



Making the Case for Resource Efficiency in Ireland and Options for Taking it Forward¹

Policy Paper²

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¹ *Corresponding Author:* Eoin.McLoughlin@environ.ie

² Comhar SDC policy papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback and to influence ongoing debate on emerging issues of relevance.

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Eoin McLoughlin,
Research Director,
Comhar SDC.

1. Introduction to Resource Efficiency

1.1 What is Resource Efficiency?

Resource efficiency is essentially about creating more value while using less resources and also selectively harnessing our renewable natural resources so that they can be provided for our economy at least cost. Or to put it another way, 'being clever about the way we use our renewable resources and consuming less materials and goods to provide the same given output'. The United Nations Environment Programme (UNEP) defines it as "reducing the total environmental impact of the production and consumption of goods and services, from raw material extraction to final use and disposal."

1.2 Why is it Important?

Natural resources underpin the functioning of the global economy and our quality of life. These resources include raw materials (e.g. minerals, metals, fossil fuels and biomass), environmental media (e.g. air, soil), flow resources (wind, water, geothermal, tidal and solar energy), and space (land use for human settlements, infrastructure, industry, mineral extraction, agriculture and forestry). Globally, we are extracting more resources than our planet can replenish and resource extraction often involves environmental degradation and depletion of non-renewable resources. A conflict of purposes exists because to maintain global economic growth resource extraction rates must be increased. For example, it has been estimated that a total global resource extraction of around 80 billion tonnes in 2020 (200% of the 1980 value) will be required to maintain global economic growth and the pressures on these resources are increasing with the global population expected to reach around 9 billion by 2050³.

Resource efficiency represents an opportunity to address this unsustainable path and policy approaches to date have focused on decoupling GDP growth from resource use. A strong economic argument for resource efficiency is the significant potential for improved competitiveness and job creation. Eurostat figures reveal a wide resource efficiency gap between EU Member States. The EU could realise considerable environmental and competitive advantages if it systematically addressed the internal resource productivity gap⁴. This will help stimulate technological innovation, boost employment in the fast developing 'green technology' sector and benefit consumers through more sustainable products.

Resource efficiency can also make a significant contribution towards achieving climate change targets for reducing greenhouse gas emissions without necessarily having adverse effects on the economy⁵. In addition, an effective resource efficiency strategy will lead to more productive use of resources and therefore higher welfare than would otherwise be available. The synergies and alignment of sustainable consumption and production, resource efficiency, green public procurement and eco-innovation could make a significant contribution to achieving a more environmentally and economically sustainable Ireland.

³ Wuppertal Institute (2009), *Eco-Innovation – putting the EU on the path to a resource and energy efficient economy*.

⁴ European Foundation (2009), *A Green New Deal for Europe - Towards green modernisation in the face of crisis Green*.

⁵ WRAP (2009), *Meeting the UK climate change challenge: The contribution of resource efficiency*.

In summary, the benefits of increasing resource efficiency include:

- strengthening security of resource supplies;
- reducing exposure and vulnerability to rising resource prices;
- improving competitive position through cost reduction;
- realising considerable job-creation potential;
- reducing overall pressure on the environment.

1.3 What are the Main Drivers?

According to a report⁶ by the European Environment Agency (EEA) the main drivers of resource efficiency include the following:

- Economic – scarcity of resources and securing future access is an important risk to the economy. Increasing resource prices is a key policy driver, particularly in areas such as energy, water⁷, waste and non-renewable raw materials. An underlying driver of resource efficiency lies in producers' tendencies to strive for improved profits and/or increased sales;
- Environment – concerns over environmental degradation and the need to reduce greenhouse gas emissions;
- Political – EU policy initiatives such as the Europe 2020 Strategy and Resource Efficient Flagship Initiative are becoming strong driving forces for national resource efficiency policies.

⁶ European Environment Agency (2005), *Sustainable Use and Management of Natural Resources*.

⁷ Although water can be considered a renewable natural resource, it can be expensive to treat so that it is of sufficient quality for consumption in homes and businesses and for it to be eventually returned to the environment. However, naturally treated water offers a lower cost alternative with groundwater not requiring expensive treatment and serves as part of our renewable natural water resources.

2. Global and European Perspectives

2.1 Resource Challenges

The European Commission⁸ recently presented an overview of developments in relation to global commodity markets and raw materials and the response which the EU is taking to address these challenges. In the EU, sectors including construction, chemicals, automotive, aerospace, machinery and equipment all depend on access to raw materials. Europe is increasingly reliant on imported metallic minerals and that scarcity may affect European industries, particularly the electronics industry⁹. The development of new eco-technologies could also be hindered by resource scarcity with global competition for these resources increasing, particularly among emerging economies.

The Commission has already identified fourteen critical raw materials at EU level (see Appendix 1). Critical raw materials are those which display a particularly high risk of supply shortage in the next ten years and which are important for the value chain. The supply risk is linked to the concentration of production in a handful of countries, and the low political-economic stability of some of the suppliers (see Appendix 2). This risk is in many cases compounded by low substitutability and low recycling rates. In many cases, a stable supply is important for climate policy objectives and for technological innovation. For example, rare earths are essential for high performance permanent magnets in wind turbines or electric vehicles but the EU is completely dependent on imports, with China accounting for 97% of world production in 2009. At the same time, no recycling or substitution processes for rare earths are currently commercially viable.

2.2 Current status of resource efficiency in the EU and globally

2.2.1. Resource productivity

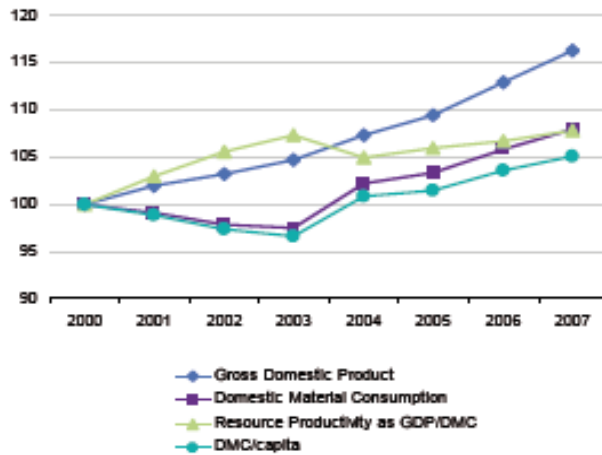
Resource productivity¹⁰ in the EU-27 rose 7% from 2000 to 2003, then decreased in 2004 but increased to slightly above the 2003 level by 2007 (Figure 1). Over the entire period 2000 to 2007 an increase of resource productivity of almost 8% was observed. While the EU-27 GDP has continuously increased during the same period, domestic material consumption (DMC) declined until 2003. When the economy grows, at the same time as DMC is decreasing, this is called ‘absolute decoupling’ of resource use from economic growth. This type of trend is observable during the period 2000 to 2003. However, from 2003 to 2007, DMC increased together with GDP at nearly the same rate (11%).

⁸ European Commission (2011), *Tackling the Challenges in Commodity Markets and on Raw Materials*.

⁹ Wuppertal Institute (2009), *Eco-innovation – putting the EU on the path to a resource efficient and energy efficient economy*.

¹⁰ Resource productivity is the total amount of materials used by an economy in relation to economic activity. It is expressed by the amount of GDP generated per unit of material consumed, i.e. GDP / DMC in euro/kg. The development of resource productivity over time provides insights into whether decoupling between the use of natural resources and economic growth is taking place.

Figure 1: Resource productivity for EU-27, 2000-07 (Index 2000=100)



Source: Eurostat (2011)

2.2.2. Resource use

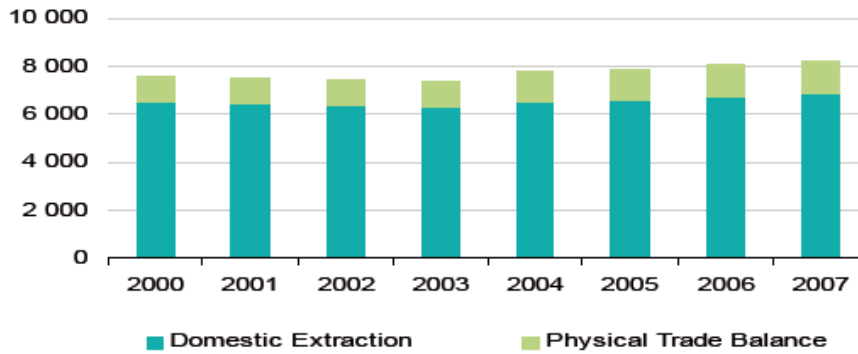
Resource use is measured as domestic material consumption (DMC). DMC is a measure of the total amount of materials directly used by an economy¹¹. From 2000 to 2003 the DMC of the EU-27 declined slightly from 7.6 to 7.4 billion tonnes, but rose again to 8.2 billion tonnes by 2007, a 7.8 % increase from 2000 (Figure 2). Extraction of materials from nature within a country's territory, called domestic extraction, makes up the largest part of DMC, 85%, with the physical trade balance (imports less exports) accounting for roughly 15%.

From 2000 to 2003, domestic extraction decreased from 6.6 to 6.3 billion tonnes but then increased to 6.9 billion tonnes by 2007 (4.9 % higher than in 2000). In contrast, the Physical Trade Balance (PTB) rose constantly over the period 2000 to 2007 from 1.0 to 1.3 billion tonnes, an increase of 26.5%. This means that the EU-27 is a net importer from the rest of the world (net imports increased by over 25% from 2000 to 2007). Since domestic extraction accounts for such a large proportion of overall resource use, it is interesting to examine its main components.

In 2007, the main materials extracted from the national territories of the EU-27 were biomass (24%) including grazed biomass and crop residues (11%), non-metallic minerals (61%), metal ores (2%), and fossil energy materials/carriers (13%). The high percentage level of non-metallic minerals reflects the importance of the construction industry and its use of extracted non-metallic minerals such as sand and gravel.

¹¹ DMC should not be taken as a sole proxy for environmental pressures associated with materials use. DMC does not include hidden flows, nor the emissions or waste flowing to the environment. Other measures discussed later in this document, such as Total Material Consumption (TMC), are better suited for such a purpose.

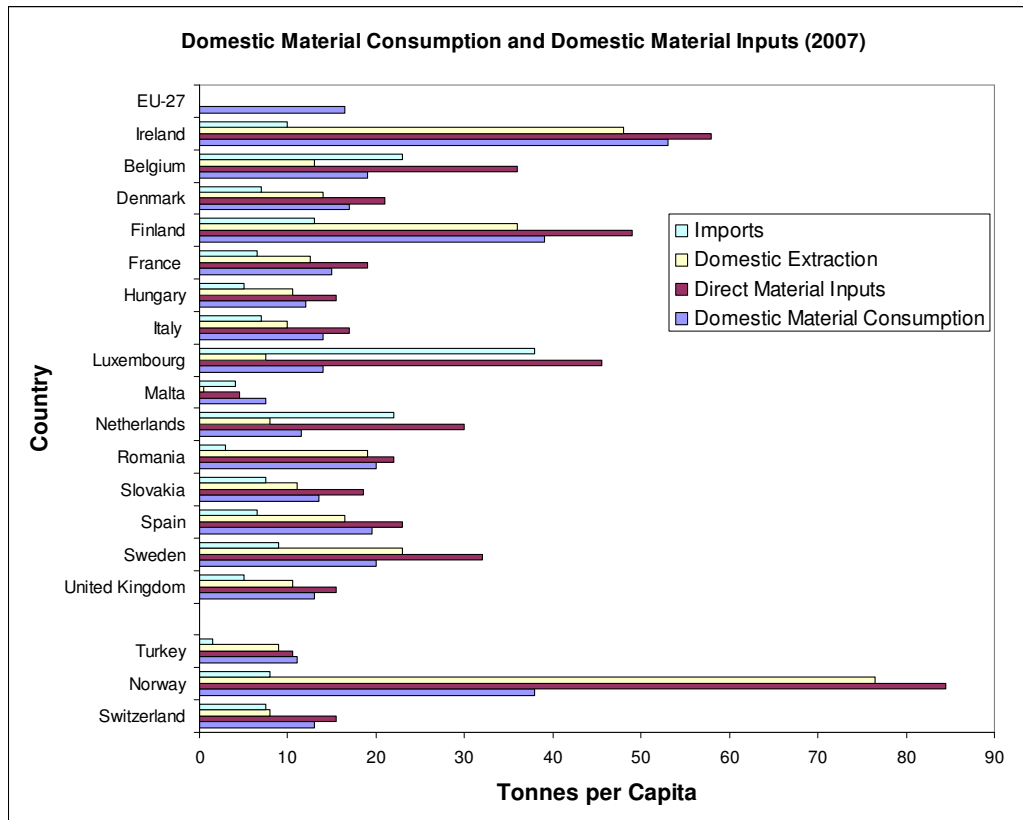
Figure 2: Domestic material consumption (DMC) by components, EU-27 (million tonnes)



Source: Eurostat (2011)

Another indicator often used is Direct Material Input (DMI) which measures the direct input of materials for use into the economy, i.e. all materials which are of economic value and are used in production and consumption activities (excluding water flows). DMI thus equals domestic extraction plus imports. The relation of DMC to DMI indicates to what extent material resources inputs are used for own domestic consumption or are exported for consumption in other economies. The difference between DMC and DMI (domestic extraction plus imports) is exports. Further discussion on the methodology used in the data compilation is contained in Eurostat (2011).

Figure 3: DMC and DMI (shown as the addition of its two components: domestic extraction plus imports). European countries, 2007 (tonnes per capita).



Source: Eurostat (2011)

Ten of the countries (9 EU Member States and Switzerland) had DMI's between 6 and 20 tonnes per capita in 2007. Their share of DMI that was used for own domestic consumption (DMC) ranged from two thirds for Slovakia to 90 % for Greece. A second group of eleven EU Member States had a DMI between 20 and 30 tonnes per capita. Their share of direct material inputs used for own domestic consumption ranged from 38% for the Netherlands to 95% for Romania. Another group of seven EU Member States and Norway had a DMI higher than 30 tonnes per capita.

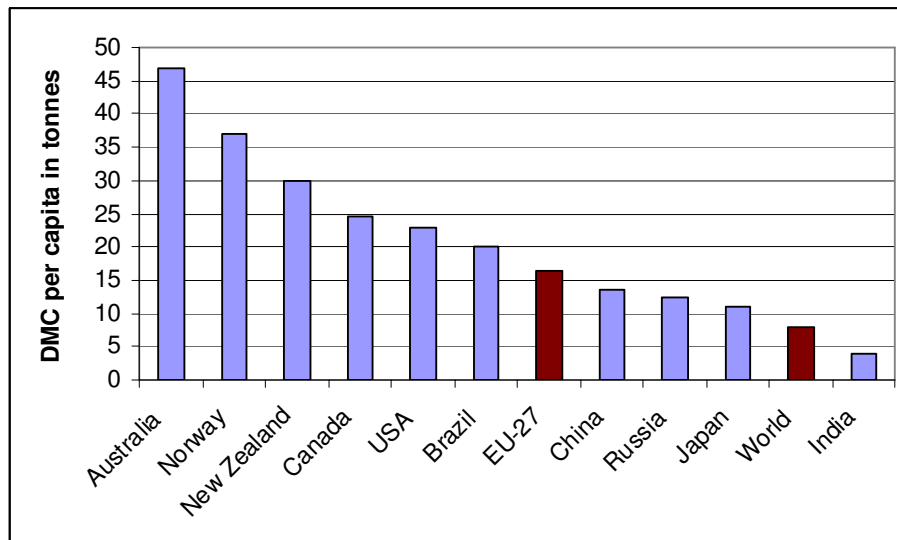
By making a side-by-side DMI and DMC comparison, three different types of economies can be characterised: (a) through-transport countries with both high imports and exports, (b) countries where domestic extraction is used mostly at home and (c) extraction exporting countries. Belgium, the Netherlands and Luxembourg are economies with high DMI but significantly lower DMC due to a high level of imports that are again exported. In contrast, the economy of Ireland is characterised by high resource requirements (DMI is second highest per capita) which are predominantly for domestic use. Finland shows a similar pattern also due to a high use of extracted natural resources in their own economy. On the other hand, Norway shows a unique pattern with the highest DMI per capita of all European countries at 82 tonnes in 2007. Norway has a high resource extraction based economy with the majority of the material being largely exported. This is seen with DMC being only 45 % of DMI. Due to data availability only the DMC of the EU-27 can be derived which was at 16.5 tonnes per capita in 2007.

Figure 4 shows how resource use in the EU compares with other selected countries. Australia, Norway and New Zealand have the highest DMC per capita while the emerging economies of India, Russia and China are at a significantly lower level. This indicates the challenge ahead as these countries seek to reach the same level of consumption as the developed world. The EU-27 had a DMC of 16.5 tonnes per capita in 2007 while the World level was 8 tonnes per capita in 2008.

However, it is important to bear in mind when viewing these figures that DMC only accounts for material directly used in an economy. It does not include the *indirect* hidden flows (often termed “ecological rucksacks”) related to imports and exports of raw materials and products. As a result, declining material consumption cannot be completely attributed to efficiency gains; some improvements are likely to be a reflection of increased substitution of domestic production by imports. Once the indirect flows associated with trade are taken into account, the material requirements of a country can expand significantly. For example, Japan is one of the leading countries in terms of resource productivity and is one of only a handful of countries where the consumption of material resources has decoupled from economic growth in absolute terms. Between 1980 and 2008, Japanese material consumption decreased by over 20% while the economy expanded by 96%. However, when including unused domestic extraction and estimated indirect flows from trade, the decrease in material consumption appears more modest at -1% between 1980 and 2008 (OECD, 2011).

Conversely, both Australia and Norway are economies based on high resource extraction with a significant amount of these materials exported abroad (i.e. oil/gas and metal ores). Two types of material flows are embodied in goods – direct flows and indirect flows. Direct flows are the materials that make up the components of a product (e.g. plastic in cell phones). Indirect flows are the flows of materials associated with the extraction and processing of the raw materials required to make a product. They include both material inputs to production (used materials) and materials that remain unused in the environment, such as mining overburden or harvest residues. These materials are not physically imported and usually remain in the producing country (OECD, 2011).

Figure 4: Use of resources per capita for select countries (2008)



Source: OECD (2011)

2.3 EU Resource Efficiency Flagship Initiative and Roadmap

The EC launched its Flagship Initiative and Roadmap on Resource Efficiency during 2011. These strategies are planned to help the EU meet a variety of key objectives, including, reducing European greenhouse gas emissions, reforming the agricultural and fisheries sectors, reducing food insecurity in developing countries, to making the Union more resilient to future rises in global energy and commodity prices.

The 'Flagship Initiative for a Resource-Efficient Europe' provides the long-term framework for the shift towards a resource-efficient, low-carbon economy. The strategy is the seventh and last of the Europe 2020 flagship initiatives which aim at building smart, sustainable and inclusive growth for Europe. It establishes resource efficiency as the guiding principle for a number of EU policies on areas such as energy, transport, climate change, industry, agriculture, fisheries and biodiversity.

The 'Roadmap for a Resource Efficient Europe' identifies the economic sectors that consume the most resources and suggests tools and indicators to help guide action in Europe and internationally. The roadmap recommends an integrated approach across many policy areas at European and Member States levels and focusing on the resources under most pressure. The instruments employed are to include legislation, market-based instruments, refocusing of funding instruments and promotion of sustainable production and consumption.

Both strategies build on and complement other initiatives such as the Roadmap for a Low-Carbon Economy, the White Paper on Transport and the Energy Roadmap (due to be published in 2011). The Resource Efficiency Roadmap also builds upon the 2005 Thematic Strategy on the Sustainable Use of Natural Resources and the EU's Sustainable Development Strategy. Furthermore, global strategies such as the OECD's Green Growth strategy and UNEP's work on the green economy both envisage a key role for resource efficiency as an essential component of sustainable development.

2.4 Resource-efficiency Indicators and Targets

The EC proposes in its Resource Efficiency Roadmap to engage with stakeholders with a view to developing and agreeing on indicators and potential targets for resource efficiency by the end of 2013. Two levels of indicators are proposed:

1. A provisional lead indicator - "Resource Productivity" - measured by the ratio of GDP to Domestic Material Consumption (expressed in Euro/tonne).
2. A series of complementary indicators on key natural resources such as water, land, materials and carbon, that will take account of the EU's global consumption of these resources.

When measuring the progress of resource efficiency, some commentators have noted the importance of using an indicator which also includes all indirect hidden flows of resource consumption, such as the Total Material Consumption (TMC) indicator. This would address the issue of countries of the EU increasingly placing environmental burdens onto the countries of the south¹², by importing raw materials thereby reducing the pressure on their own domestic environment and material resource reserves.

¹² Wuppertal Institute (2004), *Globalisation and the shifting environmental burden – Material trade flows of the European Union*.

3. Resource Efficiency in Ireland

3.1 Current status

3.1.1. Resource productivity

In 2007, Ireland ranked third lowest within the EU in relation to resource productivity, significantly below the EU-27 average. This indicates that Ireland is lagging behind its EU counterparts when it comes to decoupling resource use from economic growth with the Netherlands and Malta being over three times more productive in this respect.

Figure 5: Material productivity 2000 and 2007 [USD ppp/tonne DMC]

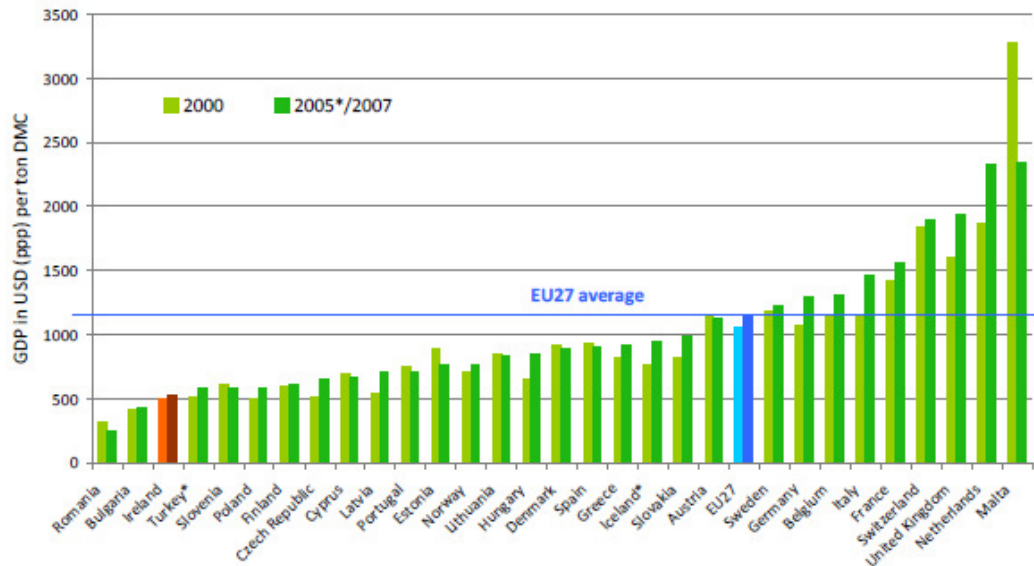
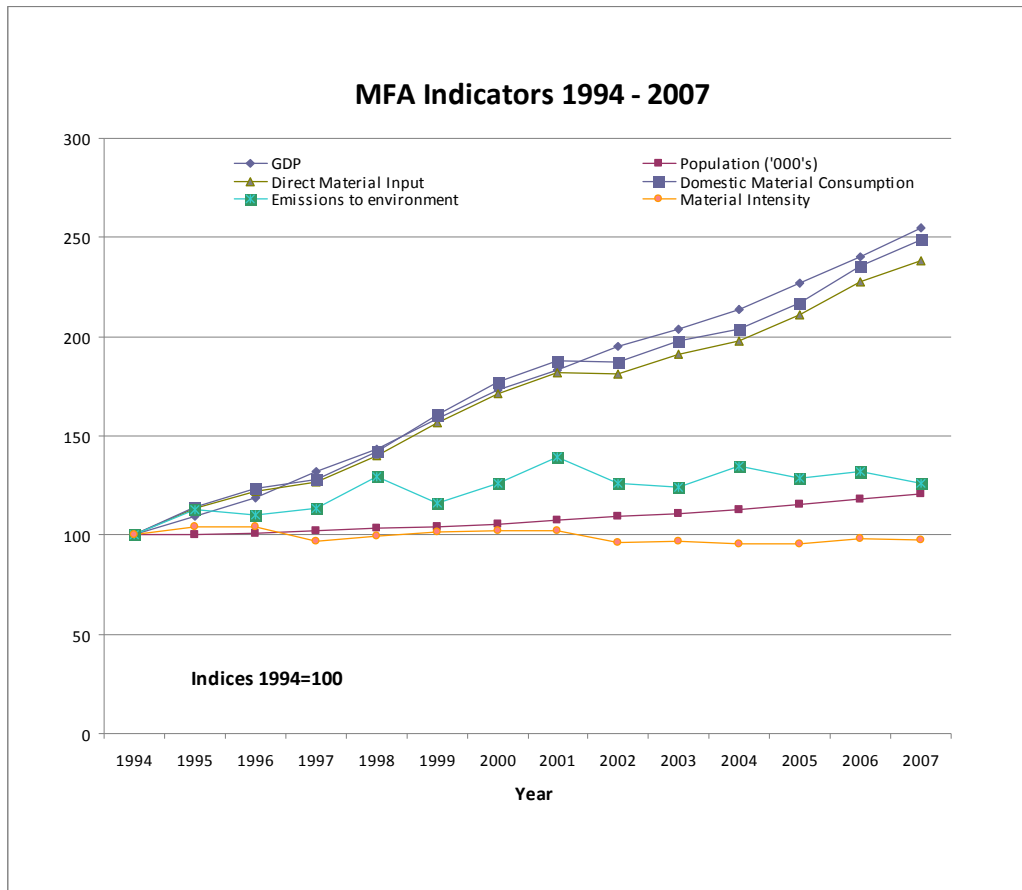


Figure 6 shows material flow analysis indicators for Ireland over the period 1994-2007. It clearly demonstrates our inability to decouple resource use from economic growth during the Celtic Tiger years. Both indicators increased significantly over the period which placed ever growing pressures on the environment.

Figure 6: Material Flow Analysis Indicators for Ireland, 1994-2007 (Index 1994=100)

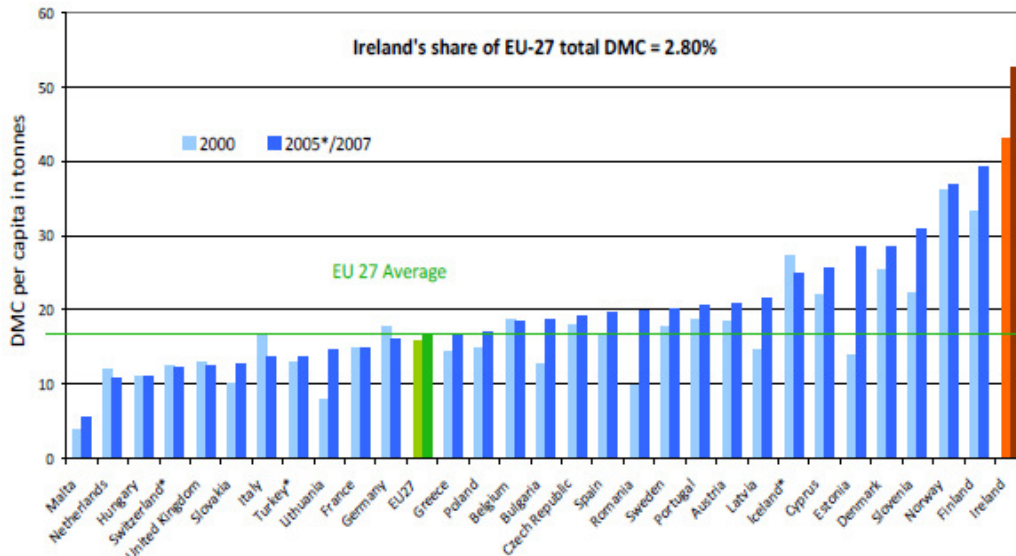


Source: CSO (2009)

3.1.2. Resource use

In 2007, Ireland used the most resources per inhabitant in the EU at 53 tonnes DMC per capita, while Malta and the Netherlands used the least. For the EU-27, the average material consumption per inhabitant was 16.5 tonnes DMC in 2007, an increase of 5% since 2000. Ireland's overall share of total EU-27 DMC stood at 2.8%.

Figure 7: Use of resources per capita 2000 and 2007 [tonnes DMC/capita]

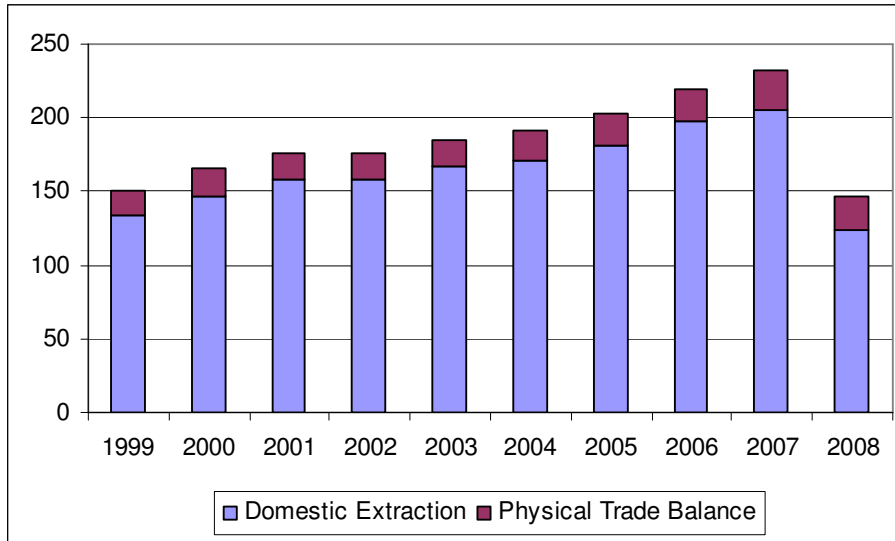


Source: Eurostat and OECD

Figure 8 shows resource use in Ireland for the period 1999-2008. DMC has fallen from 151 million tonnes in 1999 to 147 million tonnes in 2008 (2.6% decrease). However, from 1999 to 2007 DMC had increased by 54% showing the effect that the recent economic downturn has had on resource use. Domestic extraction accounts for 85% of DMC in Ireland with the physical trade balance (imports less exports) accounting for the remainder

From 1999 to 2007, domestic extraction in Ireland rose from 133 to 206 million tonnes (55% increase) but then decreased to 124 million tonnes in 2008. The Physical Trade Balance (PTB) has largely grown over the same period reflecting the fact that Ireland is a net importer from the rest of the world. Fossil fuels are the main component of imports accounting for 45% of the total amount.

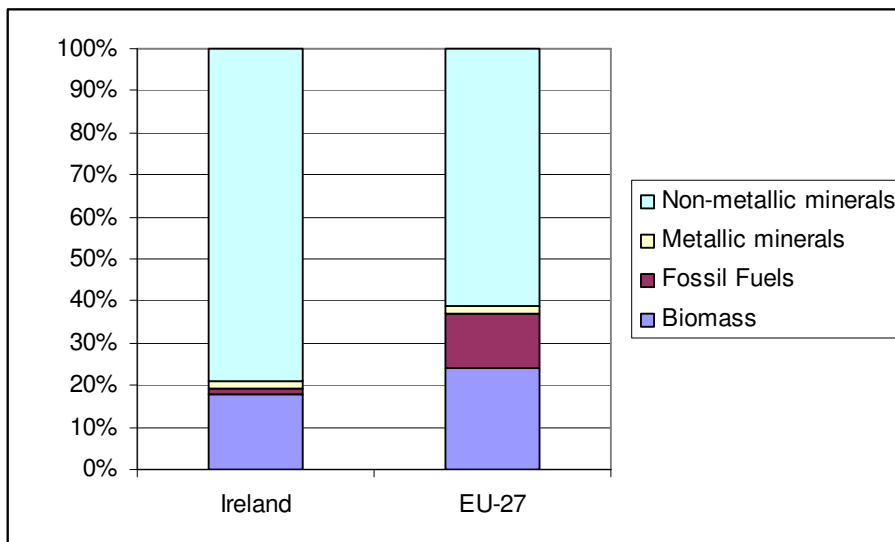
Figure 8: Domestic Material Consumption (DMC) by category over time, Ireland (million tonnes)



Source: Adapted from Environmental Accounts Material Flow 2008 (CSO, 2010)

Figure 9 shows the breakdown of domestic extraction for Ireland and the comparable figure for the EU-27. In 2007, the main materials extracted from the national territories of Ireland were biomass (18%), non-metallic minerals including sand and gravel (79%), metal ores (2%), and fossil energy materials/carriers (1%). From this breakdown, the importance of the construction sector in Ireland – which uses much of the sand, gravel and other non-metallic minerals to construct houses, other buildings, roads and bridges – can be seen. However, it is worth noting that the recent sharp decline in activity in this sector is evident in the most recent figures with domestic extraction of non-metallic minerals falling from 162.1 million tonnes in 2007 to 80 million tonnes in 2008 (51% decrease). The extent and sharpness of this decline is such that the 2008 level is lower than that for 1999 whereas the 2007 figure was the highest recorded over the 10 year period (1999-2008).

Figure 9: Breakdown of Domestic Extraction by type of materials (2007)



Source: CSO and Eurostat

3.2 National policy initiatives and programmes¹³

3.2.1 National Strategies

3.2.1.1 National Waste Prevention Programme

The Government's National Waste Prevention Programme (NWPP) was launched in April 2004 and is led by the Environmental Protection Agency (EPA). The aim of the NWPP is to explore practical ways to minimise and prevent waste, so as to break the link between economic growth and the environmental impacts associated with resource inefficiency. The programme sets out to deliver substantive results on waste prevention and resource efficiency and integrate a range of initiatives addressing awareness-raising, technical and financial assistance, training and incentive mechanisms.

3.2.1.2 National Hazardous Waste Management Plan

In 2008, the EPA published a *National Hazardous Waste Management Plan 2008-2012*. The Plan describes the national system for hazardous waste management and identifies gaps and recommends actions to ensure all hazardous waste is collected and managed appropriately and in a manner that does not cause environmental pollution. A range of specific projects are underway in relation to implementation of the Plan. Each project contributes to resource efficiency and waste prevention by managing and avoiding the use and dispersion of hazardous materials.

3.2.1.3 National Sustainable Development Strategy

The first National Sustainable Development Strategy was published in 1997 and led to progress in the development and implementation of policies and action across most sectors. However, key challenges remain across policy areas, governance, implementation mechanisms and measuring and communicating progress. A new Framework for Sustainable Development in Ireland (FSDI) is under preparation and will seek to identify areas where further effort is required and will put forward practical measures aimed at achieving added value in key sectors. It also intends to set out proposals for the effective implementation of the Framework and proposes the development of a sustainable development indicator set which will measure progress in this area. The FSDI will serve as a key national policy driver to ensure that sustainable development concerns are taken into account and acts as an important input to policy formulation.

3.2.1.4 National Action Plan on Green Public Procurement

The annual procurement budget of the Irish public sector is of the order of €15 billion. If buyers in the public sector consistently took environmental factors into account in their procurement decisions, it would provide huge leverage to "move the market" towards providing environmentally superior goods, services and works in a cost-effective way. This would enable Government and the wider public sector to continuously improve the environmental performance of their procurement activities, leading over time to significant

¹³ This section is largely based on Ireland's survey response to the European Environment Agency resource efficiency questionnaire. See <http://www.eea.europa.eu/themes/economy/resource-efficiency/ireland-2014-resource-efficiency-policies/view>

benefits to the environment and to public health. It would also boost Ireland's competitiveness and job-creation by fostering eco-innovation among SMEs and the wider business community. The forthcoming Action Plan on Green Public Procurement, *Green Tenders*, will act as a key driver in developing the green economy in Ireland.

3.2.1.5 National Climate Change Strategy

The National Climate Change Strategy 2007 - 2012 sets out the Irish Government's plans to tackle climate change and details the measures that are in place to enable Ireland to meet its commitments under the Kyoto Protocol in the period 2008-2012. It also brings together a non-exhaustive range of actions being examined to reduce Ireland's greenhouse gas emissions further across the energy, transport, industrial, agriculture, forestry and built environment sectors, in the period beyond that covered by the Kyoto Protocol, with a focus on 2020.

3.2.1.6 National Energy Efficiency Action Plan

The National Energy Efficiency Action Plan 2009 - 2020 sets out Government plans and actions to achieve its target of 20% energy efficiency savings across the economy in 2020. The Government has committed to achieving, in 2020, a 20% reduction in energy demand across the whole of the economy through energy efficiency measures. Recognising that Government must lead by example, the plan commits to achieving a 33% reduction in public sector energy use.

3.2.1.7 The Green economy

The development of the green economy in Ireland can make an important contribution to creating employment and export opportunities in green enterprises and assist existing companies in all sectors to improve their competitive position through adopting innovative environmental goods and services. The report¹⁴ by the High-Level Action Group on Green Enterprise put forward a number of recommendations for development of the sector, including the following strategic actions which may assist Ireland in achieving resource efficiency objectives:

- Promote renewable energy, efficient energy use and management (including eco-construction), waste management, recovery and recycling: water and wastewater treatment;
- Deliver green zones and a green IFSC for green investment vehicles and the administration of funds managed under green principles, carbon trading and associated professional services;
- Create world-class research centres in niche green areas;
- Remove basic hurdles to the development of the green economy including technical, regulatory and planning barriers that are delaying the development of renewable energy projects;
- Implement green public procurement;
- Provide reduced interest rate loans to companies investing in producing environmentally friendly products;
- Develop Ireland's 'Green Island' brand;
- The development agencies should work to offer an integrated suite of efficiency programmes encompassing energy, water and waste.

¹⁴ Forfas (2009), *Developing the Green Economy in Ireland*.

3.2.2 National Initiatives

3.2.2.1 EPA schemes

Cleaner Greener Production Programme

The EPA launched the Cleaner Greener Production Programme (CGPP) in 2001 as a grant scheme to encourage Irish organisations to implement cleaner greener practices. The programme targets resource efficiency among Irish businesses and organisations and is now supported by the NWPP. Since 2001 the EPA has committed over €7 million to 89 organisations that have received part funding for demonstration projects under this programme. Companies commit to developing demonstration projects that reduce their environmental impact and are applicable across the business sector. Environmental performance is fast becoming a marketing tool and there is an increasing demand for environmentally sound products and services both in the EU and across international markets.

STRIVE

The EPA research programme for the period 2007-2013 is entitled Science, Technology, Research and Innovation for the Environment (STRIVE). The aim of STRIVE is to protect and improve the natural environment by addressing key environmental management issues through the provision of scientific knowledge generated through a programme of research. The Strive report 'Innovation for a Green Economy' describes practical outcomes in the areas of environmental technologies and innovation from the investment made to date through the STRIVE programme.

StopFoodWaste

The EPA initiated the StopFoodWaste programme in June 2009 to promote food waste prevention and home composting in support of existing policy measures. The initial focus of the programme has been on the householder and is designed to empower consumers to reduce food waste by rethinking how they should shop, store, cook and re-use food and on how to compost any food waste that cannot be prevented.

3.2.2.2 Additional initiatives

SMILE Resource Exchange

SMILE Resource Exchange supports the development of mutually beneficial partnerships between businesses. The SMILE network aims to save businesses money by developing a network of businesses that reuse each other's surplus products, by-products and reusable items and share services, space and logistics. The concept is not limited to reusable items, by-products or surplus but can also be applied to logistics, services or skill share. Examples of items and products which may be on offer are plastics, timber, cardboard, paper, pallets, warehouse or office space, etc. The ambition is that these partnerships result in cost savings for businesses and more environmentally friendly practices, in particular the diversion of waste from landfill.

Market Development Programme for Waste Resources (rx3)

To progress the development of new markets for recyclables, the Government established the Market Development Group. This group includes as members a range of stakeholders from across the waste industry and business sectors. The programme operated as the "Market Development Programme Implementation Team". In late 2009, it was renamed rx3 (rethink, recycle, remake) and re-branded to more accurately reflect what the programme is trying to achieve. A number of initiatives are proposed within the Programme to promote and to address the barriers to market development for recyclable material and secondary recycled products.

Green Business Initiative

The Green Business Initiative is aimed primarily at the business community in Ireland, with an emphasis on small and medium sized enterprises (SMEs). It provides tools and methodologies to help organisations to make financial savings by looking at their resource use, particularly in relation to waste and water, and also to help the environment.

Green Hospitality Award

The Green Hospitality Award is a programme that has already generated in excess of €3 million in saving for 190 participating hotels, by providing an Environmental Management System based award scheme, support and training, benchmarking tools and audits. Over 80 hotels have gained awards.

Packaging Waste Prevention Programme

The Packaging Waste Prevention Programme aims to assist Irish businesses with positive and practical ways to reduce packaging and to promote those achievements to a wider audience. The NWPP is working closely with industrial and employer representative bodies to progress the resource efficiency agenda and programmes.

Green Retail programme

The Green Retail programme aims to assist Irish retail outlets (particularly grocery) to operate in a resource efficient way.

Green schools/green home

The Green Schools programme, co-ordinated by An Taisce in partnership with Local Authorities, involves 66% of all Irish schools of which 1,150 have been awarded the coveted Green Flag. The programme encourages students to become more aware of the environment and aims to reduce waste in schools as much as possible. A pilot initiative called Green Home is now being funded by the NWPP to build on this success and spread prevention to houses and communities. In 2010, there were approximately 10,000 householders linked to the programme and, with an average household size of 2.81 persons, this represents an estimated outreach to over 28,000 people.

Local authority Prevention network

The Local Authority Prevention Network (LAPN) is a key component in continuing to build capacity in local authorities for the promotion of resource efficiency and waste prevention at a local and grassroots level for the benefit of their localities. Over the last 4 years, the programme has demonstrated that implementing waste prevention and resource efficiencies in an organisation can lead to significant savings, in addition to the obvious environmental benefits. Developed under the NWPP, through LAPN the EPA provides assistance and support to local authorities in Ireland. Research identified that the two principal barriers to implementing waste prevention in the local authority sector have been a lack of resources and a lack of expertise and expert support. By removing these barriers the programme enables local authorities to actively pursue resource efficiency programmes in partnership with businesses, public organisations and communities in their functional areas.

Table 1 provides a summary of supports that are currently available to businesses through the various agencies in Ireland. These programmes are designed to deliver financial assistance and knowledge sharing in order to build the capacity to develop resource efficient enterprises.

Table 1: Resource Efficiency Support Tools for Business

| | Support | Nature of Service |
|-------------|---|--|
| SEAI | Large Industry Energy Network | Energy Management, Energy Efficiency, Energy Alternatives |
| | Energy Efficiency Fund | |
| | Energy Management (Tools and Resources) | |
| | Accelerated Capital Allowances & Triple E | |
| | Advice, Mentoring and Assessment | |
| EPA | Cleaner Greener Production Programme | Clean Technology |
| | Green Business | Eco-Efficiency* |
| | Green Hospitality Award Scheme | Eco-Efficiency* |
| | Local Authority Prevention Network | Eco-Efficiency* |
| | Green Retail | Eco-Efficiency* |
| EI | Research Development & Innovation Support | Clean Technology |
| | Green Offer | Clean Technology, Environmental Management Systems, Eco-labelling, Carbon Management |
| | EnviroCentre.ie | Information/Advice |
| IDA | Research Development & Innovation Support | Clean Technology & Eco-Efficiency* |
| | Capital & Training Grant | |
| | Clean Tech Support | |

Source: Adapted from EPA and other agencies (2011).

3.3 Analytical support tools in Ireland

3.3.1 Material Flow Analysis

Economy-wide Material Flow Analysis (MFA) provides an aggregate overview of annual material inputs and outputs of an economy¹⁵. In contrast to Gross Domestic Product (GDP), which measures production and consumption market activities in monetary terms, the MFA measures these activities in physical terms (tonnes). MFA has been developed in Ireland through a number of projects including the following:

- A demonstration MFA for Ireland by the Clean Technology Centre for the data year 2000 published in 2006;
- An economy-wide MFA and indicator set for Ireland by EnviroCentre, Best Foot Forward and the University of Limerick for 2003 published in 2008;
- The Central Statistics Office have produced a series of MFA for Ireland from 1994-2008;

¹⁵ Recycled material flows in the economy (e.g. of metals, paper, glass) are not included. See Eurostat (2009) for further discussion.

- The Economic and Social Research Institute has created environmental accounts for waste, water and emissions to air from 1990-2005;
- Comhar Sustainable Development Council has published recommendations on a Sustainable Development Indicator set for Ireland which includes the set of MFA derived indicators¹⁶ to inform national policy and actions on resource use and sustainable development.

3.3.2 Environmental accounts for Ireland

Environmental accounts provide information on emissions and resource use. Environmental accounts are so-called satellite accounts to the national accounts, which provide a comprehensive framework to present economic data in a coherent, consistent and internationally comparable manner. Environmental accounts are specifically designed to reveal the pressure the economy puts on the environment.

Both the CSO and ESRI have produced a set of Environmental Accounts for Ireland covering the period 1990-2006. The aim of the present accounts is to outline the potential impact on the environment of economic and social activity in Ireland. The idea is to list in quantifiable terms the amount of potential air pollutants produced by industry and households, which may in turn be compared to the employment and the value of output produced by these sectors. There is potential for the accounts to be extended to include more emissions and more resources. According to an EPA report¹⁷ candidates for extensions include material flows, land use, water use and emissions to water, and emissions covered by IPPC licensing and the annual environmental reports.

3.3.3 Ireland's Sustainable Development Model (ISUS)

ISUS is a model that creates environmental account projections based on policy options. The model projects the environmental accounts into the future based on assumptions about developments in the economy, technology and in policy. Thus the model can also be used to test the implications of alternative policy proposals as well as the effects of past policy interventions. The model can be utilised to move between production accounts and consumption accounts. Proposed resource efficiency policy measures for Ireland could therefore be modelled using ISUS.

¹⁶ See also MAGUIRE, C. & CURRY, R. (2007), *Measuring Ireland's Sustainability. The integration of environmental data in macroeconomic models*. Comhar Sustainable Development Council Working Paper, Dublin.

¹⁷ EPA STRIVE Programme 2007–2013 Ireland's Sustainable Development Model (2006-SDM-LS-11-M2) Report available for download on <http://erc.epa.ie/safer/reports>.

4. Developing Resource Efficiency

4.1 Aligning resource efficiency with sustainable production and consumption

Increasing resource efficiency involves both supply-side and demand-side systems. It requires looking at the economy via three different perspectives¹⁸. These include:

1. **Production** - what sectors have the highest impacts? This helps specify where clean and efficient technologies are most needed.
2. **Consumption** - what products and consumption clusters have the highest life cycle impacts? This helps identify where low impact products and sustainable life styles can most reduce impacts.
3. **Resources** - what materials have the highest impacts? This is relevant for material choices and sustainability policies on resources.

Following the identification of key sectors and products, barriers relating to the development of resource efficiency in these areas need to be addressed. Typical barriers that have been highlighted include¹⁹:

- Inadequate/unstable market signals – needed to shift behaviour and price externalities;
- Lack of information/awareness (on alternative options and economic benefits);
- Lack of targets and indicators at EU/national level;
- Existence of skills gaps in the workforce;
- Lack of funds and long pay-back periods;
- Lack of a coherent policy framework and supportive regulation.

4.2 Policy instruments for addressing resource efficiency

Once the key target areas for resource efficiency have been identified, there exist a range of policy instruments that have demonstrated success in increasing resource efficiency and promoting sustainable consumption and production patterns²⁰. These instruments can be categorised as follows:

- **Regulatory Instruments** - includes laws and directives;
- **Economic Instruments** - includes environmental taxes, fees and user-charges, certificate trading, environmental financing, green public procurement, and subsidies;
- **Research & Educational Instruments** - includes research and development, and education and training;

¹⁸ UNEP (2010), *Assessing the Environmental Impacts of Consumption and Production: Priority Products and materials*.

¹⁹ Many of these barriers were identified in the EC's Staff Working paper on the Roadmap to a Resource Efficient Europe (2011).

²⁰ Wuppertal Institute (2006), *Policy Instruments for Resource Efficiency Towards Sustainable Consumption and Production*.

- **Co-operation Instruments** - including technology transfer and voluntary agreements;
- **Informational Instruments** - including eco-labelling, sustainability reporting (such as the Global Reporting Initiative), information centres, consumer advice services, environmental quality targets and environmental monitoring.

Table 2 provides a summary of these different policy instruments and gives examples of programmes currently in place and where they are being applied.

Table 2: Resource Efficiency Policy Instruments – Country Examples

| | Type | Description | Example | Country |
|-----------------------------------|---|---|--|--|
| Regulatory Instruments | Norms and Standard | Rules and targets set by public authorities ('command') that subsequently are enforced by compliance procedures ('control'). | 'Top Runner' Standard. | Japan |
| | Environmental Control and Enforcement | Control of environmental impacts and enforcement of compliance with environmental legislation. | Voluntary agreements with industry to control pollution. | Switzerland/ Morocco |
| Economic Instruments | Environmental Taxes | Taxes aimed at internalising environmental costs ('getting the prices right') and implementing the polluter-pays-principle. | Plastic bag levy; Packaging tax; | Ireland/Latvia Denmark/ Lithuania |
| | Fees and User Charges | Fees paid to public authorities for services provided. | Congestion charge; Waste water charge. | Sweden/ England Germany/ Slovenia |
| | Green Public Procurement (GPP) | Acquisition of goods or services by the public sector taking into account environmental criteria. | High-level of GPP Green Purchasing Law | Austria/ Japan |
| | Subsidies | Financial support provided by government to households or private enterprises to promote resource-efficient production and services. | Green Deal; Feed-in tariff for renewable electricity. | UK Most EU countries |
| Research & Educational | R&D | Investigatory work carried out to increase the stock of knowledge and the use of such knowledge to devise new products and processes. | Research programme on Material Efficiency and Resource Conservation. | Germany |
| | Education & Training | Building capacity on resource efficiency by education and training programmes. | | |
| Informational Instruments | Eco-Labeling | Type of label displaying information regarding the environmental performance of a certain product or service. | Blue Angel Label; Energy Label. | Germany EU |
| | Sustainability Reporting | Public disclosure of information about an organisation's activities on economic, environmental and social issues. | Sustainability Reporting Programme. | Canada |
| | Information Centres | Provide information on resource efficiency and related topics to actively promote the concept. | Envirowise; NRW Efficiency Agency; German Material Efficiency Agency; Centre for Resource Efficiency. | UK North Rhein-Westphalia Germany |
| | Environmental Quality Targets and Monitoring | Science-based indicators of environmental quality approved by public authorities. | Resource efficiency indicators | EU (forthcoming) |

Source: Adapted from Wuppertal Institute (2006)

Japan Top Runner Programme

Japan created the Top Runner programme in 1998 as part of the New Energy Conservation Law for improving energy efficiency in energy-using products. An overall policy framework for targeting 21 product groups in the residential, commercial and transport sectors is set. Each product category is then further divided into several sub-groups, and an energy efficiency target for each sub-group is set. Targeted industries are the car industry (automobiles are classified according to weight), the household and office appliance industry (for example, photocopy machines are classified according to the number of sheets copied per minute) and the ICT industry.

Instead of setting a minimum energy performance standard, the current highest energy efficiency rate of the products in each sub-group is taken as a standard (the “Top Runner”). This standard represents the target value of energy efficiency within the sub-group that has to be reached within a certain time frame. By means of the Energy Conservation Law all manufacturers and importers are obliged to achieve the respective target by a specified year.

There is a broad agreement among Japanese stakeholders that the Top Runner programme has been effective. The energy efficiency of videotape recorders improved by 73.6 per cent between 1997 and 2003 (expected 58.7 per cent). Personal computers achieved their Top Runner standard well before the target year 2002.

Biofuels Production

The combination of energy (increasing oil prices and security of supply concerns) and environmental (rising greenhouse emissions from the transport sector) policies provided significant impetus to the biofuels industry. In the period 2000–2008, total world production of the two main liquid biofuels – ethanol and biodiesel – expanded at an average growth rate of 20 per cent per annum. These production increases were driven by, in some cases, generous subsidies and the requirement in many countries to meet set national targets.

However, the environmental benefits of biofuels depend greatly on where they are produced and what feedstock is used. The EU has attempted to address this issue by introducing strict sustainability criteria for biofuels that must be met. These criteria are related to greenhouse gas savings, land with high biodiversity value, land with high carbon stock and agro-environmental practices.

The ambitious biofuels targets initially contributed to extremely optimistic assessments for biofuels profitability. This in turn led to more land and crops being used as feedstock in biofuels production. In the debate since, surrounding the strong increases in food prices, biofuel support policies in Europe and the US have played a controversial role. Various researchers have analysed the impacts of biofuel production on food markets. Most studies agree that the rapid growth in biofuel demand contributed to the rise in food prices over the 2000–2007 period, but that it was not the only driving force. However, it illustrates the point that careful analysis is needed to ensure that the policy design process meets its primary objective without having unintended consequences elsewhere.

4.3 The role of eco-innovation

Eco-innovation is defined as “the creation of novel and competitively priced goods, processes, systems, services and procedures designed to satisfy human needs and provide a better quality of life for everyone with a whole-life-cycle minimal use of natural resources, per unit output and a minimal release of toxic substances”²¹. Eco-innovation means not only focusing on technological innovations but also on the human element of eco-innovation, such as those involving behavioural and lifestyle change.

Global pressure to increase resource efficiency, and the efforts to improve sustainability could become a significant source of innovation and an important asset for industry’s competitiveness²². For example, it has been calculated that the world market for eco-innovation is likely to double by 2020 (market volume estimated at €3,100 billion) and the market for material and resource efficiency is likely to triple by 2020²³.

Eco-innovation has the potential to achieve savings on material costs and provide alternative options for scarce resources. Housing, food and drink and mobility (transportation) have been highlighted by the European Commission as sectors that have the highest environmental impact through their full life-cycle and developing eco-innovation in each of these areas is of particular relevance. Environmental innovations address a double externality since improved environmental quality serves as a public good and an enhanced environmental quality does not accrue only to the benefit of the innovator.

Eco-innovation can be sub-divided into three categories: pollution management, resource management, and cleaner technologies and products²⁴. Each of these three groups consist of a number of sub-sectors which are outlined in Table 3 below.

Table 3: Eco-innovation Sub-sectors

| Pollution Management | Resource Management | Cleaner Technologies and Products |
|--|---|--|
| <ul style="list-style-type: none"> ▪ Air Pollution Control ▪ Waste Water Treatment ▪ Waste Management ▪ Remediation and Clean up of Soil & Groundwater ▪ Noise and Vibration Control ▪ Environmental Monitoring & Instrumentation ▪ Environmental Research & Development ▪ Public Environmental Administration ▪ Private Environmental Management | <ul style="list-style-type: none"> ▪ Water Supply ▪ Recycled Materials ▪ Nature Protection ▪ Indoor air pollution control ▪ Renewable energy plant ▪ Heat/energy saving and management ▪ Sustainable agriculture and fisheries ▪ Sustainable forestry ▪ Natural risk management ▪ Eco-tourism | <ul style="list-style-type: none"> ▪ Cleaner/resource-efficient technologies and processes ▪ Cleaner/resource-efficient products |

²¹ Reid and Miedzinski (2008).

²² EC COMMUNICATION (2008).

²³ Wuppertal Institute (2009), *Eco-innovation – putting the EU on the path to a resource efficient and energy efficient economy*.

²⁴ European Environment Agency (2005), *Sustainable Use and Management of Natural Resources*.

5. Key Conclusions and Options

5.1 Introduction

The de-coupling of GDP growth and economic activity from unsustainable resource-use is an important step in ensuring a resource-efficient future. Absolute decoupling of economic growth and resource use has not been achieved in Ireland nor across the EU and significant measures beyond ‘business as usual’ are required if the stated policy goals in this area are to be achieved. It is generally accepted that there are physical limits to continuing economic growth based on resource use due to the pressures this places on the environment²⁵.

The main findings from this research paper show that:

- Resource use (domestic material consumption) increased dramatically in Ireland over the period 1999-2007 with no evidence of absolute decoupling taking place. However, the figures for 2008 show a sharp decline in resource use as a direct result of the economic contraction (37% decrease in DMC compared to 2007 level);
- Domestic extraction accounted for over 85% of resource use during this same period with a high-level of non-metallic minerals compared to the EU average. This reflected the dominance of the construction sector in the Irish economy;
- In 2007 Ireland used the most resources per inhabitant in the EU at 53 tonnes DMC per capita, more than three times the EU average;
- Although resource productivity increased slightly in Ireland over the period 1999-2007, it still remains significantly below the EU average;
- Ireland is a net importer of resources from the rest of the world. Fossil fuels are the main component of imports accounting for 45% of the total.

5.2 Future Options

As discussed in the previous section, there are a number of different approaches which can be taken to improve resource efficiency in Ireland. These may include a combination of targeted regulation, economic instruments, research and educational initiatives and information tools. The development of an efficient, harmonised and target-oriented policy mix is critical to addressing the current barriers affecting the progress of resource efficiency in Ireland.

Regulation

- Resource efficiency should be embedded into the policies and processes throughout the public sector with the Government working to ensure the effective implementation of the EU’s resource efficiency initiative in Ireland;
- The compartmentalisation of policies, although understandable, can prove to be an obstacle to the implementation of resource efficiency which needs to address many different actors, sectors and materials. A coherent framework of action and policy coordination would help to achieve further progress in this area;

²⁵ UK Sustainable Development Commission (2009). Prosperity Without Growth?

- The development of sustainable energy systems - improving energy performance of buildings, industrial processes and market penetration of energy-efficient appliances – should continue to be progressed. Implementation of smart metering systems and a more flexible energy grid to facilitate distributed renewable energy systems can also make positive contributions to improving resource efficiency;
- It is important that imported products comply with EU directives and eco-labelling criteria. More and more of the resources that we use are attached to imported products. Consequently, a growing share of the impacts we cause by consuming these resources occur in other countries;
- Setting national targets on resource efficiency can be an important driver for policy development²⁶. Ireland should support and engage constructively with the European Commission in the development of such targets.

Economic instruments

- It is fundamental to ‘get the prices right’ through internalising environmental costs and implementing the polluter-pays principle. This can be addressed through the extension of environmental taxes to other activities and through the introduction of user charges in areas such as water. Such price incentives will need to take into account issues of equity and competitiveness concerns in their final design;
- The implementation of Green Public Procurement on a significant scale and the application of a reduced rate of VAT on all low impact products and services would help support and drive resource efficiency and eco-innovation activity in Ireland.

Research and educational initiatives

- Research and development support should be oriented towards producing resource-efficient solutions and the development of resource-efficient products and services;
- Behavioural change can be promoted by education. Through education, societies can become much more aware than at present of the fundamental role of the environment and its resources in underpinning economic activity and human welfare;
- Industry training networks should be supported where appropriate in order to deliver the required courses and skill sets needed for a resource efficient and low-carbon economy.

Information tools

- Consideration should be given to establishing a forum and network for resource efficiency and eco-innovation in Ireland in order to share best practice;
- Co-operation between policymakers, statistical offices and research institutes responsible for producing resource efficiency indicators should be prioritised. In particular, the

²⁶ For example, the High-Level Action Group on Green Enterprise reported that setting and meeting world-class resource-efficiency targets can improve the competitive position of existing enterprises and create new markets for those specialising in resource-efficiency services.

development of pricing indicators showing the extent to which the use of resources is correctly priced to reflect external costs would make a valuable contribution to the area;

- The relevant agencies (e.g. IDA, EI, SEAI, and EPA) should continue to work to offer an integrated suite of resource efficiency programmes for business. In other countries specific resource efficiency agencies have been established with a mandate to promote and support this agenda in order to drive exports, improve competitiveness and create jobs.

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Glossary of Terms

Decoupling refers to breaking the link between ‘environmental bads’ and ‘economic goods’. The measurement of decoupling refers to the relative growth rates of a direct pressure on the environment and of an economically relevant variable to which it is causally linked. Decoupling occurs when the growth rate of the environmental pressure (EP) is less than that of its economic driving force (DF) over a given period. One distinguishes between ‘absolute’ and ‘relative’ decoupling. Decoupling is said to be absolute when the environmental variable is stable or decreasing while the economic variable is growing. Decoupling is said to be relative when environmental variable is increasing, but at a lower rate than the economic variable.

Domestic extraction (used) is the input from the natural environment to be used in the economy. This is the annual amount of raw material (except for water and air) extracted from the natural environment.

Domestic Material Consumption (DMC) is defined as the total amount of material directly used in an economy. DMC does not include indirect hidden flows related to imports and exports of raw materials and products.

$$\text{DMC} = \text{Domestic extraction} + \text{Imports} - \text{Exports}$$

Domestic Material Inputs (DMI) is not additive across countries. For example, to calculate EU totals for DMI the intra-EU foreign trade flows must be subtracted from the DMIs of Member States. Theoretically, the exports from country A to country B should equal the imports to country B from country A and can be netted out. The quality of the intra-EU trade data does not easily allow for the netting out of these flows so aggregated EU DMI calculations have not been made at this time.

$$\text{DMI} = \text{Domestic extraction} + \text{Imports}$$

Material flow analysis (MFA) refers to the monitoring and analysis of physical flows of materials into, through and out of a given system (usually the economy) through the process chains, through extraction, production, use, recycling and final disposal. MFA is generally based on methodically organised accounts in physical units (Material flow accounts). It helps identify waste of natural resources and materials in the economy which would otherwise go unnoticed in conventional economic monitoring systems.

Physical Trade Balance (PTB) is calculated by taking the amount of imports in physical units minus exports in physical units. Relationships between the different concepts:

$$\text{PTB} = \text{Imports} - \text{Exports}$$

Resource productivity is calculated by the ratio between gross domestic product (GDP) and domestic material consumption (DMC).

Total Material Consumption (TMC) measures the total mass (weight) of materials that are associated to the (apparent) material consumption of the domestic economic system, whatever their origin is (domestic, rest of the world).

$\text{TMC} = \text{DMC}$ plus unused extraction plus indirect flows associated with imports minus indirect flows associated with exports.

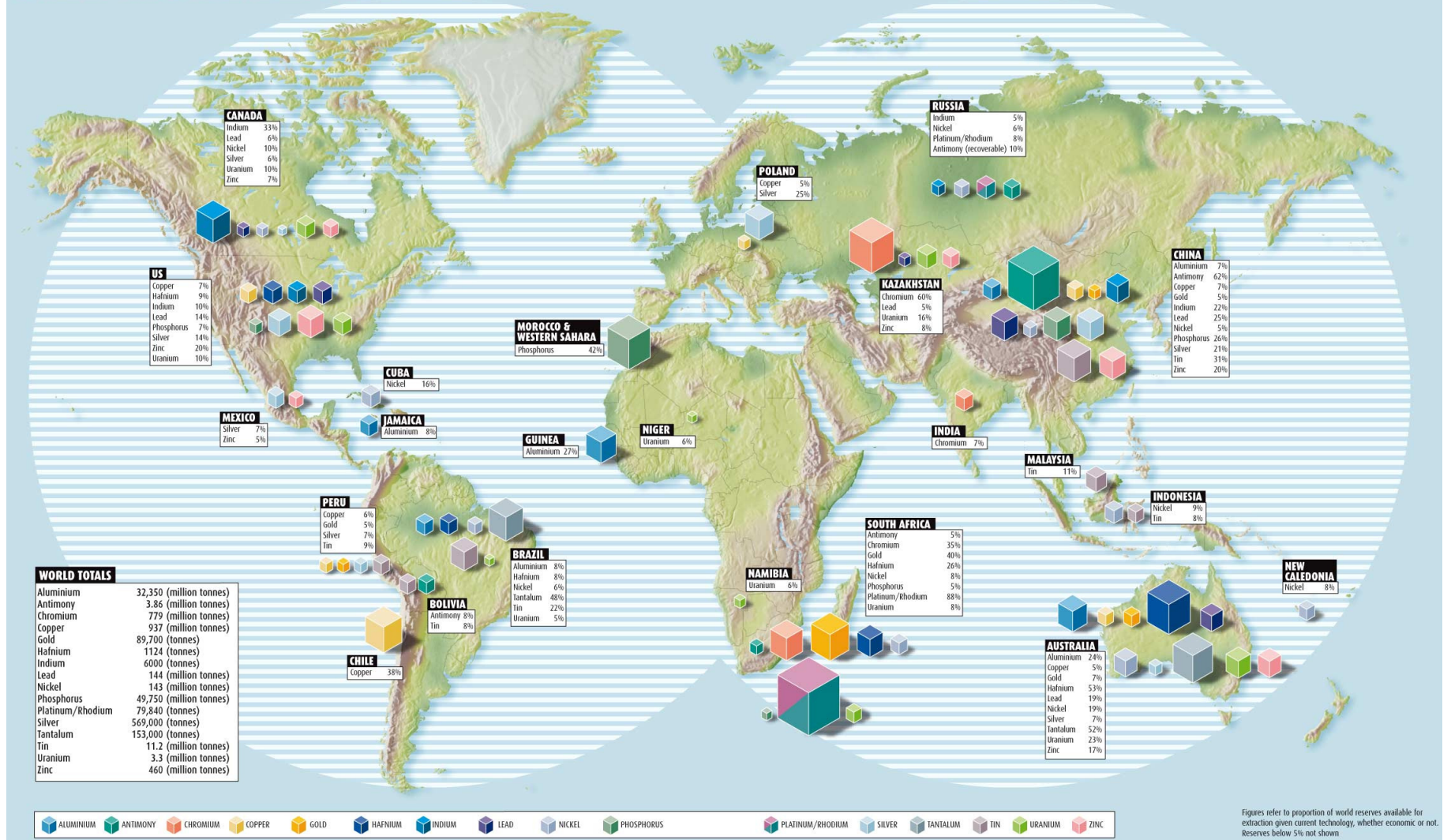
Appendix 1: Concentration of Production of Critical Raw Materials

| Raw Materials | Main producers (2008, 2009) | Main sources of imports into EU (2007 or 2006) | Import dependency rate | Substitutability | Recycling rate |
|-----------------------|--------------------------------|--|------------------------|------------------|----------------|
| Antimony | China 91% | Bolivia 77% China 15% | 100% | 0,64 | 11% |
| Beryllium | USA 85% China 14% | USA, Canada, China, Brazil (*) | 100% | | |
| Cobalt | DRC 41% Canada 11% | DRC 71% Russia 19% | 100% | 0,9 | 16% |
| Fluorspar | China 59% Mexico 18% | China 27% Mexico 24% | 69% | 0,9 | 0% |
| Gallium | N/A | USA, Russia (*) | (*) | 0,74 | 0% |
| Germanium | China 72% | China 72% USA 19% | 100% | 0,8 | 0% |
| Graphite | China 72% India 13% | China 75% | 95% | 0,5 | 0% |
| Indium | China 58% Japan 11% | China 81% | 100% | 0,9 | 0.30% |
| Magnesium | China 56% Turkey 12% | China 82% | 100% | 0,82 | 14% |
| Niobium | Brazil 92% | Brazil 84% Canada 16% | 100% | 0,7 | 11% |
| Platinum group metals | South Africa 79% Russia 11% | South Africa 60% Russia 32% | 100% | 0,75 | 35% |
| Rare earths | China 97% | China 90% | 100% | 0,87 | 1% |
| Tantalum | Australia 48% Brazil 16% | China 46% Japan 40% | 100% | 0,4 | 4% |
| Tungsten | China 78% | Russia 76% | 73% | 0,77 | 37% |

Source: EC (2011)

(*) subject to strong fluctuations

WHERE THE MINERALS ARE



Figures refer to proportion of world reserves available for extraction given current technology, whether economic or not. Reserves below 5% not shown.

Appendix 2: World Map Showing Location of Key Minerals (Source: Cohen (2007) in New Scientist)