fell to 7 per cent in spite of growing need for public housing, exacerbated by soaring house prices.

- As the need for social housing steadily grows, local authorities continue to sell off their housing stock at discounted prices. The result has been a modest net gain of only 2,300 units per annum over the past decade.

- Recent official estimates suggested that 48,000 families (approximately 140,000) people required social housing in 2002.

- Protection for Irish tenants compares badly to the conditions enjoyed by many of their European Union counterparts in relation to security of tenure and accommodation standards.

- Rapidly escalating house prices have pushed home ownership beyond the reach of many, impacting in particular on young people. Local estimates show that 42 per cent of new households in urban areas and 33 per cent nationally will be unable to purchase a home in the immediate future.

Measures for consideration:

- Innovative mechanisms (e.g. Consensus Forums, Open Space) to promote community-wide agreement on approaches to dispersed rural dwellings.

- A Rural Housing Sustainability Index, to promote sustainable development criteria for dispersed rural dwellings.

- The establishment of a new Community Housing tenure to provide housing for a broader range of income groups as well as local authority tenants and poorer households.

- Supports for the construction of at least 10,000 not-for-profit homes per year during the period of the NDP.

- A review of the policy of selling of local authority housing at discount rates.

- A long-term strategy for State acquisition of land for housing, at existing use value.

- Minimum standards required by law for the private rental sector.

3.2. European

Energy

- The European Commission recently launched a *Green Paper* that put forward proposals for a new comprehensive European energy policy, focusing on sustainability, competitiveness and security as the core principles. Forfás has noted that, in order to react to the challenges of high and volatile oil prices, increasing import dependency, strong growing global energy demand and global warming, Ireland should support the EU in elaborating a clearly defined energy policy.

3.3. International

Energy Geopolitics

- Energy choices, including choices made available to household consumers, have a direct bearing on levels of dependency on imported oil (and gas). Sustainable energy choices can contribute to a reduction in the potential for geopolitical instabilities linked to global competition for oil and gas.

3.4. Research Questions: Sustainable Consumption

Environment

- The ESRI Mid-term review of the 2000-2006 NDP described a variation in the extent to which environmental principles influenced management and delivery of OPs. Scott *et al.,* (2003) reported weaknesses in eco-auditing and considering the environmental implications of OPs.

- If sustainable development is to be meaningfully incorporated into the new NDP, these methodological and practical assessment issues will have to be resolved.

Measuring social inclusion

- The ESRI Mid-term review of the 2000-2006 NDP identified serious weaknesses in evaluating the impact of investment on social inclusion. The review also noted the absence of sanctions on those who did not meet social inclusion reporting requirements. Steps should be taken to addresses these methodological gaps in the NDP process, given the importance of continued support in, for example, the social housing sector.

Appraisal, Cost-benefit analyses, and Eco-auditing

- The ESRI Mid-term review of the NDP (2000-2006) referred to the need for an upgrade in the capacity of implementing Departments and the conduct of appraisals and cost-benefit analyses. In the context of sustainable development, the question of capacity-building in the conduct of appraisals and broad cost-benefit analyses is of critical importance.

- Expertise in assessing the potential of investment decisions to contribute to Ireland's new strategic energy requirements (reduced dependence on oil, diversification of energy supply, energy efficiency, climate change proofing) will be required throughout the OPs.

- Steps should be taken to address gaps in the environmental and sustainability auditing of the forthcoming NDP. Scott *et al*., (2003) concluded that at the level of the NDP, Eco-Audit Guidelines did not appear to have been followed and the most that could be said about their application at the level of NDP (2006) OPs and Plans was that a "useful but limited start has been made." The role and input of the pilot eco-audit in the overall programming process was marginal.

Energy

- Energy R&D should focus on increasing the efficiency of energy use in order to reduce demand, on bringing forward promising renewable energy technologies and on making the national energy infrastructure more efficient.

- Sustainable Energy Ireland has identified important data gaps during Ireland's first exercise in compiling energy consumption and GHG emissions statistics. They have called for further research to assess the extent that retrofitting has had on the efficiency of the housing stock, and for further research to establish the reasons for Ireland's high consumption of energy, electricity and energy related GHG emissions compared to the average for the EU-15.

- Barriers to consumer and community participation in innovative renewable energy generation projects should be examined as a matter of urgency.

- The insights and recommendations contained in the NDP-sponsored study by the Renewable Energy Partnership, *To Catch the Wind: The Potential for Community Ownership of Wind Farms in Irelan*d should be considered for implementation.

Policy Approaches

- OECD has recommended that national measures on sustainable consumption include: breaking the link between consumption and resource use and pollution; the Life Cycle Approach; upstream interventions; combined policy approaches, delivered across sectors; and support for private sector and civic organisation initiatives.

Endogenous Growth Theory, Demand Side Effects and Sustainable Development

- The ESRI Mid-term Review of the 2000-2006 NDP refers to the endogenous growth model (EGM) and the spillovers or externalities that arise from particular investments due to their public good characteristics. There may be some value in exploring ways to harness the principles of EGM to stimulate energy and other competitiveness gains from R&D and technology investments.

- Similarly, research should be conducted on the potential of the using the new NDP to harness demand side effects to help stimulate sustainable consumption.

Annex ll: Policy Drivers, Guidelines & Understanding Sustainable Consumption

Policy Drivers

Consumption has been the subject of debate in international policy circles since the early 1970s. However, the topic of sustainable consumption came to the fore in 1992 at the United Nations Conference on Environment and Development (the Rio 'Earth Summit') where delegates drew up Agenda 21, including Chapter 4 on changing consumption patterns:

> *The major cause of continued deterioration of the global environment is the unsustainable patterns of consumption and production, particularly in the industrialised countries.*

The sustainable consumption agenda proved to be a step too far for most governments. At the UN's World Summit on Sustainable Development (2002) in Johannesburg, delegates recommitted to the development of effective measures, specifically the "development of international programmes to accelerate the shift towards sustainable consumption and production patterns that will promote social and economic development within the carrying capacity of ecosystems."

The UN and its agencies have developed a number of initiatives since the Johannesburg Summit. The latest and perhaps most significant of these is the United Nations Environment Programme (UNEP) – UN Department for Economic and Social Affairs (DESA) sponsored Marrakech process (2003), which has developed a ten-year Framework on sustainable production and consumption. The Framework includes the following actions:

- To identify specific activities, tools, policies, measures and monitoring and assessment mechanisms including, where appropriate, life-cycle analysis and national indicators;
- To adopt and implement policies and measures aimed at promoting SCP patterns and improving the environmental profile of products and services;
- To develop awareness-raising programmes on the importance of SCP patterns, particularly among youth, through education, consumer information, advertising and other media; and
- To increase eco-efficiency, with financial support from all sources, where mutually agreed, for capacity building and technology transfer.

UNEP's work has been criticised for dodging the issue of consuming less and placing too much emphasis on merely altering consumption patterns, in order not "to scare its Northern members". (Fuchs and Lorek 2004:10).

The Organisation for Economic Cooperation and Development (OECD) has been working on sustainable consumption since 1994. The work commenced at a seminar[28], where it was conceded that the OECD

28 See URL: http://www.iisd.ca/linkagers/consume/mit.html

includes countries with about 20 per cent of the global population consuming almost 80 per cent of the world's resources. The OECD programme has explicitly concentrated on specific **household consumption** areas, such as consumption of:

- Food,
- Energy,
- Water,
- Waste generation,
- Travel, and
- Tourism

The main outputs from the OECD's work are frameworks and objectives of governmental policies and an analysis of the effectiveness of different types of policy instruments (regulatory, economic, social) in influencing consumer decision-making.

The European Union has developed strategies and policies for sustainable and consumption and production (SCP). These are divided into general policy frameworks and environmental policy areas targeting specific issues. However, most policies are designed primarily with a view to addressing 'production' rather than 'consumption'.

Table 1: EU strategies and policies for sustainable production and consumption

General Policy Framework	Specific environmental policy areas
• Lisbon Strategy of Economic and Social Renewal (2000) • 2001 Sustainable development Strategy • European Commission's Social Policy Agenda for 2000-2005 • The Community guidelines on State aid for environmental protection (2001) • 6th EU Framework Programme for Research and Technological Development (2002-2006)	■ Thematic strategy on the Sustainable Use of Natural Resources ■ Thematic Strategy on Waste ■ Integrated Product Policy (IPP) ■ EU Environment Technology Action Plan (ETAP) ■ 2002 Commission Communication on Corporate Social Responsibility ■ 2001 Commission Interpretive Communication on environmental considerations in public procurement ■ 2001 Commission Interpretive Communication on social considerations in environmental policy ■ 2004 Communication on Member States' use of market-based instruments on environmental policy ■ 2002 EU Consumer policy strategy for 2002-2006

Source: Dalhammar and Mont 2004

The 6th EU Framework Programme for Research and Technological Development funded five EU-wide projects that aim at addressing consumption-related problems. The HOMESERVICE project investigates a wide variety of services that are currently provided to households and aims to estimate their dematerialisation potential. MOSES – Mobility Services for Urban Sustainability is a project that looks at the possibilities of replacing car ownership with car sharing. FESCOLA – Feasibility and Scope of Life-Cycle Approaches to Sustainable Consumption – aims to outline how life cycle assessment (LCA) and similar approaches, such as environmental input-output analysis, can be used to advance the sustainable consumption agenda. TOOLSUST is a project that evaluates the environmental situation in five European cities and suggests ways for households to contribute to improving the current situation. It aims to develop tools for sustainable consumption in close collaboration with stakeholders. EMUDE – Emerging Users Demands for Sustainable Solutions – is a project that aims to map out emerging sustainable users' demands and to develop a set of qualitative scenarios on how these demands and specific products and services may co-evolve.

The EU Sustainable Development Strategy

The overall aim of the EU Sustainable Development Strategy (2006) is to identify and develop actions to enable the EU to achieve continuous improvement of quality of life both for current and for future generations, through the creation of sustainable communities able to manage and use resources efficiently and to tap the ecological and social innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion.

The Strategy sets overall objectives, targets and concrete actions for seven key priority challenges for the coming period until 2010, many of which are predominantly environmental:

- Climate change and clean energy
- Sustainable transport
- Sustainable production and consumption
- Public health threats
- Better management of natural resources
- Social inclusion, demography and migration
- Fighting global poverty

Education, research and public finance are stressed as important instruments in facilitating the transition to a more sustainable production and consumption patterns.

OECD Guidelines

The OECD has set out broad policy guidelines to promote sustainable household consumption.
In summary, these guidelines are:

Shift the structure of consumption: There is a broad consensus that policies affecting aggregate consumption, without differentiating for the type of consumption, are inefficient compared to policies that change the ratio of consumption to natural capital (decoupling consumption from resource use and pollution emissions). The preferred strategy is therefore "consuming differently" (i.e. opting for products and services requiring fewer resources and causing less pollution).

Change both the "hardware" and "software" of consumption patterns: Analysis of the driving factors behind the development of specific consumption patterns is critical to determining the relative emphasis that needs to be given to changing the "hardware" (infrastructure) and/or "software" (behaviour).

Use a life-cycle approach for determining points of policy intervention: Decoupling environmental pressures from economic growth, while continuing to satisfy human needs, requires a life-cycle approach to addressing consumption and production patterns, including encouraging more efficient resource use.

Upstream intervention is generally more efficient: Generally speaking, upstream intervention (economic and legal instruments targeted at producers) should be strengthened in order to reduce the effort needed by consumers.

A combination of policies will be most effective in stimulating change: One of the key conclusions emerging from government successes in past years to slow (energy) or reverse (water) consumption increase is that a combination of policies is more effective than one instrument applied in isolation.

Ensure integrated, cross-sector policies: Because of the range of economic, socio-demographic, technological and other influences that shape consumption patterns, promoting more sustainable patterns requires integrated, cross-sectoral policies that give consistent messages to consumers. Despite this, household consumption today remains a peripheral issue in most OECD countries.

Promote and support initiatives by private sector and civic organisations: There are many options for influencing consumption patterns. This requires a multi-stakeholder approach, including public policy, market innovation, NGO, and consumer advocates.

Understanding Consumption: as Evolutionary Adaptation (Jackson and Marks (1998:31))

Modern theories of evolutionary psychology suggest that consumer behaviour is conditioned in part at least by sexual competition. Amongst the behaviours predicted by evolutionary psychology are display and status-seeking behaviours. Such behaviours have been the focus of sociological discourses on consumption for well over a century. Veblen's notion of *conspicuous consumption*, and Hirsch's concept of *positional goods* both point to the importance of material goods in social positioning. Hirsch also points to the dynamic nature of this kind of consumption. We must run faster and faster to stay in the same place, because our competitors are also engaged in the race. Though evolutionary psychology appears to offer some legitimation for this behaviour, social critics argue that it remains pathological. Policy suggestions include reducing the incentive for positional consumption, addressing social inequality and promoting social and ethical 'goods'.

Understanding Consumption: 'Ordinary' Consumption and Consumer 'Lock in' (Jackson and Marks (1998:31))

Some recent work argues that conspicuous and status-seeking aspects of consumer behaviour have been over emphasised. Ordinary, every-day consumption, argue these authors, is not particularly oriented towards display. Rather it is about convenience, habit, practice, and individual responses to social and institutional norms. Far from being willing partners in the process of consumerism, consumers are seen as being 'locked in' to a process of unsustainable consumption over which they have very little individual control. This perspective identifies a vital role for government in shifting the institutional architecture of consumer 'lock in'.

Understanding Consumption: The Symbolic Role of Consumer Goods (Jackson and Marks (1998:31))

In spite of these reservations, there is one feature of display consumption which has much wider connotations than its application to status-seeking behaviours. This is the insight that consumer goods play vital symbolic roles in our lives. Drawing inspiration from anthropology and social philosophy this idea also has a popular resonance. We value goods not just for what they can do, but for what they represent to us and to others.

The explanatory uses of this hypothesis are diverse. One of its applications lies in understanding the role of commodities in constructing and maintaining personal identity. The symbolic properties of goods allow us to see material possessions as part of our 'extended self'. Some authors see the continual construction and reconstruction of identity through consumption as a defining feature of modernity.

Goods can also communicate belongingness, affiliation, group identity, allegiance to particular ideals, and distance from certain other ideals. Equally important are the insights that connect the symbolic role of consumer goods to our 'higher' self-actualisation needs. There is evidence that material goods occupy a vital role in the search for meaning in our lives. Consumerism occupies a role once fulfilled by religion, allowing us to construct narratives and rituals to make sense of our lives, and to protect the ideas we wish to live by. Though our attempts to achieve this ultimately fail, the role of consumer goods in this respect is an important one. Clearly, there are groups of products e.g. Fair Trade, that provide individuals and communities to identify with norms and values integral to sustainable development. Perhaps the Government should be doing more to identify these opportunities and promote them, as they also generate significant moments of learning.

Annex III: Tabular summaries of key drivers of sustainable household consumption in the residential energy, food and mobility sectors

Table 1: Summary of key influences on household energy consumption

Household Consumption	Key influences on sustainability of household energy consumption				
Energy	**Socio-demographic:** Household size and structure; age; behavioural factors; lifestyle; attitudes.	**Energy Supplier:** Efficiency; exergy content of energy carrier.	**Living situation & climatic conditions:** Per capita floor space; dwelling type; structural surroundings; age of dwelling; standard insulation; government requirements; penetration of household appliances.	**Economic factors:** Disposable income/ purchasing power, consumer prices, spending patterns, availability of credit.	**Technology:** Energy efficiency of household appliances.

Table 2: Key influences on mobility and travel consumption

Household Consumption	Key influences on mobility			
Mobility	Transport options: Efficiency and availability of public transport; distance to mass transit; transport technology and infrastructure; speed of movement.	Living situation: Building density; location in urban versus peripheral area/distance from city centre; local availability of service provision/ administrative spatial management; amount of open space; diversity; design; parking opportunities; settlement behaviour of forms; dwelling characteristics.	Economic factors: Prices: fuel, public transport, land, cars, (subsidies), (disposable) income, household expenditures.	Socio-demographic: Gender, age, education, household size (especially, numbers of children in households); (environmental) attitudes; lifestyle; leisure behaviour; car ownership; work hours (amount and flexibility); social structures (differentiation between home and work).

Table 3: Summary of key influences on household food consumption

Household Consumption	Key influences on sustainability of household food consumption				
Food	Socio-demographic: - age, size of household, lifestyle, education, knowledge, women joining the workforce, time/ convenience, shift to expert knowledge, value of ecological aspects, social relevance of meals, enjoyment and health, community structure	Household technology: - Cooking and cooling technology	Economic factors: - Prices (disposable) income, household expenditure pattern	Product chain: - transport, processing, packaging	Agricultural production conditions: - Fertilizer, pesticides, greenhouse production, intensity of cultivation methods, farm structure.

References

Carlsson-Kanyama, Annika, Linden, Anna-Lisa 1999, 'Travel patterns and environmental effects now and in the future – Implications of differences in energy consumption among socio-economic groups', in *ecological economics* 30 (3), pp.407-417.

Christie, Ian and 6, Perri 1998, *The Good Life*, Demos Collection, Redwood Books.

Coenen, Frans, Fuch, Doris, and Peppel, Rob van der 2000, 'The Environment and Social Well-being'. Enschede: Centre for Clean Technology and Environmental Policy.

Colley, Jeff 2006, 'Fingal Commits to Sustainable Building', in *Construct Ireland for a sustainable future*, Issue 12, Vol 2.

Csikszentmihalyi, Mihaly 1990. *Flow: The Psychology of Optimal Experience*. New York: Harper and Row.

Cooper, Andrew 1998, 'The man who found the flow', *Shambala: Buddhism, Culture, Meditation, Life*, an online journal at: http://www.shambhalasun.com/index.php

Dalhammar, C. and Mont, O, 2004, 'Integrated Product Policy and sustainable consumption: At the cross-roads of environmental and consumer policies', International workshop, 'Driving forces and barriers to sustainable consumption', University of Leeds, UK.

Diepen, Albertine van 1999, 'Sustainability and Planning: Does Urban Form Matter?', Paper read at the Second International Symposium on Sustainable Household Consumption, 3-4 June, at Groningen-Paterswolde.

Dunlap, R.E. 1991, 'Public Opinion in the 1980s: Clear Consensus, Ambiguous Commitment', Environment 33: 10-15, pp.32-37.

Dürrenberger, Gregor, Patzel, Nikola 1999, 'Energy Metabolism of Swiss Households'. Paper read at The Second International Symposium on Sustainable Household Consumption, 3-4 June, Groningen-Paterswolde.

Environmental Protection Agency, Sweden, 2005, 'Sustainable Consumption: Research and Policies', Stockholm.

Fuchs, Doris, Lorek, Sylvia 2000, 'An inquiry into the impact of globalisation on the potential for 'sustainable consumption' in households'. Report presented at the Workshop on Sustainable Household Consumption: Impacts, Goals and Indicators for Energy-use, Transport and Food, ProSus/CSTM, Enschede, 17-19 November 2000.

Fuchs, A and Lorek, S 2004, *Sustainable Consumption. Political debate and actual impact*. Vienna, Sustainable Europe Research Institute (SERI).

Goodland, R. 1998, 'Environmental Sustainability: Eat Better and Kill Less. In *The Business of Consumption*, edited by Laura Westra and Patricia H Werhane, Rowman & Littlefield Publishers, Maryland.

Gray, N.F. and Carton-Kenney, M. 2004, *A rural housing sustainability index: background to development*, Proceedings of the Institution of Civil Engineers, Municipal 157, 2004, Issue ME0, pp. 1-9.

Hoyer, Karl, Holden, Erling 1999, 'Housing as Basis for Sustainable Consumption', Paper read at The Second International Symposium on Sustainable Household Consumption, 3-4 June, at Groningen-Paterswolde.

IIED 1998, *Consumption in a Sustainable World: Report of the Workshop Held in Kabelvåg, Norway, June 2-4 1998, Ministry of the Environment, Oslo and International Institute of Environment and Development, London*.

Keelan, Conor, Henchion, Maeve, and Newman, Carol 2005, 'Eating Out on the Celtic Tiger', Paper contributed to The Economics and Policy of Diet and Health EAAE Seminar, University of Reading, April 21-22 2005.

Kenworthy *et al.,* 1997, *SceneSusTech*

Linderhof, V.G.F., Kooreman, P. 1998, 'Economic Aspects of Household Metabolism', in *Green Households? Domestic Consumers, environment, and Sustainability*, edited by Klaas Jan Noorman and Ton Schoot Uiterkamp, London, Earthscan.

Lorek, Sylvia, Spangenberg, Joachim H 2001, 'Indicators for Environmentally Sustainable Household Consumption', in *International Journal of Sustainable Development* 4(1).

McWilliams, David 2005, *The Pope's Children: Ireland's New Elite*, Gill and Macmillan: Dublin.

Moll, Henry 1999, *Facts and Visions on Food*, University of Groningen.

Mont, O. 2001, 'Introducing and Developing a Product-Service System (PSS) Concept in Sweden', Lund, IIIEE, Lund University and NUTEK, IIIEE Reports 2001:6, pp.124. National Economic and Social Council 2005, *NESC Strategy 2006: People, Productivity and Purpos*e, December 2005.

O'Donohue, John 2004, *Divine Beauty: The Invisible Embrace*, Bantam Books: London.

OECD 2002, 'Towards Sustainable Household Consumption?: Trends and Policies in OECD Countries', Policy Brief, July 2002.

Jongen, Wim, Meerdink, Gerrit, 1998, *Food Product Innovation: How to Link Sustainability and the Market*, Wageningen Agricultural University.

Offer, A 1997, 'Between the gift and the market: the economy of regard', in *Economic History Review*, L,3: 450-476.

Ofstad, S (ed) 1994, *Symposium: Sustainable Consumption*. Ministry of Environment, Oslo.

Princen, Thomas, Maniates, Michael and Conca, Ken (Eds.) 2002, *Confronting Consumption*, MIT Press, Cambridge, MA.

Princen, Thomas 2005, *The Logic of Sufficiency*, MIT Press, MA.

Renewable Energy Partnership 2004, *To Catch the Wind: The Potential for Community Ownership of Wind Farms in Ireland*, Western Development Commission, Ireland.

Sachs, Wolfgang 1999, *Planet Dialectics: explorations in environment and development*, Zed Books, London.

Sage, Colin 2001, 'Embeddedness and the Geography of Regard: Good (Agro-)Food Networks in South West Ireland', Department of Geography, University College Cork, Republic of Ireland.

Scott, S., Bacon, P., and Fry. J. 2003, 'Evaluation of Eco-Auditing in the context of the National Development Plan 2000-2006', ESRI.

Schmoranz, Ingo, ed. 1994, *Die Energienachfrage privater Haushalt*, Edited by W.A. Müller. Vol.95, *Wirtschaftswissenschaftliche Beiträge*, Physica-Verlag, Heidelberg.

Spaargaren, Gert 2006, 'Sustainable Consumption and Society', Discussion paper for the ISA-RC-24 conference, Madison, Wisconsin, June 2-3 2006.

Stagle, Sigrid, O'Hara, Sabine U 1999, 'Preferences, Needs and Sustainability –The Case of Local Food Markets'. Paper read at The Second International Symposium on Sustainable Household Consumption, 3-4 June, Groningen-Paterswolde.

UNEP 2001, *Consumption Opportunities: Strategies for change*, United Nations Environment Programme, Paris.

Diepen, A.L.M. van 1998, 'Developments in Household Composition in Europe', in *Green Households? Domestic Consumers, Environment, and Sustainability*, edited by Klaas Jan Noorman and Ton Schoot Uiterkamp, Earthscan, London.

Wal, Jack van der, Noorman, Klaas Jan 1998, 'Analysis of Household Metabolic Flows', in *Green Households? Domestic Consumers, Environment, and Sustainability*, edited by Klaas Jan Noorman and Ton Schoot Uiterkamp, London, Earthscan.

Wickham, James 2006, *Gridlock*, Tasc, New Island, Dublin.

Wiltling, H.C, Biesiot, W 1998, 'Household Energy Requirements', in *Green Households? Domestic Consumers, Environment, and Sustainability*, edited by Klaas Jan Noorman and Ton Schoot Uiterkamp. Earthscan: London.

Sustainability in the National Development Plan 2007-13

Recommendations from Comhar SDC as approved by Council 20 September 2006[1]

COMHAR SDC RECOMMENDATIONS FOR NDP 2007-13

1 These recommendations will be followed by a note on 'Capital Investment in Key Sectoral areas' following the 'National Development Plan – towards sustainability' conference October 4-6, 2006.

Preface

We welcome the decision to formulate and implement a new National Development Plan, recognising that this approach to national investment management might have been shelved now that it is not required as a condition for the drawing down of EU funding.

We regard the investment programme 2007-13 as a once in a generation opportunity to make Ireland a truly productive and sustainable society. If we get it right, we can face all of the challenges, vicissitudes and opportunities that the world has to offer with equanimity and confidence. Our input is to help achieve this fit between what we do and what we most need to do to secure our future economically, socially and environmentally.

The effectiveness of an investment programme is determined by three factors: *what* is invested in, *how* it is done, and the *quality of maintenance and management* once it is in place. Mistake making is part of the human condition, but it is important in implementing NDP 2007-13, that our mistakes be new ones. Our good and bad experience with previous investment programmes provides evidence to inform all three of these dimensions.

This is in a sense an interim report. We have organised a conference to be held October 4-6 2006 – 'Towards Sustainability in the National Development Plan 2007-13' wherein where we stand and the options for moving towards sustainability will be presented and discussed in regard to: the macro economy, quality of life, industry, shaping rural life, including agriculture and forestry, energy, transport, and households. However, in preparing this interim view, we have had the benefit of the draft briefing papers, which have been prepared for the conference, and have also got feedback from some members of our Council and others.

This note is structured as follows: A detailed Executive Summary provides key points. The Introduction provides a national and EU context, and then the template provisionally proposed by the Department of Finance (DOF) – *Broad Content, Preparation Process and Reporting Arrangements of next NDP* as provided to Comhar is used to successively address:

- Economic and fiscal framework
- Investment priorities at sectoral level
- Alignment of NDP with spatial strategy
- Capital investment in key sectoral areas, including housing, transport, aviation, energy, communications, environmental services, education, health, child care, agriculture, tourism, industrial promotion and research and development and other areas

- Role of PPPs
- Investment in human capital
- Social inclusion, aligned with National Action Plan against Poverty and social exclusion
- Factors impacting on efficient infrastructure delivery (capital appraisal, project management, procurement policy, planning, environmental issues etc.)
- Environmental impact
- Other horizontal issues including rural impact and gender issues
- North/South and East/West impact
- Monitoring and management/implementation arrangements

As regards Implementation and Reporting Arrangements, it is envisaged by DOF that the NDP will focus on three Strategic Investment Sectors (1) Economic and Social Infrastructure, (2) Human Resources, including non-capital social inclusion schemes and (3) Productive sector investment. Reporting would be structured around the three Strategic Investment Sectors, each with an individual Monitoring Committee and Lead Department, reporting to a Central NDP Monitoring Committee. Standardised reporting templates will be developed focused on financial and physical targets and outputs with account taken of horizontal impacts such as promotion of Social Inclusion. Our perspective is embodied in our Executive Summary.

In addition to benefiting from the preparatory work for our conference, Comhar's previous work, the advice of our Council members, and the European Union policy context, our analysis and recommendations are especially informed by *Towards 2016 – Ten year Framework Social Partnership Agreement 2006-2015*[2], and *NESC Strategy 2006: People, Productivity and Purpose*[3], hereafter referred to as 'Towards 2016' and 'NESC Report' respectively.

2 Department of the Taoiseach, Dublin 2, June 2006

3 National Economic and Social Council, Dublin 1, December 2005.

Executive Summary

Our recommendations follow the chapter outline proposed by the Department of Finance. In this Executive Summary we first outline the elements in which we identify what we consider would characterise excellence in NDP 2007-13 – these are also the criteria by which we propose it be evaluated and monitored. This is followed by the key points we make in regard to each of the chapters proposed by Department of Finance. We are proposing one new chapter, namely one devoted to Environmental (Natural and Built Heritage) Capital. The reader is referred to the detailed responses for more context and justification of our views.

ELEMENTS THAT WOULD CHARACTERISE EXCELLENCE IN NDP 07-13

The Right Taxonomy for Evaluation

Replace the 3 part taxonomy proposed by DOF for the investment programme namely (1) Economic and Social Infrastructure, (2) Human Resources, including non-capital social inclusion schemes and (3) Productive sector, with the following 4-part taxonomy: Infrastructure; Other physical; human (including social); environmental (natural and built heritage). This would better map the capital stocks model proposed.

Indicators of Excellence

1. Is there Target Setting, Output Bias and Monitoring?

The main point of investment is to provide a combination of more, new or better outputs. There needs to be a focus, and the investment design, implementation and management needs to have *output delivery* as its *primary focus*.

Monitoring and evaluation of progress needs to be broadly based and to cover social and environmental aspects as well as financial and economic criteria. Monitoring and reporting on cross-cutting issues require expert interpretation of properly gathered data referring to objective criteria, all carried out in a transparent and verifiable process.

A key issue in monitoring is identifying the *counterfactual or baseline* – what would have happened in the absence of the investment in question. Unless this is identified at the outset, there is no fulcrum against which to judge performance over the life of the investment. What can't be measured can't be evaluated, so the indicators of performance need to be pre-specified, the means of measurement identified, and credible mechanisms for delivery identified and supported with the requisite logistics and finance.

Comhar proposes that its *Principles for Sustainable Development* be applied to provide the basis for a sustainability bench-marking tool for policies and programmes. We believe that these Principles can provide the basis for an over-arching assessment mechanism for measuring progress on the implementation of the new NDP.

The organisations identified as driving the monitoring etc. need to be identified in the Plan. Comhar SDC will report annually on the effectiveness or otherwise of the mechanisms put in place.

2. Are there mechanisms in place that will deliver Cost Effectiveness?

Our systems should be designed to deliver the investment outcome desired at least cost, consistent with environmental and social objectives

3. Does the Plan Foster Innovation?

Our cost base is now such that only continuing innovation can save us from becoming a backwater. Notwithstanding having the largest per capita house and road construction industries in the developed world, there are few if any innovations in design, materials, methods or management that are not imported. Likewise, major investments in energy, health, education and communications infrastructure are not associated with innovation. Each of our major investment programmes should have funds and support ring fenced – 1 to 5 per cent of total expenditure, depending on the potential innovation dividend – to advance the innovation agenda. This would include funding for research development and demonstration, embedding a culture of innovation in some companies, and associated team building in the universities, and the encouragement of pilot projects that would stimulate the generation and testing of new approaches.

4. Does it support Quality of life?

Quality of life is a composite of many elements – income, employment, security, productive family and social interaction, romance, good health, mobility, intellectual and cultural stimulation, access to services, high quality natural and built environment, and beauty. The Plan should aim at providing the option of living and working in a relatively stress free and beautiful environment, where we have an attractive and interesting set of mobility choices – walk, cycle, train, bus, car – and where we are facilitated and enabled to work and to enrich ourselves culturally, intellectually and socially to the extent that we wish to do so.

5. Are other Policy Instruments appropriately and effectively mobilised?

The suite of policy instruments that we can mobilise to improve performance and change outcomes is wide, and includes: pricing, taxes and charges; subsidies; regulation (directives, laws and regulations), information that empowers producers and consumers; voluntary and negotiated agreements, whereby agents make voluntary commitments to meet certain targets, procedures or objectives; zoning and land use planning, research and development to create new choices; location decisions and public purchasing decisions. There has to be a 'fit' between these and the investment portfolio in NDP 07-13, otherwise it will not deliver to its potential.

Coherence between the NDP, the National Spatial Strategy, 'Towards 2016', the revised National Climate Change Strategy, the 'National Biodiversity Plan' and the National Sustainable Development Strategy will be essential to the delivery of optimal outcomes.

6. Does it Support Fairness?

The investment programme will inevitably favour some interests, individuals and communities more than others. It is important that the beneficiaries be identified, and that where possible investment support those most in need, however defined. The Spatial Analysis will give an indication as to how the benefits are distributed spatially. This should be complemented with indicators, which show how they are distributed as regards income, with the objective of ensuring that those most in need benefit appropriately.

7. Does it Recognise and help Correct for Market Failure?

Markets untrammelled fail to protect environmental and open access natural resource endowments. In belonging to everyone, they belong to no one. There is no price for air and water quality, for the use of the atmosphere to absorb ozone depleting chlorofluorocarbons (CFCs) or climate changing greenhouse gasses that signifies that these are scarce endowments. The (external) costs of disposing of waste can be passed on to society as a whole beauty in buildings and landscapes (external benefits) can't be captured directly in markets. Without intervention, market forces will drive these life support systems, and open access ocean fishery resources, towards destruction.

By definition, these external costs and benefits are not valued in markets. However, there are a variety of well-developed and tested techniques for providing proxy values that give us guidance as to the magnitude of the losses imposed and the benefits foregone. Carefully done analyses will help direct investment towards where the greatest net benefits to society are likely to be found and the resources to do so should be provided in the Plan.

8. Does it Achieve Low Operating Costs?

The 2007-13 period is likely to be a unique window of relative richness as regards the capacity and willingness to undertake sustained investment. With a less well-endowed future, it is important that the investment we make now be designed and implemented so as to minimise the burden of maintenance and management. If depreciation rates and operating costs are low, this will facilitate both sustaining the existing investment, and releasing resources for new investment. It will also, in many cases, reduce the environmental burden, e.g. investment in highly energy efficient building. But achieving lower annual costs in the future usually requires more investment up front. We should tend to make the trade-off in favour of low operating costs.

9. Does it Foster Design and Beauty?

The 2007-13 period will be important in determining if, for the rising generations, Ireland is a beautiful place to work and live. But beauty does not happen without encouragement. It takes skills in design and engineering, it takes courage on the part of the investors, it takes a public willing to foster and facilitate, it takes attention to detail, and meeting the challenge of combining good function and positive sensory impact. If the public investment programme in the NDP makes a conscious effort to foster beauty, it can have a positive and transforming effect.

10. Is there effective Linkage to Northern Ireland Plans and Programmes?

The Strategic Investment Board (SIB) in Northern Ireland and the Sustainable Development Commission (NI) are operating a process that provides an ideal opportunity to collaborate in regard to mutually beneficial opportunities.

11. Is there Alignment with Spatial Strategy?

There needs to be constant reference to the spatial dimensions of performance, with investment favouring those locales that are advantageously placed re. rail links etc. to develop in ways that impose low pressures on environment and other endowments.

A. ECONOMIC AND FISCAL FRAMEWORK

Re-title this chapter Economic and Fiscal Framework and Socio Economic and Environmental Context and address in a very summary fashion environmental and social trends that are linked to the economy and fiscal framework.

It should also identify the three forms of capital and their management as salient to understanding sustainable performance, and that this categorisation will be used later on.

B. INVESTMENT PRIORITIES AT SECTORAL LEVEL

This is an opportunity to lay out the aggregate investments in physical (infrastructure and other), human (including social), and environmental (natural and heritage) capital, what the overall outcomes are expected to be, and how they relate to and re-enforce each other. Charts showing such linkages would clarify understanding.

C. ALIGNMENT OF NDP WITH SPATIAL STRATEGY

Investment and (especially) the outputs associated with the NDP should be directly linked to clusters of gateways and hubs, organised in ways – regions and provinces – that have some emotional, governance-related and practical relevance in people's lives. These should be represented as performance criteria in the chapter on monitoring and management/implementation arrangements. The size and speed of delivery of allocations should depend on the quality of the plans and implementation schedules proposed.

D. CAPITAL INVESTMENT IN KEY SECTORAL AREAS

The specifics as regards Comhar's priorities will be presented after the conference October 4-6.

E. ROLE OF PUBLIC PRIVATE PARTNERSHIPS (PPPs)

Spell out the public interest, and the pre-requisites for success and how they will be assured, and ensure that sustainability concerns – and notably environmental costs and benefits associated with PPPs – are understood and appropriately addressed.

F. INVESTMENT IN HUMAN CAPITAL

Comhar SDC strongly supports the proposition that Ireland becomes a leading knowledge society in Europe, and that NDP 2007-13 be focused on achieving this objective. Making Ireland a sustainable society requires that we widen and deepen our educational programmes focussed on understanding the concept and how it can be advanced, that these be integrated into our curriculae at all levels, and that we provide all our citizens with the opportunity to enrich their understanding and engagement.

The *Sustainable Development ERTDI research programme 2007-13* needs to develop how to integrate environment and social considerations into national accounting and investment planning and decision-making. We need to focus in Ireland on how to link knowledge to empower citizens, create business opportunities from the sustainability agenda, and move to create a critical mass at third level institutions that ensures they become international leaders in selected fields.

There should be an explicit programme designed to invest in human capital at local level addressed to both local authorities and civic society.

G. INVESTMENT IN ENVIRONMENTAL (NATURAL AND BUILT HERITAGE) CAPITAL

(Proposed new chapter)

By natural and heritage capital we mean the support systems that sustain life, including catchments and wetlands that provide us with freshwater, absorb and de-toxify waste and provide water storage to diminish the impact of flood events, air sheds that allow us to breathe clean and healthy air and enjoy vistas, wildlife and biodiversity that sustains the web of life and allow us to enjoy nature, open spaces where we can recreate and get away from ourselves, salt marshes that are the main incubation places for our fish stocks, and buffer us against storms and coastal flooding, our oceans that are the ultimate source of life, and our buildings and human artefacts of distinction, that represent the best of what our ancestors have endowed us with.

And all of these play an important role in providing recreation and fitness opportunities for us and our children, and create a basis for many forms of tourism, both passive and active. Many of the investments to be undertaken in the NDP fall into either protecting or enhancing these endowments. And many of the other investments impact on them also. This categorisation will also facilitate later integration of the Climate Change and Biodiversity strategies into the NDP framework.

This category of investment needs to be recognised separately; otherwise it *de facto* becomes a residual 'protective' category, not given parity of esteem and its role as a key vector of well-being and ultimately of economic and social performance and quality of life is diminished.

H. SOCIAL INCLUSION

Inclusion is achieved by ensuring that all of us have access to the resources capacities and organisational structures to: participate in the democratic process – voting and representing; education and information; employment; start businesses; and participate in decisions about our neighbourhood, including especially its shared resources, spaces and facilities.

The former governor of California Edmund Brown Jr. observed: *As long as Peter and Paul are in the same room, I think you can make a wise set of choices. It's only when you rob collective Peter to help selective Paul that you get into your problems.* The investments in social inclusion need to always favour – and be seen to favour – collective Peter – the public interest – and in particular those categories not generally at the decision table. We need to find modes of participation that are fair, consistent, informed and time bound, involving Civic Society in all its dimensions.

I. EFFICIENT INFRASTRUCTURE DELIVERY

There are two aspects to delivering infrastructure efficiently. The first is to measure adequately all of the main costs and benefits involved. The second is to have an organisational structure in place with the requisite skills and motivation to deliver the project 'on the ground' in time, to the requisite quality and within budget. There has been criticism of the competence with which parts of the 2000-06 programme have been delivered. It is important that for NDP 2007-13 every effort is made to ensure that competence is manifest, and – as important – is seen to be so.

It is important that a mechanism for framing the estimation and evaluation of direct and indirect (internal and external) costs and benefits be put in place to provide insights to the implementing agents on the values appropriate to the estimating of external effects. This work will yield systematic insights to assist the implementing agents.

The government departments, agencies, State organisations and local authorities designated to deliver the programmes should be assessed as to their ability to in effect meet best international practise in their personnel and structures, accepting that many now have the requisite attributes to be licensed to act, and appropriately resourced where there are gaps.

J. ENVIRONMENTAL IMPACT

This chapter should be re-titled 'Environmental Assessment and Management' to better capture best practice terminology and procedures. We should adopt Integrated Assessment using the DPSIR framework, recognising that it will take time to develop the requisite data and modelling capabilities. In the interim, a framework linking environment to European policy requirements, the three capital stocks [physical, human, environmental (natural and heritage)], and the economy should be established as a basis for preliminary assessment. The R&D specified above in 'Human Capital' should be used to advance the Integrated Assessment objective.

K. OTHER HORIZONTAL ISSUES

The focus here should be 'Community Engagement' using the same spatial template proposed to deal with integration with the National Spatial Strategy, accepting that there will be many 'communities' in each unit. The recently appointed Task Force on Active Citizenship[4] is a potentially important interface in identifying how to achieve productive interaction as the investment portfolio is rolled out. Ensuring community engagement and involvement of Civic Society that is consistent with the mandate of local and regional elected members and associated staff is important to achieve, and the most effective modalities to employ in this regard are not at all clear. The NDP 2007-13 should specifically create a mandate to find a reasonable solution to this challenge.

L. NORTH/SOUTH AND EAST/WEST IMPACT

See: 10. *Is there effective Linkage to Northern Ireland Plans and Programmes?* Above.

4 The Taskforce on Active Citizenship was established in April 2006 to advise the Government on the steps that can be taken to ensure that the wealth of civic spirit and active participation already present in Ireland continues to grow and develop. The Taskforce has been asked to report to Government within 9 months of its first meeting with recommendations on how to ensure the continuation of a healthy civic society.

Introduction

The Irish Context

The economic performance of Ireland over the life of the 2000-2006 Plan is dramatic and well documented, as is our demographic transformation. Our achievements in the environmental and social domain are also impressive, but there we face a number of real challenges. On the environmental front, while we have substantially reduced gross pollution going into our waters, seas and lakes, and reduced the pollution and energy intensity of our economy per unit of real GDP, in some cases the absolute level of environmental pressure – e.g. greenhouse gas emissions and some air pollutants, continue to rise, and pressure intensifies on some of our networks of wild plants and animals (our 'biodiversity') and their living spaces (habitats) and this damages their capacity to act as life support systems and landscapes of beauty. We are facing a considerable bill in 2012 to buy the greenhouse gas related credits required to meet our commitments, and this is a product mainly of rapid growth in road transport and associated congestion, and a steady rise in the consumption of fossil fuel generated electricity. As regards social performance, we have made very impressive gains in employment and this – of all the gains – is the most important and impressive. Most have experienced an increase in absolute real disposable income, but for many, relative income differentials have widened, those least able to participate in the labour force continue to struggle, and there is a sense that community cohesion and mutual support has weakened. These challenges are implicitly and at times explicitly addressed in both the 'NESC Report' and 'Towards 2016'[5].

It is clear that our ability to sustain economic growth, employment, high environmental quality and community cohesion are interlinked. The future of our food industry and our tourism sector depends on the maintenance of a high quality environment, and the perception of same by local and (especially) international customers. Neither has a future if the perception takes hold that Ireland's environmental quality and natural assets and historic built endowments are being degraded. The ability to attract high-end internationally traded services and the scarce talents that drive these industries depends on providing the environmental social and cultural qualities that will attract people of discernment who can find employment anywhere in the world and who use quality of life as a key determinant of their location choice. Likewise, a society where sense of community and mutuality of support is weakening is a society where environmental quality is likely to diminish also because it 'doesn't pay' and high quality enterprise will in some cases not get the community support needed to survive difficult times.

This is not to say that economy, environment and social well-being always move in the same direction. At times difficult tradeoffs have to be made. But over the long haul, they need to be mutually supportive or well-being overall will suffer.

5 *Towards 2016 – ten year Framework Social Partnership Agreement 2006-2015*, and NESC Strategy 2006: People, Productivity and Purpose respectively.

European and Global Context

'Sustainability' is now embedded in the statues and practice of the European Union.

Article 6 of the Amsterdam Treaty states that *environmental protection requirements must be integrated into the definition and implementation of the Community policies […] in particular with a view to promoting sustainable development*.

The European Union's recently issued Sustainable Development Strategy *aims at continuous improvement of the quality of life and well-being on Earth for present and future generations. To that end, it promotes a dynamic economy with full employment and a high level of education, health protection, social and territorial cohesion and environmental protection in a peaceful and secure world, respecting cultural diversity*.'[6]

It sets targets and actions for seven areas: climate change and clean energy; sustainable transport; sustainable consumption and production; conservation and management of natural resources; public health; social inclusion, demography and migration; global poverty and global sustainable development challenges.

It lays out four *key objectives* as follows:

1. Environmental Protection

   Safeguard the earth's capacity to support life in all its diversity, respect the limits of the planet's natural resources and ensure a high level of protection and improvement of the quality of the environment. Prevent and reduce environmental pollution and promote sustainable consumption and production to break the link between economic growth and environmental degradation.

2. Social Equity And Cohesion

   Promote a democratic, socially inclusive, cohesive, healthy, safe and just society with respect for fundamental rights and cultural diversity that creates equal opportunities and combats discrimination in all its forms.

3. Economic Prosperity

   Promote a prosperous, innovative, knowledge-rich, competitive and eco-efficient economy which provides high living standards and full and high-quality employment throughout the European Union.

4. Meeting Our International Responsibilities

   Encourage the establishment and defend the stability of democratic institutions across the world, based on peace, security and freedom. Actively promote sustainable development worldwide and ensure that the European Union's internal and external policies are consistent with global sustainable development and its international commitments.

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6 Council of the European Union, 2006. *Review of the European Union Sustainable Development Strategy (EU SDS) – Renewal Strategy*, 10117/06, Brussels, June 9.

Policy *guiding principles* are identified, including promotion and protection of fundamental rights, solidarity within and between generations, open and democratic society, involvement of citizens, involvement of business and social partners, policy coherence between regional, national and global actions, policy integration (of economic, social and environmental considerations), use best available knowledge, precautionary principle, make polluters pay.

This in effect integrates wider social and environmental issues into the Lisbon Strategy which sets the ambitious objective that the European Union should become: *the most competitive and dynamic knowledge-based economy in the world, capable of sustaining growth with more and better jobs and greater social cohesion by 2010*.

And so our perspective and recommendations are informed by the *EU Sustainable Development Strategy*, and the imperatives of the Lisbon Strategy. In 2007 we will work with the various stakeholders in developing the revised Irish Sustainable Development Strategy. For this latter effort to be effective and worthwhile, it is crucial that the NDP 2007-13 be consistent with, and supportive of, sustainable development.

A. ECONOMIC AND FISCAL FRAMEWORK

In addition to addressing the performance of the macro economy and the financial options and opportunities that it implies, it is important that this chapter flag at the outset that this is an integrated assessment and programme. The essence of the investment programme is to support the provision of:

- Physical infrastructure that reduces costs, increases convenience, improves environmental quality and enables competitiveness and quality of life to be enhanced.
- Human capital, which facilitates all of our residents to fulfil their intellectual, emotional and economic potential.
- Environmental Capital (Natural and Heritage), which enhances the life support systems that make existence worthwhile, while providing the basis for economic and social development.

This categorisation is worth doing because the essence of a successful and sustainable country is one that keeps growing its various forms of capital. Gross Domestic Product only measures annual flow – the value of goods and services provided in a year. It also ignores the external costs and benefits that are not mediated via markets and therefore do not register in national accounting calculus. This template begins to allow us to track how we are doing as regards our stock. It is especially important that we recognise environmental (natural and heritage) capital in this context. Later on we discuss how to deal with externalities.

Comhar SDC Recommendations

We propose that this chapter be re-titled Economic and Fiscal Framework and Socio Economic and Environmental Context and address in a very summary fashion environmental and social trends that are linked to the economy and fiscal framework. The text in the 'Irish Context' in the Introduction above is the type of stage setting we have in mind. It should also identify the three forms of capital and their management as salient to understanding sustainable performance, and this categorisation will be used later on.

B. INVESTMENT PRIORITIES AT SECTORAL LEVEL

Comhar SDC Recommendations

This is an opportunity to lay out the aggregate investments in physical (infrastructure and other), human (including social), and environmental (natural and heritage) capital, what the overall outcomes are expected to be, and how they relate to and re-enforce each other. Charts showing such linkages would clarify understanding.

C. ALIGNMENT OF NDP WITH SPATIAL STRATEGY

The decision to address this is a very important and welcome decision. Up to now, there has been no formal evidence of a commitment to transform the aspiration of the National Spatial Strategy (NSS) – which was launched in 2002 as a coherent national planning framework for Ireland for the next 20 years – into verifiable realities on the ground. In terms of deliverables, it was argued at the launch of the NSS that[7] 'It (NSS) will mean better quality of life – less congestion, less long distance commuting, more regard to the quality of the environment and increased access to services like health, education and leisure. By making the most of our cities, towns and rural places, we will get the growth and development to reach our potential.'

It is important to relate these indicators of performance for the NSS – better quality of life, less congestion, more regard to the quality of the environment etc. etc. – to the NDP. There should be no necessary assumption that all gateways and hubs should be equally treated. Those that are especially well served with rail and related infrastructure and produce the plans and implementation proposals that are most likely to succeed in advancing quality of life should be favoured.

Comhar SDC Recommendations

We propose that the investment and (especially) the outputs associated with the NDP be directly linked to clusters of gateways and hubs, organised in ways – regions and provinces – that have some emotional, governance-related and practical relevance in people's lives. These to be represented as performance criteria in the chapter on monitoring and management/implementation arrangements. The size and speed of delivery of allocations should depend on the quality of the plans and implementation schedules proposed.

D. CAPITAL INVESTMENT IN KEY SECTORAL AREAS

[including housing, transport, aviation, energy, communications, environmental services, education, health, child care, agriculture, tourism, industrial promotion and research and development and other areas]

The specifics as regards Comhar's priorities will be presented after the conference October 4-6.

7 See http://www.irishspatialstrategy.ie/

E. ROLE OF PUBLIC PRIVATE PARTNERSHIPS (PPPs)

We welcome the addressing of this issue, for a number of reasons: most members of the public don't understand why PPPs are done or how they are done, and it takes a high level of skill and experience on the government side to achieve real gain for the citizenry. The only reason to support PPP is to advance the public interest, and this should be defined for all proposed schemes. Success is more likely if there are a rolling series of investments, if there is substantive competition to undertake the investments, if the objectives and standards are specified unambiguously and verifiably, if external environmental and other costs and benefits are identified and addressed, and if it is clear how risk is to be distributed in the event of underperformance.

Comhar SDC Recommendations

This chapter should spell out the public interest, and the pre-requisites for success and how they will be assured, and ensure that sustainability concerns – and notably environmental costs and benefits associated with PPPs – are understood and appropriately addressed.

F. INVESTMENT IN HUMAN CAPITAL

Continuing to enhance our knowledge, our ability to absorb new knowledge, and – perhaps most fundamentally – our capacity to innovate and create choices that did not exist before is fundamental to our future well being, and our ability to meet tomorrow's personal, economic and environmental challenges. It is important that this chapter continually link the investment in human capital with the associated physical and environmental (natural and heritage) capital; if either side of this coin is inadequate, the result will be ineffectualness, and that it address every strand of capacity building, i.e. pre-school, first, second, third and fourth level, and – of particular importance – those already out of the formal educational system who wish to enrich their personal and vocational capacities. As regards sustainability, there are many organisations – including ENFO, Sustainable Energy Ireland, Eco-Unesco, Cultivate, Green Schools (via An Taisce) – that provide a range of courses and activities that develop understanding of scientific, economic and social underpinnings, how to understand and interpret evidence, and the capacity to act effectively and responsibly at a personal level. Research (the fourth level) is crucial to understanding both the realities of our choices, and new and better ways to proceed.

Comhar SDC Recommendations

We strongly support the proposition that Ireland becomes a leading knowledge society in Europe, and that NDP 2007-13 be focused on achieving this objective. We prefer 'knowledge society' to knowledge economy' because intellectual advancement and fulfilment comes from a range of motivations and sources and what seems 'non economic' can be the most economic in surprising ways. Our investments in knowledge and human capacities should be as wide as it takes to meet our motivations. Making Ireland a sustainable society requires that we widen and deepen our educational programmes focussed on understanding the concept and how it can be advanced, that these be integrated into our curriculae at all levels, that we provide all our citizens with opportunity to enrich their understanding and engagement.

The ERTDI research programme 2000-06 has made very important contributions to our understanding of both our performance in regard to sustainability, the underlying causes, and how to maximise our contribution and potential. For 2007-13, it needs to continue and expand on this work, but focus also on how Ireland links knowledge to empower citizens, creates business opportunities from the sustainability agenda, and moves to create a critical mass at third level institutions that ensures they become international leaders in selected fields.

Local authorities are key actors in implementing and managing infrastructure. There should be an explicit programme designed to invest in human capital at local level, in the context of sharing resources, which ensures these capacities are in place. See also 'Efficient Infrastructure Delivery'.

G. INVESTMENT IN ENVIRONMENTAL (NATURAL AND HERITAGE) CAPITAL

(Proposed new chapter)

By environmental (natural and heritage) capital we mean the support systems that sustain life, including catchments and wetlands that provide us with freshwater, absorb and de-toxify waste and provide water storage to diminish the impact of flood events, air sheds that allow us to breathe clean and healthy air and enjoy vistas, wildlife and biodiversity that sustains the web of life and allow us to enjoy nature, open spaces where we can recreate and get away from ourselves; salt marshes that are the main incubation places for our fish stocks, and buffer us against storms and coastal flooding, our oceans that are the ultimate source of life, our buildings and human artefacts of distinction, that represent the best of what our ancestors have endowed us with.

And all of these play an important role in providing recreation and fitness opportunities for ourselves and our children, and create a basis for many forms of tourism, both passive and active. Many of the investments to be undertaken in the NDP fall into either protecting or enhancing these endowments. And many of the other investments impact on them also.

Comhar SDC Recommendations

This category of investment needs to be recognised separately; otherwise it *de facto* becomes a residual 'protective' category, not given parity of esteem and its role as a key vector of well-being and ultimately of economic and social performance and quality of life is diminished. It will also facilitate linking the NDP to the implementation of the National Climate Change Strategy and the Biodiversity Strategy.

H. SOCIAL INCLUSION

Inclusion is achieved by ensuring that all of us have access to the resources, capacities and organisational structures to: participate in the democratic process – voting and representing; education and information; employment; start businesses; participate in decisions about our neighbourhood, including especially its shared resources, spaces and facilities. All of these are easier for those who are already well resourced in terms of education, income and ability to communicate and reach those in the decision-making process. Those who tend not to be at the table include young people, the very old, recent

emigrants, and those with very limited income. Therefore, the inclusion agenda needs to focus particular attention on those. Civic Society, represented by a wide range of non-governmental organisations, is a primary vehicle to foster and support such inclusion. These often lack the resources to play an effective and timely role. Achieving effective participation in decisions about what is done and how is a major challenge. But, as Clement Attlee put it: *Democracy is government by discussion, but it is only effective if you can stop people talking*. We seem to struggle with finding the balance between talk and action, ranging between endless discussion and no action, to action with no participation and discussion.

Comhar SDC Recommendations

The former governor of California Edmund Brown Jr. observed: *As long as Peter and Paul are in the same room, I think you can make a wise set of choices. It's only when you rob collective Peter to help selective Paul that you get into your problems*. The investments in social inclusion need to always favour – and be seen to favour – collective Peter – the public interest – and in particular those categories not generally at the decision table noted above.

We need to find modes of participation that are fair, consistent, informed and time bound, involving Civic Society in all its dimensions.

I. EFFICIENT INFRASTRUCTURE DELIVERY

(capital appraisal, project management, procurement policy, planning, environmental issues etc.)

There are two aspects to delivering infrastructure efficiently. The first is to measure adequately all of the main costs and benefits involved. The second is to have an organisational structure in place with the requisite skills and motivation to deliver the project 'on the ground' in time, to the requisite quality and within budget. There has been criticism of the competence with which parts of the 2000-06 programme have been delivered. It is important that for NDP 2007-13 every effort is made to ensure that competence is manifest, and – as important – is seen to be so.

Measuring the Main Costs and Benefits

The first challenge is estimating the financial capital and operating costs effectively. This needs careful estimation. Many of the 'overruns' – and perhaps some of the savings. – in the 2000-2006 Programme are likely due to inadequacies in this regard. The second is estimating the benefits to be yielded. These are both internal to the project, and external, and both categories need to be recognised. By *internal*, or direct, we mean those benefits that are the main products yielded by the investment. E.g. in the case of a railway investment, the kilometres of track, the estimated passenger numbers and person kilometres travelled, the value of travel costs and reduced travel time etc. The *external* benefits include the value of green house gas emission reduction achieved and its value[8], other environmental benefits, including reduction in NO_x and particulates, impact on settlement – numbers of dwellings that can be clustered at nodes, numbers of businesses enabled etc. Not all of these can be valued, but some can, and a

8 The price of a tonne of CO_2 in the European Union Emissions Trading Scheme on 14 September 2006 was €16.38 (http://www.pointcarbon.com/)

framework that works systematically and rigorously to develop monetised and qualitative information will over time enhance our understanding of at least the magnitudes of internal and external costs and benefits that are projected.

Delivery Mechanisms

Delivering an investment programme of the scale and sophistication envisaged is not easy. The organisation charged with its delivery must have a mix of qualities and skills, operating to the highest international level. These include:

- Management skills – ability to identify priorities, to interface effectively with the policy and political system, to develop and motivate a team that can operate under time stress and with integrity and efficiency.
- Team with the requisite technical skills – finance, accounting, marketing, engineering, economics, planning, environmental sciences, research management, human resources – to be able to match intellectually and practically their peers in the contracting world. This becomes especially important where Public Private Partnership (PPP) projects are envisaged; if key skills are not in house, then it is likely that the public interest in such partnerships will not be best served.
- Delivery mechanisms – e.g. turn key contracts – that strongly incentivise contractors to deliver on or before time and within budget. Paying a competitive risk premium in the bid award, with the contractor carrying the risk, seems in most circumstances to be a good investment.
- Ability to effectively address the criteria identified below in 'Monitoring and Management arrangements'.
- Benchmarking to best practice peers internationally.

Over the 2000-2006 period, there has been much learning by doing, and many organisations at national, regional and local level have developed the requisite skills and processes. But we need to be sure that this prevails across the board, that there are no major gaps, and if there are, that we have a means of correcting for same.

Comhar SDC Recommendations

That a mechanism for framing the estimation and evaluation of direct and indirect (internal and external) costs and benefits be put in place to provide insights to the implementing agents on the values appropriate to the estimating of external effects. This work will yield systematic insights to assist the implementing agents.

The government departments, agencies, State organisations and local authorities designated to deliver the programmes should be assessed as to their ability to in effect meet best international practise in their personnel and structures, accepting that many now have the requisite attributes to be licensed to act. Resources need to be earmarked to bring capacities up to international standards where they are not already in place.

J. ENVIRONMENTAL IMPACT

In the previous proposed new chapter – Investing in Environmental (Natural and Heritage) Capital (see above) – we highlight the importance of recognising positively the investments in enhancing air quality, water quality and supply, conserving natural areas and landscapes, biodiversity and open and recreation space, reducing toxicity of waste, facilitating its minimisation, re-use, recycling and final disposal.

In this chapter, the focus is on how to address the positive and negative environmental 'side effects' of other investment programmes identified in 'D' – 'Capital Investment in Key Sectoral Areas', with the focus on housing, transport, aviation, energy, communications, environmental services, education, health, child care, agriculture, tourism, industrial promotion and research and development and other areas (See above)[9].

Modern approaches to environmental assessment and management of investment and other programmes involve adopting the DPSIR (Drivers, Pressure, State, Impact, Response) approach comprising developing an understanding of:

- Drivers – Consumption and production patterns; Population demographics; Scientific and technological innovation; GDP growth, markets and trade
- Pressure – Emissions etc. generated from investment in the sectors in question, e.g. agriculture, fisheries and forestry; energy, transport and housing, finance and trade
- State – GHG and acid deposition; particulate concentrations in the atmosphere, species richness and habitat, eutrophication of fresh water, estuarine water quality, heavy metals in land, air and water
- Impact – Changes in water and air quality, stocks of buildings, fish, forest and other resources, sea level change, land use change and soil quality, biodiversity changes. Changes in income and employment
- Response – Formal and informal adaptation to and mitigation of environmental change by altering human behaviour within and between these stages, using mix of policy instruments (taxes and levies, investment support and subsidy, regulation, voluntary agreements, research and development to create new choices, information, voluntary agreements, development of policy, law and institutions; and capacity-building).

Integrated Environmental Assessment – wherein models are used to address the DPSIR framework, and link cross-sectorally to economy and social impacts – is now being used to provide policy makers and managers with an integrated view of positive and negative impacts and their economic and social impacts.

There is European Union policy addressed to most environmental Pressures, which determines the emissions allowed (e.g. greenhouse gasses, acid precursors, via Kyoto and the Emissions Trading Directive, National Emissions Ceiling Directive respectively), the State (e.g. fresh and estuarine water quality objectives via Water Framework Directive, Urban Wastewater Directive) and the Response (information, regulation, emissions trading).

9 Note that specifics in this regard will be provided to DOF later on in a separate document.

Comhar SDC Recommendations

This chapter should be re-titled 'Environmental Assessment and Management' to better capture best practise terminology and procedures. We should adopt Integrated Assessment using the DPSIR framework recognising that it will take time to develop the requisite data and modelling capabilities. In the interim, a framework linking environment to European policy requirements, the three capital stocks [physical, human, environmental (natural and heritage)] and the economy should be established as a basis for preliminary assessment. The R&D specified above in 'Human Capital' should be used to advance the Integrated Assessment objective.

K. OTHER HORIZONTAL ISSUES

[including rural impact and gender issues]

The whole point of NDP 2007-13 is to have a significant positive impact on communities, but there will be a phasing effect – many communities will experience short-term pain as the investment is undertaken, and longer term gain, once it is in place. Therefore it is important to specify the time horizon relevant for assessing impact.

Many of the indicators proposed for evaluation noted below in 'Monitoring and Management and Implementation Arrangements' are very relevant, i.e. target setting, output bias and monitoring, cost effectiveness, fostering innovation, supporting quality of life, policy instrument complementarity, supporting fairness, correcting for market failure, achieving low operating costs, fostering design and beauty, links to Northern Ireland, effective linkage to Northern Ireland, alignment with spatial strategy, distribution of benefits. The mobilisation of Civic Society as a creative force is a key pre-requisite to ensuring that these wider agendas are met.

Comhar SDC Recommendations

The focus here should be 'Community Engagement' using the same spatial template proposed to deal with integration with the National Spatial Strategy, accepting that there will be many 'communities' in each unit. The recently appointed Task Force on Active Citizenship[10] is a potentially important interface in identifying how to achieve productive interaction as the investment portfolio is rolled out. Ensuring community engagement that is consistent with the mandate of local and regional elected members and associated staff is important to achieve, and the most effective modalities to employ in this regard are not at all clear. The NDP 2007-13 should specifically create a mandate to find a reasonable solution to this challenge.

10 The Taskforce on Active Citizenship was established in April 2006 to advise the Government on the steps that can be taken to ensure that the wealth of civic spirit and active participation already present in Ireland continues to grow and develop. The Taskforce has been asked to report to Government within 9 months of its first meeting with recommendations on how to ensure the continuation of a healthy civic society.

L. NORTH/SOUTH AND EAST/WEST IMPACT

There is a gradual accretion of activity linking policy with that of Northern Ireland where there is mutual advantage in doing so. We observe this in the decision to create a single energy market, *inter alia* involving the enhancement of interconnection and shared regulation, and in the design, planning and execution of the rail and road corridors, notably Dublin-Belfast. The principle of cost effective sharing infrastructure and services applies also in other areas including health and education. But there is much opportunity for mutually beneficial sharing of information and lessons in effective implementation across all areas.

The Strategic Investment Board (SIB) in Northern Ireland has responsibility for shaping its investment portfolio[11] and there is also a NI sustainability strategy, which posits principles – living within environmental limits, ensuring a strong healthy and just society and sustainable economy, promoting good governance, using science responsibly, creating opportunity and innovation, addressed to 6 priorities – climate strategy and energy, sustainable consumption and production, natural resource protection and environmental enhancement, sustainable communities, governance for sustainable development, and communications and learning.[12]

Comhar SDC Recommendations

There should be a separate chapter focused on maximising the potential for all island collaboration where there is mutual gain in so doing. This chapter would identify the main areas of current or likely future collaboration, and the means whereby the potential can be maximised. This should include linkage with the Sustainable Development Commission in Northern Ireland, and Comhar SDC in the Republic. The representation on implementation and monitoring bodies should reflect this opportunity.

As regards 'East/West', the links and potential synergies with the UK should be identified. This is likely to be especially relevant in regard to energy interconnection.

M. MONITORING AND MANAGEMENT/IMPLEMENTATION ARRANGEMENTS

[Reporting on three Strategic Investment Sectors (1) Economic and Social Infrastructure, (2) Human Resources, including non-capital social inclusion schemes (3) Productive sector investment each with an individual Monitoring Committee and Lead Department, reporting to a Central NDP Monitoring Committee. Standardised reporting templates focused on financial and physical targets and outputs with account taken of horizontal impacts such as promotion of Social Inclusion.]

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11 The Strategic Investment Board Limited (SIB) vision is to help the public sector to deliver major value-for-money infrastructure programmes in Northern Ireland – at speed. In practice, that means using our extensive experience of funding and implementing major investment projects, and deploying specialist skills and approaches. SIB acts as a bridge between the public and private sectors. It works with NI departments and agencies to help them accelerate the delivery of major public-infrastructure projects. In parallel, SIB works with the private sector to generate confidence and stimulate market interest, thus improving competition and delivering value for money for the taxpayer. SIB's work supports the government's priorities: to deliver economic competitiveness and better public services. By delivering an infrastructure fit for the 21st century, SIB is a key driver for economic growth. See: http://www.sibni.org/

12 First Steps towards sustainability, May 9, 2006, http://www.doeni.gov.uk/epd/sustainable%20development.asp

This is a key aspect of the NDP. It establishes how priorities are going to be judged, how progress will be assessed, and will provide a basis for adapting the programme as it is rolled out. This section comprises an elaboration of the themes used in 'Elements That Would Characterise Excellence In NDP 2007-13' in the 'Executive Summary.

Comhar SDC Response

Taxonomy

The 3 part taxonomy proposed by DOF for the investment programme namely (1) Economic and Social Infrastructure, (2) Human Resources, including non-capital social inclusion schemes (3) Productive sector investment is not a happy division – it inadvertently implies that 'economic and social infrastructure' and 'human resources' are non-productive! We prefer the following 4-part taxonomy: Infrastructure; Other physical; human (including social); environmental (natural and heritage). This would better map to the capital stocks model proposed.

Monitoring

The monitoring approach proposed – Monitoring Committee and Lead Department, reporting to a Central NDP Monitoring Committee, using standardised reporting templates focused on financial and physical targets and outputs with account taken of horizontal impacts, is fine, but the quality, nature and timeliness of the data, indicators and information and background analyses provided to this system will determine if this structure can be effective. The recently issued Progress Report on the National Development Plan 2000-2006[13] highlights the problem, wherein the predominance of indicators presented focus on expenditure, with limited focus on outputs and implications for economic, social and environmental well-being.

It is proposed by Comhar SDC that a substantial and on-going budget be provided to relevant organisation(s) to generate the relevant information, and that this feed the monitoring process.

Indicators of Performance

Comhar proposes that the key elements to be addressed include: target setting, output bias and monitoring, cost effectiveness, fostering innovation, supporting quality of life, policy instrument complementarity, supporting fairness and participation, correcting for market failure, achieving low operating costs, fostering high quality design and beauty, links with National spatial development strategy, links with Northern Ireland plan, distribution of benefits.

Target Setting, output bias and Monitoring

Inputs and intermediate outputs are relatively easy to document – kilometres of road and rail or number of schoolrooms built, or length of pipe laid. It is much more difficult to estimate what this translates into in terms of enhanced mobility and reduced environmental pressure, more or better education,

13 Report for the Joint Committee on Finance and the Public Service – *Progress on the National Development Plan 2000-2006*, Department of Finance, Dublin, June 2006

water supplied or waste treated. But, since the only point of investment is to provide a combination of more, new or better outputs, these need a focus, and the investment design, implementation and management needs to have *output delivery* as its *primary focus*.

Comhar's earlier submission[14] on the drafting of the new NDP emphasised that the monitoring and evaluation of progress needs to be broadly based and cover social and environmental aspects as well as financial and economic criteria. Monitoring and reporting on cross-cutting issues requires expert interpretation of properly gathered data referring to objective criteria, all carried out in a transparent and verifiable process.

A key issue in monitoring is identifying the *counterfactual or baseline* – what would have happened in the absence of the investment in question. Unless this is identified at the outset, there is no fulcrum against which to judge performance over the life of the investment. What can't be measured can't be evaluated, so the indicators of performance need to be pre-specified, the means of measurement identified, and credible mechanisms for delivery identified and supported with the requisite logistics and finance.

Comhar proposes that its *Principles for Sustainable Development* be applied to provide the basis for a sustainability bench-marking tool for policies and programmes. We believe that these Principles can provide the basis for an over-arching assessment mechanism for measuring progress on the implementation of the new NDP. In collaboration with the Department of Finance, we propose that an organisation be given the responsibility to set up and operate a system for monitoring and reporting on performance for the life of NDP 2007-13. Comhar will continue to evaluate and report on the effectiveness of such monitoring for the life of NDP 2007-13.

Cost Effectiveness

Our systems should be designed to deliver the investment outcome desired at least cost, consistent with environmental and social objectives discussed later on.

Our competitive position globally, our social cohesion, and our environment are all damaged if investment programmes cost more than they need to, take longer than is necessary, and yield less in terms of quality than is warranted. Every Euro that is spent on project X that is wasted, is a resource not available to invest in Y – we get less economic, social and environmental performance as a society than we could.

Competition in the provision and management of the investment is a crucial mechanism for ensuring cost minimisation. And our implementation of EU procurement rules has ensured that this principle applies. However, the quality and effectiveness of competition is significantly influenced by how the process is conducted. Where the following apply, competition will be enhanced, and where they do not, the converse applies.

- Scale – is the investment big enough to attract the attention of serious providers

14 Letter and submission to the Minister for Finance, dated 7th March

- Duration – is the period of the funding envelope provided sufficiently long to allow phasing that minimises costs
- Continuity – is there a rolling series of projects that convinces prospective bidders to invest the time and effort in serious bids on a continuing basis
- Management Professionalism – does the overseeing authority have the technical and managerial skills and the ambition to quickly make and implement decisions? (See 'K' below)

We have made considerable progress in some areas – e.g. road transport – in ensuring that these provisions apply, and these need to be generalised to the investment programme as a whole.

Fostering Innovation

Henry Ford observed: *If you need a new machine and don't buy it, you pay for it without getting it*. The sustainability of Ireland's economy depends on moving quickly to be knowledge-led. Our cost base is now such that only continuing innovation can save us from becoming a backwater. Up to this point, our investment programmes have been singularly lacking in innovation. Notwithstanding having the largest per capita house and road construction industries in the developed world, there are few if any innovations in design, materials, methods or management that are not imported. Likewise, major investments in energy, health, education and communications infrastructure are not associated with innovation. When the volume of investment activity inevitably falls in Ireland, unless companies have developed some combination of new approaches, technologies and products that will give them competitive advantage, they will have nothing to offer globally that would give them comparative advantage in other markets. The universities likewise do not have critical mass of international calibre to complement and support corporate initiative. Each of our major investment programmes should have funds and support ring fenced – 1 to 5 per cent of total expenditure, depending on the potential innovation dividend – to advance the innovation agenda. This would include funding for research development and demonstration, embedding a culture of innovation in some companies, and associated team building in the universities, and the encouragement of pilot projects that would stimulate the generation and testing of new approaches.

Supporting Quality of life

Quality of life is a composite of many elements – income, employment, security, productive family and social interaction, romance, good health, mobility, intellectual and cultural stimulation, access to services, high quality natural and built environment, beauty. The mix and emphasis varies by community, family and individual, with some seeking to live and work in an isolated place far removed from others, and others seeking gregarious living and working conditions, and these preferences can change over time. Spatial relationships are important. Where we live, work and recreate, and how these are linked, have a considerable bearing on our sense of well-being. Oliver Goldsmith observed:

How small of all that human hearts endure
That part which laws or kings can cause of cure. (The Traveller)

We cannot look to investment and the NDP to make us happy. But it can shape our potential for happiness, but providing the option of living and working in a relatively stress free and beautiful environment, where we have an attractive and interesting set of mobility choices – walk, cycle, train, bus, car – and where we are facilitated and enabled to work and to enrich ourselves culturally, intellectually and socially to the extent that we wish to do so. Linking the national Spatial Strategy and the NDP investment programme to address this dimension in our national personality is important.

Policy Instrument Complementarity

The suite of policy instruments that we can mobilise to improve performance and change outcomes is wide, and includes: pricing, taxes and charges; subsidies; regulation (directives, laws and regulations), information that empowers producers and consumers; voluntary and negotiated agreements, whereby agents make voluntary commitments to meet certain targets, procedures or objectives; zoning and land use planning; research and development to create new choices; location decisions and public purchasing decisions.

A firm commitment to coherence between the NDP, the National Spatial Strategy, Towards 2016 and the forthcoming revisions to the National Climate Change Strategy and the National Sustainable Development Strategy will be essential to the delivery of optimal outcomes.

For investment to maximise its contribution, these other policy instruments must be synchronised so that they all work in tandem. Thus, maximising the potential of the road investment and the public transport investment will require demand side management for both modes, investment in high quality and timely information for the managers and consumers of both services, research and development and associated piloting of new ways of maintaining and managing the assets etc.

Supporting Fairness and Distribution of Benefits

Most of us would agree with the sentiment in the old Music Hall song 'You ain't poor if you're poor by choice.' Less certain is agreement on how to measure disadvantage and fairness. The great achievement of the past decade has been to raise the absolute standard of living of almost all – in this sense the rising tide has lifted almost all boats – but we have widened the gap between the richer and the poorer, and this adversely affects the well being of some of the latter notwithstanding the fact that their absolute standard has risen. Defining 'poor' can also be problematic. With the dramatic rise in land and property prices, there are substantial numbers of people who are capital rich – in some cases multi-millionaires in asset terms – but income poor, in that their income may not be much above subsistence. How should these be categorised, and treated when it comes to transfers?

The investment programme will inevitably favour some interests, individuals and communities more than others. It is important that the beneficiaries be identified, and that where possible investment support those most in need, however defined. There are likely to be tradeoffs to be made here with the cost-effectiveness criterion. In situations where small scale and local involvement is necessary to foster fairness, but this can only be achieved at higher delivery cost, then choices have to be made.

The Spatial Analysis will give an indication as to how the benefits are distributed spatially. This should be complemented with indicators that show how they are distributed as regards income, with the objective of ensuring that those most in need benefit appropriately.

Correcting for Market Failure

Markets untrammelled fail to protect environmental and open access natural resource endowments. In belonging to everyone, they belong to no one. There is no price for air and water quality, for the use of the atmosphere to absorb ozone depleting chlorofluorocarbons (CFCs) or climate changing greenhouse gasses that signifies that these are scarce endowments; the (external) costs of disposing of waste can be passed on to society as a whole Beauty in buildings and landscapes (external benefits) can't be captured directly in markets. Without intervention, market forces will drive these life support systems, and open access ocean fishery resources, towards destruction. There are market mechanisms, including environmental taxes and charges, emissions trading such as the European Union Emissions Trading Scheme (EU ETS) for CO_2 which has prices trading at about €20 per tonne of CO_2 that can introduce market signals that correct for such failure. Other policy instruments, including voluntary approaches, information and regulation can also be mobilised. But in the context of the NDP, there is also a special case for investment support to make good the failure of the market. If the public sector does not step in, the failure will continue and intensify.

By definition, these external costs and benefits are not valued in markets. However, there are a variety of well-developed and tested techniques for providing proxy values that give us guidance as to the magnitude of the losses imposed and the benefits foregone. We can use prices from carbon markets as in the EU ETS, we can estimate the value of health losses and mortality, the losses in crops and productivity; we can use contingency valuation techniques and choice experiments, visualisation and experimental economics to derive credible values concerning the aesthetic and option value of environment. Carefully done analyses will help direct investment towards where the greatest net benefits to society are likely to be found.

Achieving Low Operating Costs

The 2007-13 period is likely to be a unique window of relative richness as regards the capacity and willingness to undertake sustained investment. With a less well-endowed future, it is important that the investment we make now be designed and implemented so as to minimise the burden of maintenance and management. If depreciation rates and operating costs are low, this will facilitate both sustaining the existing investment, and releasing resources for new investment. It will also, in many cases, reduce the environmental burden, e.g. investment in highly energy efficient building. But achieving lower annual costs in the future usually requires more investment up front. We should tend to make the trade-off in favour of low operating costs.

Fostering Design and Beauty

The 2007-13 period will be important in determining if, for the rising generations, Ireland is a beautiful place to work and live. But beauty does not happen without encouragement. It takes skills in design and engineering, it takes courage on the part of the investors, it takes a public willing to foster and facilitate, it takes attention to detail, and meeting the challenge of combining good function and positive sensory impact. Ugliness, conscious or otherwise, is what we will get unless we positively foster its converse. In many of our remaining built endowments and landscapes from the Medieval, Georgian and Victorian periods, there are examples of beauty manifest. In the modern era, outstanding examples exist, but are rare. If the public investment programme in the NDP makes a conscious effort to foster beauty, it can have a positive and transforming effect.

Effective Linkage to Northern Ireland Plans and Programmes – See 'L' earlier

Alignment with Spatial Strategy – See 'C' earlier

Capital investment in key sectoral areas[1]

16 October 2006

Recommendations from Comhar SDC[2]

1 Including households, transport, energy, agriculture and rural development, tourism, industrial development, forestry and the marine.

2 These proposals follow the general recommendations submitted by Comhar SDC to the Department of Finance on 20th September 2006.

Executive Summary 1 (Sectoral)

Activity	Challenges	Actions	Results
Agriculture and Rural Development	Income, entrepreneurship, political, environmental.	Payment for environmental services, promotion of competitive advantage – invest in knowledge-rich farming and rural economy, and enhanced communication, notably broadband.	Pool of internationally competitive farmers in global and niche markets, dynamic off-farm economy, cross compliance, high quality environmental services.
Forestry	Inability of softwoods to secure high value markets, need for hardwood to produce to veneer quality, lack of transparency re environmental and recreation services.	Promote Sustainable Forest Management (SFM) for small holders, identify and pay for public goods, including carbon sequestration, biodiversity conservation, and recreation services, development of forest inventory, R&D.	Softwood and broadleaf farmers who can compete, development on non-wood products and services, high quality environmental services.
Transport	More cars and freight chasing limited road capacity, with consequent rising greenhouse gas and air pollution, congestion and associated waste of time increased stress and shrinking labour pools.	Integration of land use planning and infrastructure provision with traffic nodes, increased investment in rail, busses, pedestrian and cycle ways, investment in demand side management, making roads bus friendly, join the cities outside Dublin, linked to National Spatial Strategy, and R&D.	Enhanced mobility for all, combined with reducing emissions of greenhouse gasses and air pollutants, reduced obesity and other sedentary health effects. Creation of cities with economies of scale and scope and enhanced global competitiveness.
Energy	Increasing total and per capita consumption (electricity and transport) rising emissions, high import dependency, low use of renewables.	Invest in: electricity interconnection to UK, the national grid to expand potential to 'take' more renewables, facilitate more wind power, develop potential of biomass for heat and electricity, R&D focussed on technical, economic and environmental issues, carbon storage and sequestration, Demand Side Management as top priority, focused on all investments that provide private and public gains that exceed costs, including public buildings and housing.	Ireland moves from laggard to European leader in development and implementation of renewables, and of energy efficiency.

Tourism	High cost destination demands that we move up the quality and value diversity chain to survive. Dependent on environmental endowments not controlled by the industry. Coast in particular threatened by developments.	Identify carrying capacity in key areas and act on the implications. Support investment in eco-tourism products and services, invest in implementation requirements of Waste Water and Water Framework Directive to help deliver high quality base for water related activities. Support development and implementation of Coastal Zone Strategy to ensure crucial features of the resource protected. Continue to conserve key build and natural heritage features.	A high quality tourism product and services rooted on a resource and environmental asset base that is protected for now and the future.
Industry	High costs and difficulties of scale and scope outside Dublin agglomeration. Need to make quality of people and place a byword, and provide constant innovation.	R&D crucial to provide knowledge-based edge, reward for achieving and maintaining in independently audited environmental standards, investment in eco-parks and in high quality waste management.	Dynamic industrial sector where productivity and innovation gains exceed rise in costs, based in a high quality environment, and reducing the volume and toxicity of waste emissions over time.
Households	Achieving neighbourhoods that are safe, facilitate walking and cycling, provide ready access to employment, and enable participative and informed citizens.	Invest in making National Spatial Strategy a reality so new city regions and rural areas can have high quality of life and compete. Invest in information provision that is relevant, timely, and tied to location, provide resources to community groups, and skills in conflict resolution and negotiation, and resource the outcomes of the Taoiseach's Task Force on Active Citizenship.	Engaged, committed, informed and empowered communities.
Marine	Peaking of marine fishery, pressures on coastal spawning and other assets, limited knowledge of the marine resource, decline in some stocks.	Invest in research discovery programmes, Seabed survey, and in ocean energy research, Ireland as a landing destination, conservation of key species, notably Atlantic salmon, development and implementation of Coastal Zone Strategy.	Ireland as a leading knowledge centre in marine research, coastal communities that understand options, conserved salmon.

Executive Summary 2 (Cross Cutting)

Activity	Challenges	Actions	Results
Sustainable Development Fund (SDC)	The need to address the many situations where there are challenges across sectors and communities that would benefit from integration to meet sustainability objectives.	Invite bids on a competitive basis for projects from local authorities, enterprises, communities, NGOs that in design and execution will make a substantive contribution to meeting sustainability objectives.	A growing pool of experience and achievement on the ground that epitomises best practise in regard to sustainability, including reduced pressure on environment, high quality of social and economic life.
National Spatial Strategy (NSS)	Plans need to move to performance, if critical mass is to be achieved outside the Dublin conurbation.	All investment, but especially transport, need to support linkage and reduced pressure on environmental and other endowments and the provision of high levels of infrastructure at transport nodes linked to NSS.	Cities outside Dublin that are linked to the point that they can and do act as one conurbation. Reduced development pressures in the Dublin region, and improved quality of life.
Good Governance	Ensuring that organisations implementing the NDP have the requisite skills and resources to deliver major sophisticated programmes. Specification and monitoring of outputs.	Invest in whatever organisational and skill development necessary, and ensure there are credible and measurable indicators of performance.	Elements implemented on time and within budget, with indicators that are measurable and are measured which will allow periodic adjustment as Plan implemented.
Research and Development	In most areas of the economy and society, there is a deficit in innovation and knowledge led activity. As costs rise, this will inevitably result in decline unless the deficit is addressed.	Build on progress to expand the R&D portfolio to address all phases of activity. Sustainability should be a strand of research activity in all programmes.	A society that generates and tests new ideas systematically, and converts those that make sense into services and products that enhance quality of life nationally and globally.

The Right Price Signals	Many of the key environmental and other values that are important are not traded through markets and therefore do not have a 'price'. Without such prices these ecological and other services are not given parity of esteem in the evaluation of choices	There are internationally validated techniques for developing proxy prices for goods and services not traded in markets. Investment in the development of such will improve the ability to assess value for money. Separately recognising environmental capital, as proposed in our earlier submission, is part of the process of providing coherence and transparency	Integration of environmental and other services not valued directly in markets will be incorporated into programme design and assessment across a range of sectors.
Information	As citizens, politicians, policy analysts, business people, some information that is gathered is not accessible, and other key information is not collected. This results in suboptimal decisions.	Invest in finding out why data collected is not accessible and what gaps are crucial and need to be filled. This will provide the basis for investment.	The Knowledge society will be manifest.
Cities	Cities are the drivers of economic and cultural innovation, the hubs.	The various NDP related initiatives need to be shaped by the city leaderships to ensure that the whole is greater than the sum of the parts.	Dynamic and successful cities, economically, socially, culturally and environmentally.
Environmental Endowments	We have key requirements to meet in regard to Wastewater, Water Framework, Biodiversity, Air quality and Wastewater Directives.	It makes sense financially and environmentally to meet these as integrated components of sectoral policy. So each sectoral investment programme should be 'scanned' and action taken where opportunity arises.	Move towards environmentally sustainable performance, meet EU targets in time, and at minimum cost.

Preface

On the 21st September last, Comhar SDC submitted to the Department of Finance recommendations on 'Sustainability in the National Development Plan 2007-13'. The recommendations, followed the template proposed by the Department of Finance (DOF) – Broad Content, Preparation Process and Reporting Arrangements of next NDP – as provided to Comhar SDC, and were approved by the Comhar SDC council on 20th September. We advised that the recommendations on 'Capital Investment in Key Sectoral areas' would be submitted as soon as possible following the Comhar Conference "Sustainability in the National Development Plan 2007-2013" on 4th to 6th October. The conference addressed how specific sectors within Ireland – industry, energy, transport, agriculture, forestry, tourism, marine, and households – have performed economically, socially and environmentally to date, and the options available for enhancing performance over the life of NDP 2007-2013. Briefing papers were prepared by experts in the particular sectors, which provided a framework for the Conference discussion on each sector and are available from the Comhar SDC website[3]. In each session the format consisted of a presentation by the briefing paper authors, followed by a discussion of the investment priorities for the next NDP with a selected panel of stakeholders and the audience. The resulting recommendations have been gathered together and are now set out in this document.

3 http://www.comhar-nsdp.ie/conference2006/index.html

1. General Principles

The NDP for 2007-2013 provides an exciting opportunity to take advantage of the economic success of the past decade and to ensure that Ireland continues to grow but that it does so in a sustainable manner. Sustainability implies implementing the three objectives of economic prosperity, social equity and cohesion, and environmental protection. The pace of recent economic growth may have implications for environmental quality and societal welfare. Several researchers (Clinch et al. 2006; Walsh 2006) have shown that economic growth is not synonymous with well-being and the question therefore arises – what investments should be undertaken in order to ensure sustainable growth and improved well-being for all?

Ireland has become a wealthy country and rising costs now threaten our competitiveness. It is imperative that competitiveness be improved and therefore investment over the next seven years should make this one of the priorities. The new NDP can assist in increasing competitiveness by reducing costs in some areas, such as transport, communication etc, while improving quality in others for example education, labour skills, RD&D, infrastructure. In the coming years there is a need to continue to improve environmental quality in Ireland. Research for Comhar (Clinch et al. 2006) shows that environmental amenities are significantly related to life satisfaction and quality of life in Ireland. An appealing environment is necessary to attract a better skilled labour force. In addition, Ireland must meet several international environmental commitments during and at the end of the term of the next NDP. It is appropriate that NDP investment address these specific environmental issues and take account of them simultaneously with infrastructure investment, in particular the Water Framework Directive, Biodiversity Directive, Climate change mitigation and adaptation, air pollution (National Emissions Ceilings, Convention on Long Range Transboundary Air Pollution on Heavy Metals), Waste Directive.

Comhar SDC notes that there have been calls to subject the NDP 2007-2013 to ex-ante environmental assessment and supports this call. We hope that as the more detailed programme measures under the new NDP are developed they should be subjected to such assessment to ensure their compatability with sustainability objectives, notwithstanding the statutory obligations arising in relation to Strategic Environmental Assessment. A further strategic priority of the NDP 2007-2013 is to improve its social impact. This may involve investing in measures which bring people together and support the less well off. Communities play a vital role in this process and require support both infrastructurally and institutionally.

There are several cross-cutting themes that arise as recommendations across all sectors and are important to emphasise in their own right.

- Information is crucial – both its gathering and dissemination. Two situations are evident; some data are gathered at tax payer expense, but are not readily accessible for analysis; secondly, in many areas data gaps exist and therefore it is difficult to carry out the ex-ante and ex-post analyses needed to implement evidence-based policy. Another dimension of information is its dissemination so that consumers and businesses can make informed and rational choices. In another forum, Comhar SCD intends returning to this issue.

- Getting the price signals right in order to drive the 'right' decisions can support this. Consumers and businesses require information and pricing incentives to appropriately value public good contributions such as the environment and social capital.

- The R&D imperative – the generation of new knowledge. All sectors require investment in R&D and training to generate human and knowledge capital in order to improve competitiveness and balanced regional development.

- Good governance is needed to effectively administer investment and develop new ideas. The institutional tools to do so should accompany any investment project under NDP 2007-2013. Progress and success should be measured by monitoring outcomes rather than inputs on a regular basis with a set of sustainability indicators. As already indicated in the first part of this submission by Comhar SDC to the Department of Finance, Comhar SDC would be glad to play a role in this task assuming that the data gathering and management mechanisms are in place to make such a role useful; Comhar's Principles for Sustainable Development could form the basis for the development of over-arching indicators for the new Plan.

- Overall, the individual contributions to the Comhar SDC conference on sustainability and NDP have highlighted the necessity to align investment priorities under the new NDP to implementation of the National Spatial Strategy for land use. As a small country, investment in infrastructure and projects must be clustered in order to achieve economies of scale and scope and the related ecological and social gains. As recognised by the Department of Finance template, investment should also link the five horizontal issues of balanced regional development, the promotion of social inclusion, environmental sustainability, the All-Island dimension, and the EU Lisbon Process.

- Comhar SDC proposes that a **Sustainable Development Fund (SDF)** be established, which would be reserved for projects that specifically substantively promote some aspects of sustainability. This fund should be made available on a competitive basis for investment in enterprises, activities and communities within and across sectors that achieve demonstrated improvement in environmental performance – with a particular focus on meeting some combination of the requirements associated with the Water Framework Directive, Biodiversity Directive, Climate change mitigation and adaptation, air pollution (National Emissions Ceilings, Convention on Long Range Transboundary Air Pollution on Heavy Metals), Waste Directive while also advancing competitiveness and social cohesion. For example, funds could be linked to firms achieving certification under an independent environmental or energy-saving scheme, the establishment of an eco-habitat or carbon neutral community, the rehabilitation of towns that have recovered their streets because they have been bypassed, etc. Some of the specific sectoral recommendations described below could qualify for finance from the Sustainable Development Fund SDF). If this idea commands support, Comhar SDC will be pleased to advise on its detailed design and implementation.

We set the stage for each sector by identifying the challenges, make recommendations and conclude with the results that can be expected. These recommendations reflect thematic priorities. We do not specify an amount of investment and the results are expressed qualitatively. Quantification exceeds the time and other resources available to us.

2. Specific Sectoral Recommendations

2.1. Agriculture and Rural Development

Challenges

Farmers in Ireland have displayed courage in opting for direct payments rather than input and output support for their activities. This simultaneously provides them with a regular income, and (in theory at least) reduces the bureaucracy and increases their freedom to make decisions concerning their enterprise. But it also poses challenges: the prices for their core outputs – milk and beef – are likely to fall in real terms over time, while the costs of their inputs – notably labour and land – already at a very high level, are unlikely to fall, and – at least as regards labour and energy – are likely to increase. At the same time they have to meet the growing costs of complying with traceability, environmental and safety requirements.

The key challenges now facing agriculture and rural development are:

- *Income challenge* – dependence on direct payments;
- *Entrepreneur challenge* – land prices preclude new entrants;
- *Political challenge* – majority of funding (over 60%) will be contributed by Irish tax payers; it will not be politically sustainable to continue with direct payments funded by the general tax payer – often to asset millionaires – for no transparent and agreed services;
- *Environmental Challenge* – climate change, biodiversity, air quality (ammonia), eutrophication (phosphorous).

The core off-farm rural employment opportunities in construction will diminish as the demand for houses and other buildings tapers off and falls. Four categories of farmer – which will often overlap – will emerge from this context:

1. Those who succeed in competing – in terms of cost and quality – with the best in the world in the production of commodities, including milk and beef. To do this, they will need scale, Ryanair-like cost control, access to excellent transport and IT infrastructure, and management skills comparable to the best of the private sector. This relatively small group will need support to make this transition to be able to compete with the best in Argentina, Brazil and elsewhere.

2. Those who succeed in competing – in terms of cost and quality – with the best in the world in the production of differentiated products and services that service growing niche markets that do not have to compete directly with major international producers. For this group, cost control is also crucial, but product development, creativity, marketing, branding and delivery skills are what give them core competitive advantage. This will be highly diverse, ranging from organic food producers, developers of relatively new food lines such as venison, growers of 'slow food' with a focus on flavour, and those who enter the energy market.

3. Those who are part time farmers, with their primary income deriving from off farm activity, but wish to stay involved on the farm. These – sometimes disparagingly referred to as 'hobby farmers' – have an important role in maintaining output and in importing ideas – e.g. in regard to equipment, management techniques, product development, IT – from the non farm world. Numbers are likely to grow over time. They may also be the key providers of farm-related tourism activities.

4. Those who are in farming full time, but are not interested in either the development of internationally competitive farming, off farm work or the development of niches. They will move out over time and therefore their numbers will fall.

For all categories, the following are crucial to their ability to succeed:

Recommendations

1. Payment for Environmental Services

- High environmental quality is a key pre-requisite for success in all markets. Without it, a key comparative advantage is lost, and once gone, is very difficult to recover. Payments should be linked to the value of environmental services provided, including contributions to:
  - Water Framework Directive – reducing nutrient emissions
  - Biodiversity Directive – conservation and creation of habitats
  - Climate Change mitigation and abatement – reductions in greenhouse gas emissions (methane, Nitrous oxide)
  - Air Pollution reduction – ammonia
  - Waste Directives – reduced volume and toxicity of throughput.
- Extension of REPS[4] to include positive habitat management/creation measures for more commercial farmers, integrated with Local Authority habitat management practices, e.g. hedgerow maintenance, and inclusion of more such measures within core REPS.

2. Promoting Competitive Advantage

Farmers need:

- Easy and low cost access to markets – from the local farmers' market to export markets – using all transport modes. Our recommendations under 'transport' are very important if this mobility is to be achieved.
- New knowledge based farming (competitive and environmental services) with R&D, demonstration and (especially) risk capital;
- Innovation in cost reduction and product and service development;

4 The term Rural Environmental Protection Scheme (REPS) is inadequate to reflect the environmental contribution of farmers. They provide a range of environmental services, and therefore 'Rural Environmental Services Programme (RESP)' would be more appropriate.

- Internet access – it is difficult to imagine how farming and rural societies can succeed over the next decade unless they have immediate and efficient 24 hour access, under their control and with the knowledge to use it, to the best information on inputs and markets, and can communicate locally and globally with customers and information networks;
- Capacity building, with continuing upgrading of skills and abilities;
- Investment in human resources to create new off farm enterprises and infrastructure;
- Access to lower cost land. The current land price boom provides substantial capital gain to some farmers, but at the cost of ensuring – if it continues – that no new entrants will enter the profession, and viability in all of the first three categories above will be diminished perhaps to the point of extinction.

The National Development Plan 2007-13 cannot meet all of these challenges, but it can make an important contribution by, for example[5]:

Process Investment Priorities

- Supporting new knowledge based farming (competitive and environmental services) with investment in R&D, demonstration and (especially) risk capital;
- Investment in human resources to create new off-farm enterprise and infrastructure;
- More location-specific measures akin to corncrake scheme in Shannon Callows;
- Implementation of a plan for biomass, which takes into account economic and environmental assessment;
- Implementation of a plan for public access that is not solely dependent on specific designated paths (Comhairle na Tuaithe on its own has failed to do so). The prospects of a dynamic rural tourism and economy will be seriously inhibited unless this challenge is successfully met.
- Free environmental service including nutrient planning, including measurement of farm P levels, and wildlife or environmental advice that is not dependent on farm planning consultants, similar to FWAG in UK.

Physical Investment

- Improved slurry storage capacity, including biofilters (small-scale willow/Micanthus plantings);
- Support for provision of broadband to every household.

Results

These investments will help ensure that farmers who wish to compete seriously in local and global markets will have the opportunity to do so. There will be transparency as regards the environmental and related services that farmers are delivering for payments, and this will help ensure that such payments continue and that the services being supported will be delivered. It will help farmers achieve cross compliance – ensured by the requirement that continued good standing as regards environmental compliance is necessary to be eligible for support payments. These measures support the horizontal issues of balanced regional development, promotion of social inclusion, and environmental sustainability.

5 With reference to the briefing paper by Bullock and Styles (2006).

2.2. Forestry

Challenges

There has been considerable progress in terms of developing the forestry estate in Ireland, and in expanding the associated volume of wood output (Byrne and Legge 2006). The forest owned by the State is managed on its behalf by Coillte. In addition to providing the bulk of the wood output, it also provides the main arena for forest based outdoor recreation, including orienteering and hill walking and also manages a number of important habitats. Most of the recent afforestation has taken place on private land, so the ownership balance is shifting away from the State. As regards the wood industry, key challenges include: technical constraints that thus far mean that Irish wood is not being used in the rapidly growing timber frame sector; increasing supply from Eastern Europe is putting – and will continue to put – downward pressure on prices; challenges in producing high quality (veneer) products from the hardwood planting on private land – which comprises about 15% of the total.

The following four categories of forest owner will be involved:

1. Coillte as the dominant holder of wood stock and as the main provider of both wood supply and non market recreational and other services.
2. Private owners whose primary interest is in becoming successful commercial suppliers of wood to the processing market, and other products such as Christmas trees.
3. Private owners – who will also in many cases be part time farmers – who will be interested in generating some income from the forest, for a range of activities, including recreation and tourism.
4. Private owners who have only become involved to 'harvest the grants' and are likely to allow their woodlands to develop without any specific or pro-active management.

Recommendations

1. Ensuring Environmental Performance

- Sustainable Forest Management (SFM) planning should be supported by regularly updated forest inventory data – see below – and ongoing research related to all aspects of SFM. Traceability is now a feature of the wholesale and retail wood product markets. SFM is a brand that is now a pre-requisite for servicing international markets. Without it the sector has no commercial future, so investment to sustain this is required. This will become a challenge as the small lots planted over the past 20 years begin to be harvested; the costs per unit of achieving certification will be substantial and investment is required to reduce these costs.

- Financial incentives will be required to ensure that forestry continues to provide public goods, notably carbon sequestration, biodiversity conservation and recreational services. Promotion of public goods should be integrated into nationally accredited forestry training courses and technology research and development. The annual premium should be recognised as a payment for these services, and it should be adjusted up or down depending on their quality and extent.

- Carbon sequestration in forests will make a significant contribution to the delivery of national commitments under the Kyoto Protocol. Further research is required to strengthen national reporting, particularly in relation to soil carbon, peatland forestry and broadleaf species. Such research is also necessary if forest farmers or others are to be paid for this carbon capture. The amount of capture, the net losses (especially relevant on peatland soils) are very site-specific. The environmental contribution of forests will require further government support. The participation of Irish forests in the EU Natura 2000 programme, which provides funding for areas that have been designated as special areas of conservation, is below its potential. Support the delivery of quantified and verified delivery of environmental services including:

    - Water Framework Directive – reducing emissions of nutrients and particulates to water
    - Biodiversity Conservation – protection of habitats
    - Climate Change mitigation and abatement – de-carbonisation Air Pollution reduction – PMs and NO_x Waste Directives – reduced volume and toxicity of throughput
    - Provision of Recreation services: These need to be documented, and recognised. They are an important contribution of the public forest estate managed for the State by Coillte.

2. Commercial

- Broadleaves grown for commercial purposes are unusual in Ireland, in spite of the fact that – suitably established and managed – they can produce very highly valued products. Special capacity building and other support are needed if those farmers who wish to become professional hardwood tree farmers are to succeed.

- The same is true for those with conifers, although the work is less skill demanding and less labour intensive.

- Research must continue to allow Irish soft woods to achieve higher valued markets, and to support the small but potentially valuable hardwood tree-using industry. If this is not done, the commercial viability of both forms of tree farming will be threatened.

3. Bioenergy

- Additional financial support for bioenergy is required if forestry is to meet its potential to play a significant role in the provision of renewable energy in Ireland. Support is required to underpin the role of existing forests and wood processors in meeting demand for wood pellets and other bio-energy needs.

4. Information and Capacity Building

- The ongoing National Forest Inventory will provide an essential resource in planning and executing SFM. The inventory should be updated at 5-10 year intervals to provide up-to-date information for management and planning.

- Commitment to longer term multi-annual budgeting for the sector and continued investment in afforestation; this should be accompanied by comprehensive designation of forest land-use at a national level and the encouragement of investment in forestry by private sector companies and pension funds. A tree's commercial and environmental performance is defined by the appropriateness of the match between the site and the species. 'The right tree on the right site' means having detailed knowledge of sites, and of the performance once a forest is planted.

- Continued development of training and education programmes for forestry professionals, farm foresters, forest operatives and contractors.

- The target of 30 per cent of new planting as broadleaves has not been met. If payment as proposed above is based in part on the provision of environmental services this is likely to involve more broadleaved forests, but the mix should be driven by services provided, not species rules.

- Investment in research, demonstration and development (R&D) is necessary in all aspects of the wood-chain, including process and product R&D, training and information to support the above.

Results

These investments will ensure that those who wish to be serious tree farmers have the opportunity to be so. For the general public, there will be some transparency as regards what the public interest is achieving in exchange for the payments, and a commitment that those valuable environmental and recreational services will be provided. It is likely to make the case for more broadleaved forests. For the forest products industry, if the R&D delivers, it will allow it to escape the low end of the market.

2.3. Transport

Challenges

The rapid rise in the number of passenger and freight vehicles on Irish roads will continue to cause challenges in the future. The main challenges in this regard will be the continued increasing dependence on oil, the related rise in greenhouse gas and NO_x and particulate emissions from the sector, and the increase in congestion, particularly in urban areas (Douthwaite et al. 2006). Transport 21[6] provides an exciting portfolio of investments to transform our mobility. But there are complementary actions that are needed if it is to fulfil its full potential.

6 See http://www.transport21.ie/for details.

Recommendations

1. Integration of transport and provision of land related services

- Funding must be made available to integrate land use planning and transport provision. An underlying root cause explaining the increased use of private car in Ireland is the dispersed settlement pattern which itself is a product of rapid growth in population and incomes, the search for affordable housing, the absence of affordable clusters of housing or sites available adjacent to schools, and public transport, and life style preferences. There has been substantial greenfield development far from urban areas without the development of associated transport systems to facilitate commuting to employment centres and associated social, health and education services. The integration of planning and future transport systems is a fundamental requirement in order to arrest this trend – capacity building, support for provision of water supply, waste treatment, schools and other infrastructure at key transport nodes should be developed to appropriate scale and scope. This should not be demand driven. If the supply if provided, the demand will follow.

- This land use related funding should be 'packaged' with the transport budgets, so that they roll out in the appropriately efficient sequence.

- This will take some of the demand pressure for non farm uses of rural land, with a consequent reduction in prices, and the creation of opportunities for farm expansion for farming and for new entrants, both of which are at present virtually impossible, and this threatens the future viability of commercial farming.

2. Support for Pedestrians and Cyclists

- Walking and cycling are important from several perspectives – health, social, environmental and economic – and represent an integral component of mobility; there should be a bias in investment to support where at all possible this category of mobility because it yields so many public good health and environmental benefits. It seems unlikely that we can be successful in addressing the rapid rise in obesity levels in children if we do not provide the infrastructure that makes it easy for them and their parents to walk and to cycle. We note that cities such as Brussels and Vienna are now providing 'pay as you go' bicycle facilities and services, which meet the need of both locals and tourists for short distance cycles. Ireland is far from being state of the art in this regard, and all suffer the consequences of more congestion, more air pollution and greenhouse gas emissions, and poorer experience for tourists. Also, the potential for tourism-driven, longer cycle and hiking experiences, e.g. in parallel with the canals, are not being seized.

3. Traffic and Demand Side management – maximising the payoff to the investment

- Investment in demand-side management infrastructure is necessary to ensure that the existing transport road and rail assets and the €34.4 billion to be spent in 'Transport 21' are effectively used by all modes. This is not something that should be left to wait until 'the public transport infrastructure is in place'. Motorists pay huge congestion charges today in the form of time wasted and increased tension and frustration, and receive nothing in return except more congestion. The plans to maximise the payoff to the €34 billion investment in transport infrastructure need to be put in place as the infrastructure is put in place.

- Invest in Intelligent Transport Systems (ITS) – There are so-called soft measures under the category ITS that would greatly improve the efficiency of both freight and private transport systems. ITS measures include the use of computer, electronic and communication technologies and transport management systems to improve efficiency of surface transport. Measures such as electronic integrated public transport ticketing and adaptive traffic signalling are cost-effective to implement yet can have a significant impact on road speeds in urban areas and hence congestion and emissions. On the road freight transport side good logistics management has been shown to significantly reduce congestion from goods vehicles.

4. Rail and Public Transport

- Rail transport: the Strategic Rail Review[7] recommended that investment be continued in improved passenger rail services, particularly now that large-scale investment has already been undertaken in rail infrastructure. Reduced journey times, more frequent services, and better timetabling are needed to enable rail services to compete with road transport. Good estimates of the public good values and services involved – congestion, air pollution, greenhouse gas emissions etc – would allow an informed choice to be made between modes. Freight rail transport has not received investment to the same extent as passenger rail services to date. The Strategic Rail Review stated that some routes for rail freight might not be commercially successful. However, the viability of many routes should be reassessed in a transparent manner in terms of their potential to provide a net social benefit and a subsidy granted where the service is identified as producing a public good. This is important in light of the rapid rise in recent years in goods vehicles on Irish roads, which is straining new infrastructure, causing congestion, and damaging the environment. The full costs and benefits of road vs. rail freight must be estimated and a decision made regarding the latter;

- Investment in public transport: there has been under-investment in public transport in the past. However under the Transport 21 scheme €16 billion of the total €34 billion will be invested in public transport. It is clear that priority should be given to linking the public transport systems currently in operation. The remarks above about the packaging of land use infrastucture etc at the nodes, as they emerge, are crucial if this investment is to pay off.

7 Published in 2003. For Summary see: http://www.transport.ie/upload/general/3230-0.pdf

- Public procurement of fuel-efficient vehicles: this has been highlighted in the review of the National climate change strategy as a measure to reduce greenhouse gases from transport. It should be commended as a way to encourage the introduction of alternative fuels to the market and to gradually improve the fuel efficiency of the commercial vehicle fleet over time.

5. Roads

- The inter-urban motorway/dual carriageway will be complete by 2010. It is important that it be managed to maximise total mobility, since road building without complementary policies encourages motor vehicle use. An important opportunity is provided for bus transport, and investment in both the management of the system and the infrastructure itself – see demand management above – should be made to facilitate this opportunity and maximise the potential for all forms of public transport on the inter-urbans in order to attempt to arrest the trend of increasing numbers of private cars.

6. Strategic Considerations and Spatial Strategy

- No investment portfolio is more salient to the challenge of achieving the spatial strategy objectives than transport. A key consideration for the new NDP will be to provide economies of scale and scope for the cities of the west and south by providing enhanced mobility between them.

7. Collateral Fiscal Policies

- It is important that the tax signals motorists and others receive as they purchase and operate their cars facilitate and encourage their move towards more sustainable transport. We will be making a separate submission for Budget 2007 thereon.

Results

Getting the above in place by 2013 will provide real living and mobility choices to most of the Irish public, will help get them into less energy intensive and polluting forms of transport, will reduce the incidence of obesity and the stress and time wasting and will – with other policies – help slow the rapid growth in oil consumption and greenhouse gas and other emissions. It will also provide entrepreneurs in farming, tourism, industry and services and inward investment with the capacity to get products and services quickly and efficiently to market, and allow the cities outside Dublin to link as competitive conurbations in attracting investment and a diversity of labour skills.

2.4. Energy

Challenges

In NDP 2000-2006 sustainable energy was targeted to receive €223 million under the headings energy conservation and renewable/alternative energy. The NDP progress report[8] published in June 2006 does not provide an update on energy projects financed under the NDP to date. We believe that this sector deserves a much higher priority in NDP 2007-13. We welcome the publication on October 1, 2006 of the Green Paper – *Towards a Sustainable Energy Future for Ireland* – that identifies the context and challenges, and the key options facing us.[9] We intend to respond to the invitation to make submissions thereon by December 1, 2006.

The sustainability of the Irish energy sector is challenged by several trends:

- Increasing total and per-capita consumption of energy: Demand for energy is projected to continue to rise at an average rate of almost 3 per cent per annum, with the greatest increases in the transport and residential sectors. Demand for electricity is expected under 'business as usual' to grow by 2.5–4.3 per cent per annum until 2020.

- High dependence on imported fuels and on fossil fuels for electricity generation with resulting impact on security of supply: By 2010 Ireland will depend on imported energy, mainly fossil fuels, for 93% of its total energy supply.

- Increasing emissions of CO_2 from the burning of fossil fuels: Ireland's CO_2 emissions under business as usual are expected to rise to 37 per cent above 1990 levels by 2010 (74 Mt CO_2 equivalent by 2010, or 13.1 Mt CO_2 above Ireland's Kyoto target)

- Low use of renewable energy resources: Ireland currently meets only 2.2 per cent of its energy needs from renewable sources, although the contribution of renewable electricity is rising rapidly.

- There is a very welcome development of North South collaboration across a range of issues.

The Opportunity

The Green Paper recognises that there are considerable opportunities to move from the 'business as usual' trajectory to a different and more commercially and environmentally sustainable path. These include:

- Improved energy efficiency: to what extent can we reduce investment in expensive new plant by more efficient use of what we've got already, and by investing in highly energy efficient new buildings and plant? It damages the economy and environment to increase energy consumption when it is cheaper and more environmentally benign to increase the efficiency with which we use it.

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8 Report for the Joint Committee on Finance and Public Service, Progress on the National Development Plan 2000-2006, Department of Finance, June 2006.

9 See: http://www.dcmnr.gov.ie/NR/rdonlyres/54C78A1E-4E96-4E28-A77A-3226220DF2FC/26716/EnergyGreenPaper1October2006.pdf for details.

- Expanded use of renewables: There are now opportunities to sharply increase the share of indigenous renewable energy in the supply mix.

Recommendations

The next NDP (2007-2013) must continue to invest in measures that support these goals such as renewable/alternative energy, energy efficiency, and innovation with the following investment priorities (Legge and Gray 2006):

2.4a. Electricity generation

The electricity transmission infrastructure is currently inadequate to the needs of a rapidly growing economy. It is estimated that an estimated 2,000 MW of new generating capacity will be needed over the next 15 years to meet expected demand. This means that upcoming decisions on the mix of generating plants will determine Ireland's energy mix for the medium term.

- Infrastructural investment: investment in the interconnector and the electricity network infrastructure are required to ensure sufficient transmission capacity in the future, and to allow for diversification of supply.

- Renewable electricity: Renewable electricity is likely to meet the government's target of 13.2 per cent of installed capacity by 2010, mainly due to an expected increase in installed wind power to over 1000 MW by 2011. Greater penetration of renewable electricity will be difficult without further investment due to problems with connecting intermittent or small-scale sources. Continued investment is needed in facilitating renewable energy and in technology, economics and environment associated research, development and demonstration projects. There is scope for Ireland to become a leader in wave and ocean energy sources but increased investment in these technologies is needed. The next NDP should continue to match market needs with new programmes to support the latest nascent renewable energy technologies.

- Wind energy: The Government could facilitate high wind penetration by encouraging the deployment of open cycle gas turbine stations, which have a relatively low capital cost and provide the flexibility to balance the energy system when the wind drops.

- Biomass: The Government should support the replacement of peat (and, eventually, other fuels) with biomass for electricity generation. Biomass production would retain the social benefits of local employment that are gained by using peat while also boosting the use of a renewable source of energy with fewer environmental impacts.

- R&D: Government support for research and development in renewable technology and associated environment and economics is necessary because of uncertainty in the energy sector and the fact that all the gains from research may not be captured by those who invest in the research. Wave and tidal energy is seen as a promising area for future development in which Ireland could develop a national competitive advantage. Comhar SDC welcomes the initiative by Minister Noel Dempsey to create an R&D programme in energy named after Charles Parsons.[10] It is important that this initiative be developed and expanded.

10 Announced September 28, 2006. See: http://www.dcmnr.gov.ie/Press+Releases/Minister+Noel+Dempsey+Launches+Charles+Parsons+Energy+Research+Awards.htm for details.

- The Grid: Currently Ireland's electricity grid does not permit the connection of large amounts of electricity from intermittent or dispersed sources (like wind energy and CHP). "Embedded" or "distributed" generation is electricity generated in small-scale units that are connected to regional electricity distribution networks. There is much potential for new technologies such as modular combined cycle gas turbine, open cycle gas turbine, combined heat and power (large-scale, mini and micro) and fuel cells to be included in a national system of distributed generation. The accommodation of such decentralised generation will be essential for the wider penetration of many kinds of renewable electricity, which is often intermittent or small in scale. A grid that supported distributed generation would bring many benefits, including:

    - Improved security of supply through an increased number of generating units, diversified fuel mix, increased reliance on domestic sources of power;
    - Reduced environmental impacts through reduced greenhouse gas emissions;
    - Increased local employment through the construction and operation of plants locally;
    - Increased efficiencies through competition and reduced costs to consumers.

- Combined Heat and Power (CHP): CHP, also known as cogeneration, is the simultaneous production of usable electricity and heat in a single process. CHP units are about 20-25 per cent more energy efficient than conventional electricity generating units because they use the heat produced rather than releasing it into the atmosphere. CHP units are often located close to point of use, thus increasing efficiency by reducing transmission losses. The further penetration of CHP will require incentive structures and adaptations to the national grid that allow embedded generation. Biomass-fired CHP has all the above benefits of CHP and in addition also uses an indigenous and renewable source of energy.

- Microgeneration: technologies such as micro-CHP, micro-wind power and domestic solar panels would bring embedded generation closest to the point of use. Microgeneration could be promoted by funding R&D in new microgenerating technologies. New measures will be required to allow grid connection, preferably by a simple and standardised procedure to reduce the barriers to market entry.

2.4b. Energy fuel mix

Ireland is expected to depend on natural gas for 68 per cent of its electricity needs in 2020. This has particular implications for security of supply and therefore more diversification of energy fuels is necessary with the following recommendations:

- Coal: If coal is to remain part of the energy mix, the development of CO_2 capture storage and sequestration (CSS) should be supported to mitigate its release of CO_2 emissions. This technology is still far from being cost effective, but much work is on going in the US, Japan and Europe focussed on commercialising CSS. The fast-tracking of this work is driven by the European Union Emissions Trading Scheme (EUETS) which has created an EU-wide market in CO_2; this provides utilities with an immediate payoff (€10-20 per tonne) for reducing emissions, which is especially attractive for the most carbon intensive fuel, namely coal. It is crucial that this market continue post 2012, so that utilities can make long-term carbon-efficient investments.

- LNG: the development of a Liquefied Natural Gas (LNG) terminal would enhance security of supply but at great cost. Nevertheless, investing in an LNG terminal in the UK or even mainland Europe would enhance Irish supply security through greater interconnectedness of the markets. A partnership with the UK in this regard should be considered.

- Biofuels: Ireland has the potential to produce biofuels from agriculture, such as biodiesel from rapeseed oil, as well as from other industrial activities like vegetable oils recovered from the food industry. It is essential that biofuels meet the highest standards of quality and performance – any deficiencies in this regard may damage irretrievably their credibility in the market place. This is especially true in regard to ethanol. The Government should act on the suggestion by the Oireachtas Joint Committee (2006) to investigate the possibility of supporting the conversion of the Mallow sugar factory to bioethanol production.

- Support for new energy supply and services which provide a mixture of competitiveness and environmental services.

- Financial provision for Sustainable Energy Ireland's *House of Tomorrow and Greener Homes Scheme* should be sustained and increased over the life of the new Plan.

- Continued and enhanced support for householders through SEI's Greener Homes Scheme should include additional options for micro-generation (small-scale wind/hydro generation and photovoltaic panels) including financial provision for battery sets for micro-generation systems.

2.4c. Demand-side measures

Demand-side management can reduce the size of the energy sector relative to the whole economy and will be essential to reducing Ireland's dependence on imported energy, environmental impacts and vulnerability to increased prices. It is an area that – in spite of the substantial net payoffs to investment – has not secured the priority it deserves. It is important that in NDP 2007-13 this asymmetry is corrected and it is given 'parity of esteem.'

- Energy efficiency: Energy efficiency can deliver large environmental and economic benefits at less cost than renewable and other new technologies, but such opportunities are often ignored due to market barriers such as imperfect information, access to capital and hidden costs. Building regulations and information campaigns can deliver large energy savings through energy efficiency initiatives with respect to major refurbishment programmes and new buildings, using existing and proven technology. Awareness and education initiatives can be a very cost-effective way to reduce energy consumption and can bring high returns. Investment in smart metering and ensuring the right prices will assist this cause.

- Transport: Investment measures to reduce energy consumption in transport should focus on increasing the provision of public transport and, crucially, a shift away from current development patterns that encourage suburban sprawl towards urban containment, involving high-density residential development, mixed land uses and good public transport. Acting on our recommendations

(see 2.3 'Transport') to combine investment in transport with parallel investment in land use infrastructure at the nodes is crucial in this regard. Other measures could include fiscal measures to encourage hybrid vehicles, increase the taxation of heavily polluting vehicles, congestion charges (or similar schemes) and incentives for teleworking.

- Residential and Public Sector: Through its House of Tomorrow and Public Sector Programme, Sustainable Energy Ireland has demonstrated that a 40 per cent improvement above the 2005 Building Regulations is readily[11] achievable. The Energy Performance in Buildings Directive will from 2007 require the energy labelling of all new buildings and those that are sold. It is important that the NDP 07-13 commits to make all new public buildings including public sector financed housing, meet the House of Tomorrow (+40 per cent) standard and that the regulations be changed so that private sector performance matches the public.

- Industry: The energy specific recommendations are included in '2.6 Industry'.

- 'Towards Zero Energy communities' There is a strong case to support – perhaps via the Sustainable Development Fund – communities that work in partnership with public and private stakeholders to provide models of effective delivery of close to zero energy performance, and the use of advanced renewables.

- Supporting measures are necessary to underpin sustainability of the investment in the built environment. Full and timely implementation of the EU's Energy Performance in Buildings Directive will be an important dimension in advancing the energy efficiency of the building stock but should also be accompanied by the early review of Part L of the Building Regulations to enhance further the thermal efficiency of buildings.

Results

If these actions are taken over the 2007-13 period, Ireland will move from being a European laggard as regards both energy efficiency and renewables, to being a leader. Our dependency on imports, with all the attendant risks of price volatility and supply interruption, will be diminished. Our emissions of greenhouse gas emissions will fall substantially below the business as usual baseline, and the bill for the Irish taxpayer to buy out our overshoot of our Kyoto target will be reduced.

2.5. Tourism

Challenges

In 2005, there were 6.7 million overseas visitors to Ireland up from 4.2 million in 1997, representing a 37% increase. Over the same period, total foreign revenue earning increased from €2.1 billion to €4.3 billion (51% increase). In the context of international tourism, sustained rapid growth is forecast to continue. In the short-term, greater access by way of low-cost airlines together with a revival in major

11 More than 4000 units in all counties, covering a range of building types, and undertaken by a range of developers, have been installed. See: http://www.sei.ie/for details.

European economies would reinforce and strengthen tourism with market potential to attract visitors from the new accession countries. However, in regard to the future, the sector will come under increasing pressure as the perception takes hold that Ireland is an expensive place to visit. Many of the costs in this regard are not under the control of the tourism industry. This means that compensation to visitors in the form of better quality and more variety will be required if Ireland is to hold its market share, and this in turn means focus on the quality of environment, widely defined to include both nature an the built heritage. The key challenge is to develop appropriate policies and funding framework to facilitate development of sustainable and spatially balanced tourism industry (Tourism Research Centre 2006).

Ireland has been promoted as a clean, green tourism destination, famous for its landscape, environment, natural habitats & biodiversity. Investment under the NDP must ensure that this natural resource base, which is fundamental to the tourism sector, is protected and enhanced. Fáilte Ireland visitor surveys highlight the quality of sightseeing and scenery as the primary visitor motivation. There has been substantial investment in water supply and treatment over the life of the current plan, and this and related investments need to be continued, so that the objectives of the Water Framework Directive are met, and the basis for tourism and local use of water assets is enhanced. There is a significant role for the tourism sector itself in protecting the environment on which it is so dependent. Ireland's main asset is its scenery; however this is also a public good, which is not directly under the control of the tourism industry.

Pressures arising from tourism include

- Waste generation
- Energy
- Seasonality/concentration of tourists
- Housing/Urban problems
- Illegal dumping
- Activities with potential to harm sensitive areas – threats to ecosystems & biodiversity
- Disruption of coasts
- Deforestation
- Water overuse – water quality/wastewater treatment
- Greenhouse gas emissions – climate change (car dependence/airline importance) exacerbate climate change/greenhouse effect – c.10% over target
- Unsustainable & inequitable resource use

Recommendations

- As regards sustainability concerns, tourism suffers from a lack of policy and is under-researched. It is important to know limits and how best to safeguard our natural assets. Resources must be committed to statistics, research and planning to increase understanding/anticipate trends. Specific instruments will have to be developed to objectively determine the capacity/limits of an area, and how to manage them once identified.

- Investments in new tourism infrastructure and services – including eco-tourism – that provides a combination of competitiveness and environmental services. Environmentally friendly products and services, which meet requirements of consumers, should be supported. Development of attractive promotional packages aimed at boosting revenue in rural areas. A good example is the cross-border "Green Box" area in Leitrim, Fermanagh and parts of Sligo, Monaghan, Cavan and Donegal where fourteen tourist accommodation providers have been awarded the EU Eco-label. Fáilte Ireland's Environmental Unit should be adequately resourced to ensure that it can deliver on its mandate under planning and environmental codes. Assignment of responsibility and provision of funding to complete a national inventory of outstanding landscapes (an update of the An Foras Forbatha inventory undertaken nearly thirty years ago). Provision of funding for the preparation and implementation of a national Coastal Zone Management strategy – is a key priority to protect the assets of the sector and to meet many other objectives.

- Continue investment in water supply and waste treatment such that the requirements in regard to both the Urban Wastewater Directive and the Water Framework Directive are met within the 2007-13 period.

- Public goods infrastructure must be protected– buildings and streetscapes of character, cultural endowments, parks, and amenities usable by residents and visitors. There has been considerable investment in same over the current plan, and this momentum should be continued.

- Note the 'Transport' recommendations as regards the need to invest positively in more national scale and branded long journey hiking and cycle paths where canals and other existing infrastructure can act as the sinews of such a system.

Results

Appropriately implemented and managed, these investments will guarantee that tourism's natural resource and environmental asset base is protected, and in particular its coastal endowments, which are crucial to the long term viability of the sector. It will provide a platform for a variety of products and services related to high quality natural resources that will allow entrepreneurs in the sector to compete successfully with differentiated activities that can command a premium price in the market place. It will ensure that rural tourism does not become an oxymoron, and help give substance to the national spatial strategy.

2.6. Industry

Challenges

Ireland has moved from an agricultural economy and pastoral, cultural landscape to a post-industrial knowledge economy (Kennelly and Bradley, 2005) and continues to steer its economic base away from high labour-input industries towards higher value-added lower energy-intensive industries such as electronics, ICT, pharmaceuticals and chemicals aimed for export on global markets (Goodbody, 2001). As costs rise, quality will become central to sustaining industrial competitiveness.

Environmental protection, economic growth and industrial competitiveness are mutual complementary goals, as a healthy environment is paramount to maintaining the competitiveness of Ireland's food, agriculture and tourism industries, while also maintaining the viability of knowledge-based service industries (ICSTI, 2004, Browne 2006).

In terms of eco-efficiency, Irish industry has succeeded in achieving absolute decoupling in the case of greenhouse gas emissions and relative decoupling in the case of projected industrial waste as well as maintaining progress towards commercial and packaging waste targets. The next stage is the transition from reactive, ex-post environmental management and compliance with regulation transposed from EU legislation and moves towards innovative, pre-emptive practices.

The next NDP for 2007-2013 should facilitate sustainable industrial development through balanced regional development, north-south collaboration and forward planning in infrastructural provision in order to maintain international competitiveness. Capital infrastructural investment will increase benefits for existing firms through transport cost reduction, improve environment for new business development and induce labour market benefits through reducing commuting times, increasing labour productivity and improving participation by enabling remote working as a result of full broadband roll-out (IBEC, 2006, p6). The investments noted in 'Transport' are key to achieving the economies of scale and scope needed to compete with the Dublin agglomeration. Both public and private transport in the 2007-13 period need to focus on linking the cities outside Dublin. This will automatically facilitate and encourage investment outside the M50 penumbra.

Irish industry and enterprise can become more sustainable by participating in eco-industrial networks, voluntary corporate sustainability reporting (CSR) and initiatives such as Business in the Community Ireland, the 2004 STEM (Sustainable Together through Environmental Management) Project, the Sustainable Energy Ireland (SEI) Large Industry Energy Network and Energy Agreements Programmes, the EPA Cleaner Greener Production Programme (CGPP) and Environmental Technologies Programme and Enterprise Ireland's Ei4 Business Initiative, as well as adhering to the new Irish Energy Management Standard IS 393 and the proposed British standard on sustainability management BS 8900, which links formal standards such as ISO14000 and private standards such as the GRI and AA1000.

As regards waste, there has been progress over the current plan, with additional infrastructure, the use of pricing to encourage re-use and recycling, and a professionalising of the business and of some local authorities.

Moving with ever more intensity to a knowledge-based economy is a crucial pre-requisite to compete in global markets, and to do so in manners that enhance environmental and social responsibility. Comhar SDC supports the programme outlined in *Strategy for Science, Technology and Innovation 2006-2013*, which is designed to make Ireland a knowledge leader in key areas.[12]

12 See http://www.entemp.ie/publications/science/2006/sciencestrategy.pdf for the full strategy.

Recommendations

Measures recommended for the NDP that are particularly relevant for industry include:

- Investment in transport access and public transport, to both widen the access to labour and to markets. In constructing new plants, every effort should be made to facilitate access to public transport, and car-pooling etc should be encouraged.

- Support for locating employment-generating land uses and associated infrastructure in close proximity to public transport and town/village services;

- Investment in projects contributing to:

  - Water Framework Directive – reducing emissions and intake,
  - Biodiversity Directive – conservation and creation of habitats,
  - Climate Change mitigation and abatement – decarbonisation of industry and energy,
  - REACH Directive (pharma sector),
  - Air pollution reduction – PM and NO_x
  - Waste Directive – reduced volume and toxicity of throughput;

- Rewards for participation or certification for ISO14001, energy efficiency agreements or other independently validated quality performance standards;

- Investment in Ecoparks with economies of scale and matching the criteria above;

- Infrastructural development and investment of €1 billion in the waste sector, including privatisation of waste management, regional waste management plans, integrated facilities and grant aid for waste management infrastructure for all market players;

- Investment in ideas and people – R&D and training – including projects that enhance performance as regards sustainability.

Results

This programme will ensure that both indigenous entrepreneurs and inward investment will have quality and knowledge in their widest senses as key sources of comparative advantage as they face more competition. Industry will be correctly perceived as an important contributor to quality of life. New knowledge will result in a continuing flow of innovations that enhance productivity and open new frontiers.

2.7. Households

Challenges

Eighty per cent of our environmental impact as consumers comes from just four everyday decisions – how we run our homes, what food we eat, how we get around, and holiday travel (Doran 2006). Individually and collectively, sustainable consumption measures need to begin here. Households and communities can play a proactive role in embracing sustainable consumption – given an appropriate voice and support in strategic decision-making. New bodies such as the National Consumer Agency could be given a statutory role in advancing sustainable consumption and sustainable household consumption. The Taoiseach's Task Force on Active Citizenship could also make a considerable contribution to the demand-side debates on responsible consumption.

A complex range of social, economic, demographic and other lifestyle-related factors influence household consumption of energy, food, and mobility, but income and prices are key influencers of consumption. Other sections in this document make recommendations on energy generation and mobility, therefore this piece focuses mainly on the built environment and community issues. The experience of community can influence patterns of consumption in a number of ways. At the most basic level, there is recognition that a protected environment is a significant contributor to our quality of social and individual life. The kind of natural and man-made environments, including the state of local neighbourhoods, impact hugely on the quality of family and community life.

The National Economic and Social Council (2005) has described its vision of sustainable neighbourhoods as compact, centred, diverse and walkable neighbourhoods that have sufficient populations to support the development of high quality services and have a diverse mix of housing suitable for all people at all stages of the family cycle. The Council draws attention to the risk, however, that new core principles in support of sustainable neighbourhoods i.e. sustainable urban densities, consolidated urban areas, compact urban satellites, and rapid communications – "may not be adequately reflected in actual developments." (NESC 2005)

There is currently a trend of additional housing being located as satellites, urban peripheries or bolted on to existing small villages without the necessary services, e.g. waste water treatment plants, schools, community facilities, parks etc. By not providing these packages of services in sufficient quantity, there is inevitable pressure to meet the housing demand by dispersed rural housing. This is a product in part of preference, but largely of necessity, as prospective buyers move to options that they can afford. Isolated single dwellings – and their demands on infrastructure and services – can impact significantly on the national heritage in a number of ways:

- Landscape and seascapes (inc. geology);
- Biodiversity (incl. flora, fauna and wildlife habitats);
- Archaeological Heritage (incl. vernacular heritage);
- Water Quality (particularly groundwater); and
- Built Heritage (incl. architectural heritage, vernacular heritage, inland waterways, heritage parks and gardens).

Planning authorities, in their assessment of planning applications for single houses, should have ready access to accurate and high quality data pertaining to the state and likely impacts on groundwater resources and national heritage if they are to be expected to deliver decisions that guide new rural houses to locations where they will not result in significant negative impacts. The Heritage Council has observed that the principal gaps in heritage data relate to landscape character and to biodiversity value outside of those areas which are designated as being of national (NHA) and European importance (SAC and SPA). Landscape Character Assessments (LCAs) are one of the tools that can facilitate this process.

Other community-based consensus and community engagement mechanisms should be made available to local stakeholders, for example Community Development Boards, including:

- Civic Fora
- 21st Century Town Hall Meetings (Dialogues)
- Citizens Juries
- Deliberative Surveys
- Multi Criteria Analysis Conferences
- Open space meetings

These innovative mechanisms are designed to assist communities address complex issues, and resolve potential conflicts between stakeholders. They could be used more widely to generate debate on innovative responses to pressures for the further development of dispersed housing in rural areas e.g. criteria to be included in local development plans. The NDP should provide incentives for more local authorities to integrate sustainability into their local area plans.

Support for decentralised renewable and low carbon energy production is one of the most far-reaching contributions that NDP investments in infrastructure design can make to the sustainability of local communities in the near term. A decentralised approach could deliver multiple benefits in the context of sustainable development, including dividends in terms of national energy security, environmental benefits, economic activity, innovation, more consumer choice, and community empowerment in every sense. Some proposals to advance this objective are included in '2.4 Energy' above.

An informed citizenry is a key pre-requisite for a fulfilled and active community. There are campaigns ['Race against waste' (Waste), 'Power of One' (Energy)] that provide very useful information, and associated web sites such as Sustainable Energy Ireland (www.sei.ie/) but the work of Clinch et al., (2006) shows that it is the quality of life in the immediate hinterland that is most salient in shaping well being, and we don't have information that is systematically site specific.

Some conflicts are caused by irreconcilable differences, and no amount of mediation of negotiation skills will find a mutually agreeable solution. However, in most cases, conflict is gratuitous, and could be avoided or diminished in destructive impact if the issues and choices were posed early on, and if key stakeholders engaged with the appropriate framework and skills.

Recommendations

- A strong commitment to coherence with National Spatial Strategy (NSS) and the targeting of investment for physical infrastructure in the "gateways" and "hubs" will help give the other cities and regions outside Dublin comparative advantage as regards scale and scope, and reduce the pressures on Dublin and its hinterland. This is essential to underpin the implementation of the NSS.

- Information that is timely, relevant and accurate is a key means of citizen empowerment. This can now be provided on a web-based system; all households are now digitally referenced. The householder should be able to enter their address and access a full suite of timely information on the local social and physical environment. Investment in the provision and up dating of such a system should be a priority.

- Provision of resources to allow for biodiversity proofing the Government's own building programme particularly in the light of new building contracts under the Government's Decentralisation programme.

- Support for community groups that foster environmental and social goals within the community. This could include resources to engage in mediation and negotiation. Ongoing work in UCD indicates that communities are less antagonistic and more amenable to productive discourse where they are involved early on in a mature and full discussion of options.[13] The Sustainable Development Fund could be used as a way of channelling substantial resources on a competitive basis to communities that developed and implemented a local Sustainable Development Plan.

- Support for local authorities who are implementing such plans, and need the skills and information resources to do so.

- The National Anti-Poverty Strategy set targets to address fuel poverty in local authority dwellings, for 2007 and 2010. The new NDP should set aside funding to ensure that fuel poverty targets are met, and ensure continuous review of efforts to eradicate fuel poverty by, *inter alias*, supporting energy efficiency and renewable energy measures.

- Dissemination of information to consumers on consequences of food, energy and mobility choices.

- Investment in whatever priority measures the Taoiseach's Task Force on Active Citizenship develops.

Results

This investment package will result in informed and empowered communities, able to negotiate and to engage with others to arrive at a mutually beneficial consensus. The application of the Sustainable Development Fund will provide a number of communities that have successfully implemented a suite of interrelated and mutually re-enforcing projects that promote sustainable development and provide a model for others to follow.

13 On going PhD research by Louise Gallagher, School of Geography, Planning and Environmental Policy UCD.

2.8. Marine

Challenges

To many, the Marine sector in Ireland is synonymous with fish and fisheries, often seen as a minor inconsequential player of little economic interest and even less economic potential. In the past decade that we have begun to realise the breadth and scale of the Irish marine resource, its current value and its very real and tangible economic, social, environmental and scientific potential (Whelan 2006).

In addition to our modest land bank of 90,000 km^2 we claim stewardship over an additional 900,000 km^2 or 220 million acres of hidden marine territory. The majority of our population lies within 20km of our 7,500m long coastline and practically all of our exports and imports are carried by sea.

Although under-developed and with a fledgling marine sector by international standards, the ocean economy in Ireland is currently valued at €3 billion and supports 44,000 jobs, both directly and indirectly and contributes just over 1% of Ireland's GNP – a much lower proportion than in most other maritime countries.

Perhaps one of the greatest challenges facing the marine sector is the sustainable management of our marine and aquaculture fisheries resources. Despite considerable investment over the past two decades Ireland's marine fisheries resources are under increasing pressure and urgently require a new management paradigm if they are to continue to provide sustainable employment. For example Ireland had fish landings of €210,000,000 in 2002. This was the second most valuable year on record (2001 landings: €254,000,000). However, these figures mask a long-term decline in volumes. The 245,000 tonnes landed in 2002 was the lowest in a decade, and considerably down from 1998's all-time record high of 320,000 tonnes. Irish coastal waters are amongst the richest fishing grounds in the world in terms of primary productivity. Future changes include the need to adopt an ecosystem-based approach to ensure the sustainable management of fish stocks.

The Marine Institute is currently (2006) finalising a major research and innovation strategy for the period 2007-2013, with the objective of delivering an integrated research and innovation programme that will, through the use of research, knowledge and technology transform the sector to deliver sustainable, high growth, high value-added, market led opportunities. Comhar looks forward to the publication and implementation of this strategy – *Sea Change: A Marine Knowledge, Research and Innovation Strategy for Ireland (2007-2013)* and a commitment to bring forward measures to:

1. Strengthen the competitiveness of traditional marine industries and their progression to higher value-added activities.

2. Push the frontiers of knowledge and explore the interfaces between disciplines.

3. Deliver integrated scientific advice, policy and regulation to support environmental, social and economic advancement.

Recommendations

Comhar SDC would like to see the new NDP commit to deliver an integrated research and innovation programme that will, through the use of research, knowledge and technology transform the marine sector to deliver sustainable, high growth, high value-added, market led opportunities. The new NDP should provide adequate resources to meet the costed recommendations in the recently published Strategy for Science, Technology and Innovation (2007-2013). Recommendations from this and other sources include:

- The development of research discovery programmes in Marine Biotechnology; Marine Biodiscovery; Marine Technologies.

- Recommendations to establish Ireland as an internationally recognised centre for Ocean Renewable Research (ocean energy).

- Establishment of a Smart-Bay system for the observation, monitoring and management of coastal and ocean environments and the testing of new advanced technologies.

- Development of Ireland as a global monitoring centre for climate change assessment in the context of the North Atlantic Gulf Stream unique marine and other ecosystems and the Smart-Bay system.

- Use of the data derived from the Irish Seabed Survey and the new INFOMAR programme to place Ireland in a position of competitive advantage in a range of areas including participation in international research programmes.

- Stimulate greater involvement by Irish seafood industry in marine-related research, prioritise the development of marine health foods (functional foods), target a significant increase in FP7 participation and seek EU support for a climate change monitoring centre.

- Creation of Ireland as a favoured site for landing fish from all sources.

- Conservation of key ocean related assets under our (partial) control. A key iconic and symbolic target in this regard is the Atlantic salmon.

- Development and implementation of a Coastal Zone Management Strategy to *inter alia* protect spawning grounds for fish stock, and wetlands and other habitats. [This is a crucial investment also for the tourism sector, whose potential will be diminished if this zone is not optimally managed.]

Results

This will result at the end of the NDP with Ireland as a favoured destination for landings, as a science based manager of coastal resources, broadly defined, with salmon having a secure future, and with a coastal zone management system in place that protects key spawning grounds, habitats and ocean focused recreation activities so that outputs are sustainable into the far future.

2.9. Cross-cutting themes

In following this template, we have not given specific separate attention to our cities, or to the environmental themes that feed into and are a part of the sectoral analyses and recommendations.

Cities

These are the hubs we look to make a statement to the world that Ireland is an exciting and fulfilling place in which to live, to do business and invest, to visit and to enjoy. Successful cities are safe, vibrant, clean, with a high quality and well-interpreted natural and built environment, full of creativity, exemplifying excellence in design, entrepreneurship and diversity, absorbing new people and new influences, with centres of learning of international repute. The Dublin city region is on the global stage, ranked 18 in the top 61 cities of Europe in terms of GDP per capita.[14] The other cities are not, and it is an important task of NDP 2007-13 to create high-speed links such that they can together begin to achieve the agglomeration economies that will make them a global force together. The measures described above will together support this objective, but urban and national leadership is needed also to give local character, style and shape so that the outcomes are urbane in the best sense.

Environmental Endowments

Our water, air quality, biodiversity, our waste challenges and climate change obligations all press and some are made more complex to achieve because of our prosperity. And all are guided by EU Directives that demand compliance over the life of the NDP. Because fulfilling these obligations is so embedded in what we do sectorally, we have flagged these as issues and opportunities throughout. It is best is they are achieved organically as a part of doing business – this achieves targets at least cost compared to 'retro-fit', it gives a sense of ownership and commitment to the sectoral agents and it is more dignified and better for our image to be seen to be ahead of the game, rather than being expensively dragged through expensive and time consuming administrative and legal procedures. But it is important to ensure that the sum of the parts does comprise a whole.

14 Frankfurt am Main is number one (74,455), Copenhagen 8th (50,775) and London is 21st (35,072) from *State of English Cities Volume 1*, Department of Deputy Prime Minister, London, March 2006.

References

Browne, D. (2006), 'Economic, social & environmental performance of industry & how to influence it', Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-2013*, October 4-6 2006, Davenport Hotel, Dublin.

Bullock, C. and D. Styles (2006). 'Sustainability of the Irish Agricultural Sector', Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-2013*, October 4-6 2006, Davenport Hotel, Dublin.

Byrne, K., and T. Legge (2006). 'Economic, environmental & social performance of the Irish forestry sector', Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-2013*, October 4-6 2006, Davenport Hotel, Dublin.

Clinch, P., S. Ferreira, F. Brereton, M. Moro, and C. Bullock (2006). 'Understanding & measuring the quality of life in Ireland', Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-2013*, October 4-6 2006, Davenport Hotel, Dublin.

Doran, P. (2006). 'Economic, Social and Environmental Performance of Irish households and communities, and how to influence it', Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-2013*, October 4-6 2006, Davenport Hotel, Dublin.

Douthwaite, R., D. Healy, and K. Leyden (2006). 'Economic, environmental & social performance of the Irish transport sector'. Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-2013*, October 4-6 2006, Davenport Hotel, Dublin.

Goodbody (2001). *Review of the National Anti-Poverty Strategy*, Department of the Taoiseach.

IBEC (Irish Business and Employers Confederation) (2006). *National Development Plan 2007-2013: A New Approach to Balanced Regional Development*, IBEC Submission to Department of Finance.

ICSTI (Irish Council for Science, Technology and Innovation) (2004). *Sustainable Development in Ireland: The Role of Science and Technology*, Forfás.

Kennelly, J.J., Bradley, F. (2005). Ireland in the New Century: An Opportunity to Foster an Ethic of Sustainable Enterprise. In: *Sustainable Development*, Volume 13.

Legge, T., and M. Gray (2006). 'Economic, environmental & social performance of the Irish energy sector', Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-2013*, October 4-6 2006, Davenport Hotel, Dublin.

NESC (National Economic and Social Council) (2005). *NESC Strategy 2006: People, Productivity and Purpose*, December 2005.

Tourism Research Centre (2006). 'Economic, environmental & social performance of the Irish tourism sector', Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-2013*, October 4-6 2006, Davenport Hotel, Dublin.

Walsh, B. (2006). 'Shaping the Macroeconomy and Quality of Life', Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-201*3, October 4-6 2006, Davenport Hotel, Dublin.

Whelan, K. (2006) 'Towards Sustainability – The Marine Sector', Comhar Briefing Paper. Presented at *Sustainability in the National Development Plan 2007-2013*, October 4-6 2006, Davenport Hotel, Dublin.

Conference Programme

Comhar SDC – Conference,

October 4th – 6th, 2006, Davenport Hotel, Dublin 2.

Conference Programme

Wednesday, October 4

09:00 Registration and coffee

09:30 Opening Frank J. Convery, Chair, Comhar – the Sustainable Development Council

SESSION I SHAPING THE MACRO ECONOMY AND QUALITY OF LIFE

Chair: Dermot McCarthy, Secretary General, Department of An Taoiseach

09:45 – 10:15 'Overview of the National Development Plan 2007-13', Dermot Nolan, Department of Finance

10:15 – 10:45 'Towards Sustainable Growth', Brendan M. Walsh, UCD

10:45 – 11:15 'Understanding and Enhancing Quality of Life in Ireland', Peter Clinch and Susana Ferreira, UCD

11:15 – 11:45 Coffee/Break

11:45 – 12:15 Panel: Mary Kelly (EPA) & Paul Sweeney (ICTU)

12:15 – 13:00 General Discussion

13:00 – 13:15 Dermot McCarthy, 'Concluding comments'

13:15 – 14:30 LUNCH

Session II INDUSTRY

Chair: Mr. Seamus O'Moráin Assistant Secretary General, Enterprise Trade and Employment

14:30 – 15:00 'Towards Sustainable Industry' – David Browne, University of Limerick

15:00 – 15:30 Panel: Donal Buckley (IBEC), Brendan Finnucane (Enterprise Ireland) & Robin Curry (EnviroCentre)

15:30 – 15:45 General Discussion

15:45 – 16:00 'Concluding Comments', Seamus O'Moráin

16:00 – 16:30 BREAK

Session III MARINE

Chair: Dr Cecil Beamish, Assistant Secretary General, Department of Communications, Marine, and Natural Resources

16:30 – 17:00 'Towards Sustainable Marine sector' – Dr. Ken Whelan, Marine Institute

17:00 – 17: 30 Panel: Frank Doyle (Irish Fisherman's Organisation) & Karin Dubsky (Coastwatch)

17:30 – 17:40 General Discussion

17:40 – 17:50 'Concluding Comments' Dr. Cecil Beamish

Thursday, October 5

SESSION IV SHAPING RURAL LIFE

Chair: John Fox, Assistant Secretary General, Agriculture and Food

09:00 – 9:30 'Towards Sustainable Agriculture' – Dr. David Styles (TCD) & Dr. Craig Bullock (Optimize)

09:30 – 10:00 Panel: Ruairí Deasy (IFA), Liam Downey (NUI Maynooth) & Ciaran Casey (Leader Support Unit).

10:00 – 10:30 General Discussion

10:30 – 11:00 BREAK

Chair: Denis Byrne, Assistant Secretary General, Agriculture and Food

11:00 – 11:30 'Towards Sustainable Forestry' – Dr. Ken Byrne, UCC

11:30 – 12:00 Panel: Eugene Hendrick (COFORD) & Anja Murray (An Taisce)

12:00 – 12:20 General Discussion

12:20 – 12:30 'Concluding comments', Denis Byrne

12:30 – 13:30 LUNCH

Session V ENERGY

Chair: Sara White, Deputy Secretary General, Communications, Marine, Natural Resources.

13:30 – 14:00 'Towards Sustainable Energy' – Thomas Legge

14:00 – 14:30 Panel: David Taylor (SEI) & Larry Staudt (Dundalk IT)

14:30 – 14:45 General Discussion

14:45 – 15:00 'Concluding Comments' Sara White

15:00 – 15:30 BREAK

Session VI TRANSPORT

Chair: Pat Mangan Assistant Secretary General, Transport

15:30 – 16:00 'Towards Sustainable Transport' – Dr. Kevin Leyden

16:00 – 16:30 Panel: Fred Barry (NRA) & Jeremy Ryan (DTO)

16:30 – 16:45 General Discussion

16:45 – 16:55 'Concluding Comments', Pat Mangan

Session VII TOURISM

Chair: Paul Bates Assistant Secretary General, Arts, Sport and Tourism

17:00 – 17:30 'Towards Sustainable Tourism' – Dr. Kevin Griffin, DIT

17:30 – 17:45 Panel: Paddy Matthews (Fáilte Ireland), Catherine Reilly (Irish Tourist Industry Confederation) & John Power (Irish Hotels Federation)

17:45 – 18:00 General Discussion

18:00 – 18:10 'Concluding Comments' Paul Bates

Friday, October 6

Session VIII HOUSEHOLDS

Chair: Mary Davis, Chair of the Taskforce on Active Citizenship

09:00 – 09:30	'Towards Sustainable Households' – Dr. Peter Doran, Queen's University Belfast
09:30 – 10:00	Panel: Professor Richard Moles (University of Limerick)
10:00 – 10:30	Minister's Address
	Reflections by Dick Roche, TD, Minister for Environment, Heritage and Local Government
10:30 – 11:00	BREAK
11:00 – 11:15	'Concluding Comments' Mary Davis

Session IX INTEGRATION

Chair: Tom O'Mahony, Assistant Secretary General, Department of Environment, Heritage and Local Government

11:15 – 11:45	'Reflecting Sustainability in the National Development Plan'
11:45 – 12:15	Panel: Helen Johnston (Combat Poverty), John Fitzgerald (ESRI), Rory O'Donnell (NESC), & Gavin Harte (An Taisce).
12:15 – 12:30	General Discussion
12:30 – 12:40	'Concluding Comments' Tom O'Mahony

Statement from the Chairman of Comhar SDC

The new National Development Plan (NDP) 2007-2013 will provide the essential framework for investment decisions for the next seven years. Ensuring environmental protection, social equity and cohesion as well as economic prosperity must be key objectives.

Moving towards sustainability requires us to:

- stabilise use of energy and other resources,
- reduce pressure on eco systems and other life support systems,
- maintain conditions for the economy to provide employment for all who wish to be employed, and
- enhance social cohesion to secure a healthier, more secure quality of life generally.

This two and a half day conference will focus on our recent performance and consider how we can improve and enhance future performance over the life of the next NDP. The conference will address how specific sectors within Ireland – industry, energy, transport, agriculture and forestry, tourism, marine, and households – have performed in the past, and the options available for enhancing performance over the life of National Development Plan (NDP) 2007-2013.

Focus will be on achievements to date over the 2000-2006 NDP, trends under 'business as usual', policy options to change outcomes, including investments needs and options. It will give key stakeholders (government, business, community, environmental) an opportunity to hear first hand where we are and where we are likely to be over the new term.
Professor Frank Convery, Chairman of Comhar SDC

Keynote Speakers

Professor Peter Clinch is concurrently Jean Monnet Professor of European Environmental Policy and Professor of Regional and Urban Planning at UCD. In addition to his posts at UCD, he has worked for the World Bank in Washington D.C., USA and as a consultant to the Overseas Development Administration in West Africa and to the OECD Professor Clinch is author of numerous publications in books and international journals.

Dr. Susana Ferreira holds a Ph.D. in Economics from University of California, San Diego and is a Lecturer in Environmental Economics at University College Dublin. She has been a visiting scholar at Universidad del Rosario in Bogotá, Colombia, Bethlehem University in the West Bank, and served as a Consultant for the Environmental Economics and the Social and Economic Development Units at the World Bank. Her articles have appeared in *Economic Development and Cultural Change, Energy Policy, Land Economics* and *Environmental and Resource Economics*.

Professor Brendan Walsh is formerly a professor of National Economics, UCD, and is currently Senior Research Fellow, School of Geography, Planning and Environmental Policy, UCD. He has carried out varied and extensive research including "Did (and Does) the Border Matter" and "Labour Market Adjustment in the Irish Regions".

Dr. Ken Byrne holds a B.Agr.Sc. (Forestry) and Ph.D. (Forest Soils) from UCD and is a Postdoctoral Research Fellow, Centre for Hydrology, Micrometeorology and Climate Change, at the Department of Civil and Environmental Engineering, University College Cork. His research interests are carbon cycling and greenhouse gas balances in soils and vegetation; the role of land use in the mitigation of greenhouse gas emissions; carbon accounting systems for land use, land use change and forestry.

Dr. Kevin M. Leyden is an Associate Professor of Political Science at West Virginia University and Director of the Institute for Public Affairs. His current research examines how the built environment affects individuals socially, politically, and physically. He is also a member of a research team currently examining the transportation system of Ireland for that country's Environmental Protection Agency. His recent work on the relationship between neighbourhood design and social capital was published in the American Journal of Public Health (September, 2003).

Dr. Craig Bullock is an environmental and socio economist who manages Optimize, a consultancy based in the west of Ireland. In addition, he works part time within the Department of Planning and Environmental Policy at UCD. His previous work has included valuation or cost-benefit analysis of heritage, recreation, landscape and studies related to planning and quality of life. He has conducted evaluations of Irish policy, including aspects of REPS and the Rural Development Plan.

Dr. David Styles moved to Ireland in January 2001 to study for a Ph.D. on phosphorus losses from soils to water at TCD, which was completed in 2004. Subsequently, he completed a six-month soil research project with Teagasc in Wexford, as part of the EPA's phosphorus and eutrophication project. Research for the Ph.D. involved the monitoring of soils and waters within the Mask catchment of county Mayo. He has recently started working as a research fellow for the EPA/TCD, analysing the impact of IPPC licensing and sectoral economic performance on pollutant emissions to air and water.

Dr Ken Whelan is a Director of the Marine Institute and a member of the National Biodiversity Forum. His early work has included a Ph.D. study on the biology of Irish ephemeroptera (mayflies) and the impact of peat bog development on freshwater ecosystems in the midlands and west of Ireland. He has published extensively both in the scientific literature and in the popular press, has produced and presented many films and videos on various aspects of Irish fisheries and is a regular radio contributor.

Dr Peter Doran is a lecturer in sustainable development at Queen's University Belfast, and a writer/ editor for the International Institute for Sustainable Development's Reporting Services at UN negotiations on environment and development. He has worked in the NGO sector and for the Northern Ireland Assembly. Peter received his Ph.D. in International Relations from the University of Kent, Canterbury.

David Browne was educated at Rockwell College and the University of Limerick and holds degrees in Industrial Chemistry and Environmental Science. He is currently completing a Ph.D. in the area of sustainable urban development. He has lectured in Environmental Modelling, presented at conferences, participated in international summer schools and workshops and published in peer-reviewed journals.

Dr. Kevin Griffin holds a Ph.D. in historical geography and teaches tourism, transport and heritage courses at the DIT with specialising in computerised mapping, data analysis, and landscape investigation. He is currently managing Strand 1 of the EPA project on Sustainable Tourism Indicators and is conducting research for Combat Poverty on Social Tourism.

Thomas Legge holds a Master of Public Administration in Environmental Science and Policy from Columbia University in New York. He has worked for the European Commission and Centre for European Policy Studies in Brussels with an emphasis on EU policy on climate change and energy issues.

Annex 1

Comhar SDC

Members 2006 – 2008 and related nominating/representative bodies

Chairman:

Prof. Frank Convery

Pillar 1 – State/Public Sector

Cllr. Aileen Pyne *
Association of Municipal Authorities of Ireland

Tony Larkin
County and City Managers' Association

Tom O'Mahony
Environmental Network of Government Departments

Laura Burke
Environmental Protection Agency

Cllr. Therese Ridge
General Council of County Councils

Pillar 2 – Economic Sectors

Niamh Hunt
Chambers of Commerce of Ireland

Donal Buckley *
Irish Business and Employers' Confederation

Paula Carey[1]
Irish Congress of Trades Unions

Emer Dunne
Irish Creamery Milk Suppliers Association

Ruaidhrí Deasy
Irish Farmers' Association

** Four year appointment for second term expiring on 31st December 2006*

1 Position vacant – resigned from ICTU during 2006

Pillar 3 – Environmental NGOs

Elaine Nevin
ECO UNESCO

Aoife Cassidy
Keep Ireland Open

Pat Finnegan
EENGOCF[2]

David Healy *
EENGOCF

Richard Douthwaite
EENGOCF

Pillar 4 – Social/Community NGOs

Bernie Walsh *
Community Platform

Br. Kevin Codd *
Conference of Religious in Ireland (CORI)

Ornagh Darcy
Irish Rural Dwellers Association

Matthew Seebach
National Youth Council of Ireland

Billy Murphy
PLANET

** Four year appointment for second term expiring on 31st December 2006*

2 *Environmental NGO Core Funding Group* comprising An Taisce; Coastwatch Ireland; Conservation Volunteers Ireland; Earthwatch; Feasta – Foundation for the Economics of Sustainability; Friends of the Irish Environment; Irish Doctors Environmental Association, Irish Peatland Conservation Council; Irish Wildlife Trust; Irish Women's Environmental Network; Keep Ireland Open; VOICE

Pillar 5 – Professional/Academic Sector

Richard Moles *
Environmental Sciences Association of Ireland

Caitriona Maguire
EnviroCentre Belfast

John Hammond *
National Council for Curriculum and Assessment (NCCA)

Carmel Sheridan
Royal Dublin Society

Emer Colleran
Royal Irish Academy

** Four year appointment for second term expiring on 31st December 2006*

About Comhar

The aim of Comhar SDC is to advance the national agenda for sustainable development by advising government on the sustainability dimensions of policy. Comhar SDC also engages with stakeholders and the public to promote debate and understanding of sustainable development issues.

Comhar SDC has 25 Council members representing key stakeholders across five pillars - the State/public sector, the economic sectors, environmental NGOs, social/community NGOs, and the professional/ academic sector. The current Council was appointed in January 2006 for a period of three years.

Comhar SDC is supported by a full time secretariat based in St. Andrew Street, Dublin 2.
The organisational structure is:

Chairman: Professor Frank Convery
Director: Noel Casserly
Research Manager: Dr. Lisa Ryan [Thomas Legge, January 2007 to August 2007]
Office Manager: Paschal Stephens
Administration: Ellie Corcoran

Comhar SDC's work programme, publications and recommendations are available at
www.comhar-nsdp.ie

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