

Comhar SDC submission to the Commission on Taxation Environment Subgroup

Executive summary

A carbon levy should be introduced immediately in the non-ETS sectors to provide the right signals to emissions reduction activities.

Initially the carbon levy should be set **at the same price as the ETS market price** to encourage least cost reductions although emissions targets for the non-ETS sectors will be more difficult and expensive to meet than in the ETS sector. This would imply a levy of approximately €20-25 per tCO₂, which would translate to roughly 5c per litre of petrol. It should be clearly marked on receipts to raise awareness of the carbon implications of purchases

The **use of the carbon tax revenue** is very important. A carbon tax should be introduced with appropriate structures in place to ring-fence revenues for specific activities. The carbon levy is predicted to be beneficial to the economy and cause growth if the revenue is used for a combination of: compensation to vulnerable groups, labour tax reductions, and energy efficiency savings in proportion to the sectoral contributions.

Further targeted sectoral policies will be needed to reduce GHG emissions; Comhar SDC prioritises the following:

- Policy measures for sustainable **transport** should focus on a national road pricing scheme, a rural transport strategy, and least cost options such as eco-driving.
- **Agriculture** will mainly not be affected by a carbon tax. However, investment is needed in education and incentives for best practice in cattle and slurry management. The rate of sustainable afforestation should be increased significantly to provide carbon sequestration and biomass options.
- Refund a portion of carbon tax to the **services** sector under condition that companies join energy-saving agreements. Implement green procurement requirement beginning with public sector.
- In the **residential** sector carbon tax funds could be used to eliminate fuel poverty, provide grants to increase alternative fuel use in homes; give tax credits to spending on energy efficiency measures such as home insulation, continue grants for renewable heating and electricity systems.

Table of Contents

Introduction.....	2
Proposals	2
Carbon levy.....	3
Revenue use.....	4
Sectoral measures.....	7
Transport.....	7
Agriculture	10
Services sector.....	10
Residential	10
Biodiversity.....	10
Conclusions.....	10

Introduction

The Programme for Government states that Ireland will reduce greenhouse gas emissions by on average three percent annually over the lifetime of the Government. Even if this is interpreted as reducing a cumulated annual three percent by 2012, this still means a reduction in emissions to a level equivalent to 86 percent of 2007 emissions, which is substantial.

In addition, Ireland faces a greenhouse gas emissions reduction target in the non-Emissions Trading Scheme sectors (non-ETS) of at least 20 percent (compared with 2005) by 2020. The sectors mainly affected are transport, agriculture, residential heating, and services. Policy measures are urgently needed to reduce emissions from these sectors drastically. Transport and agriculture will prove particularly intractable. A cut of 20 percent is huge and requires radical changes over the period rather than incremental policy measures.

Proposals

Several levels of policy measures are needed to reduce Irish greenhouse gas emissions. Across all non-ETS sectors a carbon price should be introduced immediately to encourage the most efficient emissions cuts. A carbon price signal is the most efficient way to reduce carbon emissions in the Irish economy. The revenue from a carbon levy can be used to generate economic growth, help vulnerable groups and be invested in new energy-saving technologies and activities. In addition to a carbon levy, targeted policy measures are needed to encourage emissions reductions in the non-ETS sectors, especially the most intractable – transport and agriculture. Some these will require funds, which can be paid from the carbon levy revenue.

Emissions from the non-ETS sectors are more difficult, and therefore more expensive, to reduce than those from the ETS sectors. The dilemma is whether there should be a different carbon price in the non-ETS sectors, reflecting the higher abatement costs there and the different emissions reduction target, or whether the ETS price should be used for non-ETS sectors. Although it is cost-effective to have the same carbon price across all sectors, if this price is set by the ETS market, it will not be high enough to reduce non-ETS emissions sufficiently to meet the non-ETS targets. Comhar SDC proposes a compromise to initially introduce a carbon tax on non-ETS sectors at the ETS level but to use some of the revenue to implement further

emissions-saving measures that will increase the emissions saved and increase the effectiveness of the carbon levy. Later, based on these experiences, the carbon tax should be reviewed and further options should be explored that may facilitate a higher carbon price in the economy such as a cap and share scheme.

Carbon levy

The economic situation in 2009 is predicted to be constrained. This should not be a barrier to the introduction of a carbon tax. Based on modelling results from research described below, Comhar SDC is of the view that introducing a carbon tax will trigger growth in GNP and employment, investment in energy efficient technologies and reduce greenhouse gas emissions.

Even if carbon prices are introduced at a low rate, it sends an important message to all that carbon emissions are to be taken seriously and gives confidence to long-term investment in low carbon technologies.

The questions arising are:

- What level should the price be set at?
- How much emissions can be reduced by a carbon tax?
- What use should the revenue be put to?
- How should vulnerable groups be protected?

Some modelling has been carried out and the results can help us answer these questions. Comhar SDC has commissioned research looking at fiscal measures such as a carbon tax and a cap and share scheme¹. Consultants AEA Technologies and Cambridge Econometrics carried out this research. In parallel ESRI have used the HERMES and ISus models to assess the impact of a carbon tax on the Irish economy².

The really good news is that all the modelling results for both a carbon tax and cap and share scheme show that neither is detrimental to the economy at any of the price levels examined. The use of the revenue is particularly important in ensuring that the scheme operates as efficiently as possible and that vulnerable groups are compensated for the price rises.

Comhar SDC suggests that initially a carbon tax should be introduced that creates a consistent carbon price across all economic sectors. Since the sectors covered by the ETS already face a carbon market price across the EU, the least complex design of a carbon price for non-ETS sectors could involve aligning carbon costs in these sectors with the ETS market price. A single price throughout the economy will ensure that emissions reductions are undertaken at least cost. Therefore a carbon tax would be set at the level of the ETS price. This could be relatively simply estimated based on historical values for a given period or on the futures markets and set annually. The EU Commission estimates the price of a tonne of CO₂ emissions to range from €20 in 2010 to €38.

¹ Pollitt, H., U. Chewprecha, and J. Tarafdar (2008) *Cap and Share – Policy Options for reducing greenhouse gas emissions for Ireland and possible macroeconomic effects*, Report for Comhar SDC, Dublin 2 (forthcoming).

² Tol, R.S.J., T. Callan, T. Conefrey, Fitz Gerald, J., S. Lyons, L. Malaguzzi Valeri, and S. Scott (2008). "A Carbon Tax for Ireland", *ESRI Working Paper No. 246*, Economic and Social Research Institute, Dublin 2.

The latest ESRI modelling results predict a reduction in emissions of 1.7% if a carbon tax of €20/tCO₂ were applied and the revenue used to pay national debt. This reduces to 1.5% if the revenues were used to reduce income taxes and remains at 1.7% if a lump sum is paid to householders³. The E3ME model by Cambridge Econometrics predicts an emissions reduction of approximately 1.0% if a carbon tax at the ETS price were set in Ireland and the revenue used to reduce income taxes and increase social welfare benefits. Both models predict GNP growth in the region of 1-2% as a result of the carbon tax revenue recycled to increase disposable income for workers and non-workers. The E3ME model shows that even with much higher carbon prices in the region €200-300 per tCO₂ that if the revenue is used to reduce income tax and increase social welfare that GDP still increases 0.5-0.9%.

The research by Cambridge Econometrics included modelling the level of carbon tax needed to achieve a reduction of 20% and 30% energy-related CO₂ emissions from non-ETS sectors by 2020 compared with 2005. The results indicate that the prices required would be €182 and €329 per tCO₂ in 2020⁴. A reduction of 10% is estimated to require a carbon price in the region of €80/tCO₂. However, a carbon price set this high would mean that the non-ETS sectors would face much higher carbon prices than those in the ETS.

Several points are clear from these results:

- A carbon tax set at the ETS price level with astute use of the revenue will not harm the Irish economy.
- Secondly, a carbon tax at the ETS rate will not reduce CO₂ emissions in the non-ETS sectors significantly, at least not near the amount needed to fulfil Irish greenhouse gas emissions commitments. A higher carbon price will be needed if it is the sole mechanism to reduce non-ETS emissions and in this case other forms of pricing such as personal trading may be more politically acceptable.
- And thirdly the use to which carbon tax revenue is put has a significant impact on the (a) macroeconomic effects, (b) level of emissions reductions, and (c) public and political acceptance. This latter point is becoming increasingly important with rising energy prices.

Revenue use

The EPA estimates that the CO₂ emissions from the non-ETS sectors in 2010 to be approximately 29-31 MtCO₂, which would generate revenue from a carbon tax at €20-25/tCO₂ of between €570-760 million⁵ annually.

A first option is give back some or all of the revenues from the carbon tax to the different sectors in approximate proportion to their payments, and in manners that further intensifies and incentivises actions to reduce emissions and to address some of the equity and competitiveness concerns associated with a carbon tax. Many

³ Conefrey, T., J. Fitz Gerald, L. Malaguzzi Valeri, and R.S.J. Tol (2008), "The Impact of a Carbon Tax on Economic Growth and Carbon Dioxide Emissions in Ireland", *Working Paper No. 251*, Economic and Social Research Institute, Dublin 2.

⁴ Translating to a petrol price increase of approximately €0.5 and €0.8 per litre respectively.

⁵ EPA (2008) Ireland's National Greenhouse Gas Emissions Inventory for 2007 Provisional Figures, 16 October 2008. Available at <http://www.epa.ie/downloads/pubs/air/airemissions/name,25200,en.html>

FitzGerald, J., A. Bergin, T. Conefrey, S. Diffney, D. Duffy, I. Kearney, S. Lyons, L. Malaguzzi Valeri, K. Mayor, and R.S.J. Tol 2008. *Medium-Term Review 2008-2015*, Economic and Social Research Institute, Dublin 2.

economists do not favour hypothecation of revenues from environmental taxes for greenhouse gas emissions saving activities. The argument is mainly that it reduces the flexibility of the government budget and also that if an activity is not worth subsidising from the national budget then it is also not worth subsidising with the carbon tax revenue (Tol et al. 2008). There is the risk that if significant funds are earmarked for investment in specific activities then they may be wastefully spent in order to “use up” the funds.

However there are also some advantages associated with a decision that some of the carbon tax revenue should be invested in further greenhouse gas emissions savings activities:

- The experience of SEI through the pilot negotiated agreements programme with industry in 2002 showed that the emissions savings were almost doubled if a carbon tax was linked with an industry agreement providing energy-saving expertise and services.
- There may currently be underinvestment of the government budget in public good activities such as energy technology R&D, centres providing expertise and advice to firms in energy efficiency and other greenhouse gas emissions mitigation and adaptation activities, which are of little commercial value at this time.
- Investment in developing alternative energy sources such as renewable energies may reduce the burden of the carbon levy in the long run and create a new industry with employment.
- Investment of the revenue in the sectors that have paid the taxes increases the popularity and hence political feasibility of implementing a carbon tax substantially.
- There is a fairness aspect; if all the revenue is spent on individuals' income tax reductions and welfare benefits, then it might be argued that business sectors facing the carbon tax such as road haulage, services sectors etc also deserve a share of the revenue directly.⁶
- Investment in further energy-saving activities should increase the effectiveness of the carbon tax.

Therefore we believe there is a strong case to recycle some of the revenue to individual sectors to increase stakeholder buy-in to a carbon tax scheme and also to maximise the greenhouse gas emissions savings that could be achieved through investment in public good activities such as provision of centres of expertise etc. In order to identify the best means to utilise the revenue in each sector, the government should engage with each sector to identify expenditure within the sector that will further reduce emissions. This is consistent with the partnership model that has worked well for Ireland, and should encourage ‘buy in’ as well as increasing the effect on emissions reduction yielded by the incentive effects of the levy alone. The key requirement of any sectoral agreement would be that it significantly further reduce emissions at least cost.

An important advantage of any such scheme could be the growth of new, environmental industries based around energy-saving technology that would benefit Ireland's economic growth and job creation in the long run. Below we identify some key measures that are needed in non-ETS sectors to reduce their emissions, some of which could be funded through carbon tax revenue. Further study is needed to examine the gaps in current spending and assess the amounts needed to develop

⁶ Although they would benefit indirectly through stable wage demands as a result of the income tax reduction.

opportunities and technologies to reduce greenhouse gas emissions. Investment in environmental research is crucial in this regard. Regular review would be needed of the amounts spent to ensure efficiency.

Another portion of the funds should be used to compensate individuals for rising carbon prices, either by reducing labour taxes or to provide a lump sum rebate to households. Since carbon tax raises prices and therefore the cost of living too, it would normally be expected that wage demands would also rise. Therefore the revenue from carbon tax could be used to offset some of the increased costs people face by, for example, reducing income taxes, social insurance contributions, increasing social welfare, or giving a lump sum to all households. Wages have risen in Ireland significantly over the last years with 5.5% growth in 2007 and exceed that of many of our trading partners. While the Spring ESRI Quarterly Economic Commentary forecasts this to decrease over 2008 and 2009 to 4% and 3.5% respectively (Barrett et al. 2008)⁷, the use of carbon tax revenue to reduce labour costs further could be significant in improving Ireland's competitiveness. A carbon tax refund may be a more efficient way to compensate lower income groups than income tax reductions or social welfare contributions. The ESRI modelling research finds that recycling revenue in the form of lower labour taxes is better for GNP than giving a lump sum to all households.

Box 1: Rural Ireland

In the analysis of most market-based policy instruments such as carbon taxes to reduce CO₂ emissions, it becomes quickly clear that, regardless of policy measure, there are substantial challenges facing the reduction greenhouse gas emissions in rural Ireland. This is because of the current situation where houses in rural areas are more likely to be larger, not linked to natural gas mains, isolated from public transport services, and therefore dependant on the private car. The result is that any fiscal measures to reduce emissions will generally increase the cost of living in rural areas. Structural issues such as previous bad planning and lack of transport infrastructure must be addressed as a matter of urgency to improve the sustainability of rural areas. This should be carried out as a separate but related challenge so that rural Ireland does not continue to be perceived as a barrier to climate change policy.

Scott and Eakins (2004)⁸ and Tol et al. (2008) examine the impact of a carbon tax on household income and find that it is regressive as expected⁹; the lower income deciles of the population spend a higher share of their incomes on fuels. Scott and Eakins (2004) considered various forms of compensation¹⁰ to lower income households and found that a strategy which delivers lump sum compensation to the bottom five income deciles of the order of the average annual expenditure on carbon tax (estimated at €246) would be best. They also recommend setting aside approximately €50 million for energy efficiency enhancing schemes such as house insulation and fuel switching. There were an estimated 100,000 households or 6.5% of the population in 2005, who went "without heating at some stage during the year" because they could not afford it¹¹. It costs on average €1,000 to install attic or wall

⁷ Barrett, A., I. Kearney, and M. O'Brien 2008. *Quarterly Economic Commentary, Spring 2008*. Economic and Social Research Institute, Dublin 2.

⁸ Scott, S. and J. Eakins 2004. 'Carbon Taxes: Which Households Gain or Lose?' *EPA Final Report 2001-EEP/DS7-M1*, Environmental RTDI Programme 2000-2006.

⁹ Interestingly, Scott and Eakins find that while a carbon tax would be regressive for expenditure on residential fuels, expenditure on transport fuels as a share of disposable income is highest for middle income families and therefore may need some form of compensation for the increased costs.

¹⁰ In particular they investigated VAT reduction and different strategies of lump sum compensation.

¹¹ CSO (2006) EU Survey on Income and Living Conditions (EU-SILC) 2005.

cavity insulation in a home (which improves energy efficiency by 20%); therefore a significant budget is required to perform this task in all homes classified as at risk of fuel poverty. If all these vulnerable houses had insulation installed at a cost of €1,000 per house, then this would require 13-17% of the estimated carbon tax revenue collected.

The modelling work by Fitz Gerald et al. (2008) and Tol et al. (2008) estimates that the increased cost of living due to the carbon tax could be fully compensated by reducing labour taxes and increased welfare benefits with 65-80% of the revenue, leaving 20-35% of the revenue available for other uses. From this it seems that there is scope to make room for use of the revenue for both macroeconomic and greenhouse gas emissions mitigation benefits.

Recommendation: In line with the literature discussed here, we propose that 47-50% of carbon revenues be utilised to reduce income taxes, 13-17% be used to compensate lower income households, and the remaining amount be invested in public good activities to reduce greenhouse gas emissions in the affected sectors. Many policy measures included in the Programme for Government have not yet been undertaken, which may be suitable for funding by a portion of the carbon tax revenue.

Sectoral measures

In addition to an economy-wide carbon price, targeted sectoral fiscal measures are needed to enhance the effectiveness of the carbon tax. Some measures may require funding but others require structural or institutional change without significant cost. Sectors covered by the carbon tax should be invited to discuss carbon reducing measures that could be funded by revenues from the carbon tax. In most cases the advent of a carbon price will incentivise the introduction of measures to reduce greenhouse gas emissions. Sectors should be consulted to give input of the most effective funding of greenhouse gas saving measures, particularly in instances of public goods.

Transport¹²

Vehicle taxes are now aligned with CO₂ emissions; however they do not affect driving behaviour or demand. Road user charges are needed to reduce car use and to generate revenue for investment in alternative modes of transport. This is in accordance with the “polluter pays principle” and allows the polluting mode to subsidise the less polluting mode of transport.

The chief recommendation is the implementation of a **national road pricing scheme**. A national scheme of road user charges can internalise all externalities associated with transport in a fair manner and has the advantage that congestion is addressed as well as environmental damage. Compared with the option to introduce congestion charges in major urban areas only, the full roll-out of a national road pricing scheme has a similar technological requirement and is the logical extension of such an instrument, with the advantage that all transport emissions are covered¹³.

Under such a scheme, all transport fixed charges such as vehicle taxes should be removed and converted to distance-based road charges which should vary according

¹² For more details on transport measures, the reader is referred to Comhar SDC response to the public consultation on the Department of Transport Sustainable Transport Action Plan available at <http://www.comharsdc.ie/files/Comhar%20STTAP%20report.pdf> (May 2008).

¹³ Especially considering that rural travel accounts for 86 percent of vehicle-kilometres driven annually (McDonagh 2006).

to vehicle emissions, geographical location, and time-of day. These charges would incorporate a carbon emissions price, which would be consistent with the economy-wide carbon tax. This will encourage consumers to purchase more fuel-efficient, clean vehicles and to drive less, and it will furthermore ensure that when they do take to the road, they can move smoothly, safely and efficiently. The design of the scheme should be made as simple as possible and stakeholder buy-in is crucial at the design stage of the scheme to reduce resistance to its implementation. In recent years the technology required to operate national road pricing has become more accessible and should be widely available within five years. The revenue collected through such a scheme should be sufficient to offset the revenue shortfall from vehicle taxes. It should be earmarked for transport infrastructure investment and to alleviate any distributional impacts thus making road pricing more acceptable to the public and providing a real choice of travel options.

The Netherlands is in the process of passing legislation approving the phased introduction of a national road pricing scheme with popular support. The Dutch experience in developing such a scheme shows the necessity for a lengthy preparatory period to study the most suitable scheme design, raise public awareness and obtain the stakeholder buy-in that is needed for legislative approval of a national road pricing scheme. Box 2 provides a short description of the Dutch scheme.

BOX 2: The Dutch experience

The Netherlands is planning to introduce national road pricing from 2012. This was already proposed and rejected in 2001 and some lessons have been learnt since then.

- Overall people are not willing to pay more taxes but they are willing to pay fair prices.
- Public and political acceptance is very important for the introduction of a national road pricing scheme. It is important to keep the design of the scheme simple
- The scheme should start as soon as possible, even if only on a small scale as the problem is urgent.
- Politicians are needed with courage for the successful implementation of road pricing.

In order to get buy-in, extensive negotiations were held with stakeholders such as motorists association, environmental groups, representatives of employers and employees, regional governments, etc. The recommendations made by the group were for a **km-price** that varies according to time, place and the effects on the environment (all roads, all motor vehicles). They also proposed that the current tax system (for purchase and ownership of a vehicle) be converted into the new system (use of the vehicle).

Various schemes were considered but the kilometre charge was selected, which requires all vehicles to have a GPS system installed. The objective is to reduce congestion and environmental damages. The expected charge will be €0.03-0.04 – 0.10/km depending on the type of vehicle, time of day, location. It will be revenue neutral compared to the current vehicle tax system. There will be phased implementation with the scheme operating on a small scale with volunteers and commercial users first. The Cabinet approved the scheme in December 2007 and it will start with freight transport in 2011. This will require intensive technical and policy-related cooperation with Belgium, France and Germany. Passenger cars will follow a year after the launch of freight transport. The complete system roll-out will be scheduled for 2016 and beyond. As part of the introduction of the price per kilometre, there will be extensive trials to test the technology and assess the behavioural and accessibility impacts, especially in the congested areas in the Northern wing of the Randstad (*Noordvleugel*).

Similar preparatory work should begin in Ireland as there will be significant lead-in time for the implementation of such a scheme. A feasibility study of a national road pricing scheme should be commenced immediately to investigate the potential strengths and weaknesses of such a scheme as applied in Ireland. A full roll-out of this measure should be timed to begin with the near completion of the Transport 21

measures in 2013/2014; this will help ensure that alternative model of transport are in place.

A seminar on the subject of fiscal measures in transport policy was held by Comhar SDC with expert and stakeholder participation. The main points arising from the discussion on road-user charges are summarised here as:

- Price elasticities of transport demand for Ireland have not been estimated and therefore it is difficult to estimate the impact of fiscal measures on transport;
- Competitiveness is very important; Dublin competes globally and so don't want firms leaving the city.
- The announcement of a km-charge might reverse the land use trends and encourage people to live closer together.
- People will accept road pricing if they are given sufficient information and lead-in time to adjust their behaviour.

Fiscal measures and Revenue use

- The question of revenue use is very important, as it should be used to take care of vulnerable groups.
- Without a regional tax system it is difficult to hypothecate revenues and return money locally.
- It is not the tax that will determine the impact on marginalised people but how the revenue is used.

Seminar Policy recommendations:

- National transport fiscal measures have a long lead-in time and other cheaper measures ("soft") measures should be implemented in the interim.
- Easy policy measures would be to (i) make diesel vehicles more expensive to pay for their increased AQ emissions, (ii) implement a parking charge and give the revenue back to companies, (iii) encourage flexibility in work hours.
- Vehicle taxes must be removed and user charges implemented with credits for marginal groups.
- The visibility and transparency of any measure is very important to raise awareness and acceptability.

Other transport fiscal measures include the following:

- Review Transport 21 investment to prioritise modes that progress the sustainability agenda – economic, social and environmental goals. Include external costs in transport pricing and ensure planning includes sustainable transport at all stages.
- Review and implement a national rural transport strategy.
- Serious consideration must be given to improving the sustainability of Irish freight transport. Public investment in a national distribution centre (using road pricing or carbon tax revenue) is required for freight transport to improve the logistics of small freight operators in particular and to enable the efficient use of existing infrastructure. Most freight transport in Ireland has its origin and destination within Ireland¹⁴ and better coordination of freight transport services is needed.
- Begin to plan infrastructure for electrification of transport.
- Introduce ecodriving as part of the driving test for private and commercial licenses immediately. Require all driving instructors to undertake training. (Benefit – 15-20% reduction in emissions per vehicle, cost - negligible).

¹⁴ CSO (2007) Road Freight Transport Survey 2006.

Agriculture

- Use revenue from the carbon tax to provide incentives and training for farmers to engage in best practice in dairy cow, beef cattle, and slurry management.
- Invest significantly in agricultural research, specifically in greenhouse gas mitigation methods in the dairy sector.
- Value ecoservices properly so that farmers are incentivised to carry out ecological activities.
- Increase rate of public and private afforestation to increase the forests counted for carbon sequestration and that can be used for biomass.
- Provide support for the nascent biomass industry and encourage further research in second generation biofuels.
- Investigate schemes for domestic offset projects to incentivise farmers to invest in greenhouse gas emissions saving activities.¹⁵

Services sector

- Refund a portion of carbon tax under condition that companies join energy-saving agreements.
- Implement green procurement requirement beginning with public sector.

Residential

- Eliminate fuel poverty.
- Provide grants to increase alternative fuel use in homes.
- Give tax credits to spending on energy efficiency measures such as home insulation.

Biodiversity

The Government needs to maintain the momentum in addressing the challenges in protecting Ireland's biodiversity. Adequate resources are needed to ensure that the National Parks and Wildlife Service and local authorities can meet their biodiversity obligations.

Conclusions

A carbon levy should be introduced immediately in the non-ETS sectors to send the right price signal across the economy that greenhouse gas emissions must be reduced. A carbon levy will have an "announcement effect" that is expected to cause individuals and business to find ways to reduce their CO₂ emissions. The carbon levy is not expected to be damaging to the economy and the revenue can be used to compensate vulnerable groups and encourage further emissions and labour tax reductions. This will cause growth in the economy and provide incentives for new innovation in the renewables sector. Investment is needed in environmental and energy research to ensure first mover advantage and long term growth in the sector.

Targeted policy measures are needed to reduce emissions in non-ETS sectors. Currently the transport and agricultural sectors are proving the most difficult from which to reduce emissions. A national road pricing scheme should be introduced to reduce car travel demand and to generate revenue for alternative modes of transport. Least cost measures in all sectors exist such as ecodriving and better planning in transport, cattle management in agriculture and insulation in buildings. These should be focussed on *a priori*. Revenue from the carbon levy should be used to invest in further longer-term abatement measures.

¹⁵ Examples of domestic offset projects can be seen in France at:
<http://www.caissesdepots.fr/spip.php?article662>