OECD Environment Working Papers No. 59

Ireland's Carbon Tax and the Fiscal Crisis: Issues in Fiscal Adjustment, Environmental Effectiveness, Competitiveness, Leakage and Equity Implications

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https://dx.doi.org/10.1787/5k3z11j3w0bw-en

OECD

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

03-Oct-2013

English - Or. English

ENVIRONMENT DIRECTORATE

ENV/WKP(2013)6
Unclassified

ENVIRONMENT WORKING PAPER No.59 - IRELAND'S CARBON TAX AND THE FISCAL CRISIS: ISSUES IN FISCAL ADJUSTEMENT, ENVIRONMENTAL EFFECTIVENESS, COMPETITIVENESS, LEAKAGE AND EQUITY IMPLICATIONS

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This paper describes the features of the Irish carbon tax, recounts the story of its interplay between fiscal adjustment and helping meet the obligations to raise taxes, and implications for competitiveness and carbon leakage, environmental effectiveness and equity issues, and draws some conclusions regarding why it happened, and provides some tentative insights for other countries in a similar situation.

JEL Classification: P48, Q38, Q48, Q58

Keywords: Carbon tax; Fiscal adjustment, Policy lessons

JT03345563

Complete document available on OLIS in its original format

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ABSTRACT

Beginning in late 2008, Ireland experienced a fiscal crisis. This resulted in November 2010 in agreement between the Irish government and the European Central Bank, the European Commission and the International Monetary Fund (IMF) – known collectively as 'the Troika' – whereby the latter provided substantial financial support, on condition that a number of revenue raising and expenditure reduction targets were met. Also in 2010, a carbon tax at a rate of EUR 15 per tonne of CO_2 was introduced, covering most CO_2 emissions from the non-traded sectors (mainly transport, heat in buildings and heat and process emissions by small enterprises). This paper describes the features of the tax, recounts the story of its interplay between fiscal adjustment and helping meet the obligations to raise taxes, and implications for competitiveness and carbon leakage, environmental effectiveness and equity issues, and draws some conclusions regarding why it happened, and provides some tentative insights for other countries in a similar situation.

The circumstances that resulted in a carbon tax being proposed and subsequently introduced in Ireland include: Leadership by the Green Party; limited public opposition; Government need for the income; supports the Green Economy; support from the academic and wider policy population; exemptions for large emitters (many in EU ETS) and agriculture; effective engagement and good planning.

It is difficult, and dangerous, to draw generalisable conclusions for other countries from one small case study. Every country's culture and circumstances are particular and unique. However, below are some tentative implications for other countries in fiscal crisis considering introducing a carbon tax:

1. Crisis does indeed create opportunity; and the more severe, the better;
2. The income can play a valuable role *at the margin* in meeting obligations for tax increases;
3. There is a trade-off between scope and effective rate of tax;
4. There is a need to revisit the analytics of recycling and the double dividend;
5. The imperative to raise income and reduce debt limits the extent to which equity issues can be addressed;
6. It is difficult in the short run to draw conclusions about environmental effectiveness;
7. Pay attention to the 'green economy' performance and issues relating to the tax – an important rationale for the Irish carbon tax was that it would stimulate new enterprise in renewables and energy efficiency, encourage innovation and generally drive 'the smart economy';
8. Where the alternative is to raise taxes on labour, a carbon tax in general will not damage competitiveness;
9. With any environmentally salient carbon tax, over the 2014 to 2016 period, the rate is likely to be higher than the equivalent allowance price in the European Union Emissions Trading Scheme (EU ETS).

Eventually, crises pass; Europe will once again experience growth and rising employment. Unless the points noted above are credibly addressed, there is some prospect that the carbon tax will be 'unwound'.

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Keywords: Carbon tax; Fiscal adjustment, Policy lessons.

RÉSUMÉ

L'Irlande a connu fin 2008 une crise budgétaire qui a conduit son gouvernement à conclure, en novembre 2010, un accord avec la Banque centrale européenne, la Commission européenne et le Fonds monétaire international (FMI) – collectivement dénommés la « Troïka » – dans lequel ce dernier s'engage à lui apporter une aide financière conséquente, sous réserve qu'elle remplisse un certain nombre d'objectifs en matière de prélèvements fiscaux et de réduction des dépenses. En 2010 a été également mise en place une taxe carbone de 15 EUR par tonne de CO_2, couvrant la plupart des émissions de CO_2 des secteurs hors SCEQE (transport, chauffage des bâtiments et chauffage et procédés des petites entreprises, principalement). Ce rapport décrit les caractéristiques de cette taxe, relate ses interactions avec le rééquilibrage budgétaire et les obligations de prélèvements fiscaux, examine ses conséquences pour la compétitivité et le transfert d'émissions de carbone, son efficacité environnementale et les questions d'équité, et tire certaines conclusions sur les raisons qui ont poussé l'Irlande à faire ce choix, en proposant plusieurs enseignements qui pourraient se révéler utiles aux pays confrontés à une situation analogue.

La taxe carbone a été proposée puis mise en œuvre en Irlande dans un contexte bien particulier caractérisé par : le rôle moteur du Green Party ; la faible opposition du public ; un État en quête de recettes ; la promotion de l'Économie verte ; le soutien des milieux universitaires et des responsables publics en général ; l'exonération des grands émetteurs (inclus pour beaucoup dans le SCEQE) et de l'agriculture ; un réel engagement et une bonne planification.

Les conclusions d'une petite étude de cas sont difficilement généralisables et il serait dangereux de les étendre à d'autres pays. Chacun possède sa propre culture et des conditions qui lui sont spécifiques. Ont été cependant réunis ci-après quelques enseignements qui pourraient être utiles aux autres pays qui traversent actuellement une crise budgétaire et envisagent l'application d'une taxe carbone :

1. La crise peut être considérée comme une aubaine ; et plus elle est grave, mieux c'est ;
2. Les recettes peuvent utilement contribuer, *à la marge,* au respect des obligations de hausse des impôts ;
3. Il importe de trouver un compromis satisfaisant entre le champ d'application de la taxe et son taux effectif ;
4. Il convient de revoir l'analyse du recyclage et du double dividende ;
5. La nécessité d'engranger des recettes et de réduire la dette limite les possibilités de prise en compte des questions d'équité ;
6. Il est difficile à court terme de tirer des conclusions quant à l'efficacité environnementale ;
7. Il convient de suivre les performances de « l'économie verte » et les questions liées à la taxe : l'une des principales raisons d'être de la taxe irlandaise sur le carbone était qu'elle devait stimuler la création d'entreprises dans le secteur du renouvelable et des économies d'énergie, encourager l'innovation et plus généralement engager le pays sur la voie d'une « économie intelligente » ;
8. Comparée à une autre option qui consisterait à relever la fiscalité de l'emploi, la taxe sur le carbone ne portera généralement pas préjudice à la compétitivité ;
9. Toute taxe carbone présentant un réel intérêt pour l'environnement risque de se traduire, pendant la période 2014-2016, par des taux supérieurs au prix équivalent du quota dans le Système communautaire d'échange de quotas d'émission (SCEQE).

Toutes les crises ont une fin ; l'Europe finira par renouer avec la croissance et la reprise de l'emploi. Si les points énumérés plus haut ne sont pas traités de façon crédible, il est possible que la taxe carbone finisse par être vidée de sa substance.

Classification JEL : P48, Q38, Q48, Q58.

Mots clés : taxe carbone ; ajustement budgétaire, enseignements pour l'action.

FOREWORD

Beginning in late 2008, Ireland experienced a fiscal crisis. This resulted in November 2010 in agreement between the Irish government and the European Central Bank, the European Commission and the International Monetary Fund (IMF) – known collectively as 'the Troika'– whereby the latter provided substantial financial support, on condition that a number of revenue raising and expenditure reduction targets were met. Also in 2010, a carbon tax at a rate of EUR 15 per tonne of carbon dioxide (CO_2) was introduced, covering most CO_2 emissions from the non-traded sectors (mainly agriculture, transport, heat in buildings and heat and process emissions from small enterprises).

This paper describes the features of the tax, recounts the story of its interplay between fiscal adjustment and helping meet the obligations to raise taxes, and implications for competitiveness and carbon leakage, environmental effectiveness and equity issues, and draws some conclusions regarding why it happened, and provides some tentative insights for other countries in a similar situation. It was written by Frank J. Convery, Louise Dunne and Deirdre Joyce, of University College Dublin, Ireland.[1]

1 . The authors gratefully acknowledge help from a number of sources: They have benefitted from insights from ENTRACTE, which is a European Commission funded (FP7) multi-group research endeavour with a focus on modelling 1) the interaction of various instruments and 2) member state actions and their effects on the performance and prospects of EU level policies. Untangling the data so as to separate the emissions of the sectors in the European Union Emissions Trading Scheme (EU ETS) from those that are not (NETS) poses challenges; the authors are very grateful to Paul Duffy of the Environmental Protection Agency (EPA) and Martin Howley of the Sustainable Energy Authority of Ireland (SEAI) for their work and their help. One of many advantages of having a carbon tax is that it involves the Department of Finance and the Revenue Commissioners in the collection and interpretation of data. The authors are very grateful to Eric Gargan of the Department of Finance for his work and guidance in these domains. For background on the politics of bringing in green taxes, the authors are grateful for the time afforded to them by the former Green Party Ministers and their Advisors, Eamon Ryan, former Minister for Communications, Energy and Natural Resources; John Gormley, former Minister for Environment Heritage and Local Government; Dan Boyle, former Chairperson of the Green Party and Donall Geoghegan, former Chef de Cabinet. Researchers in the Economic and Social Research Institute, including Tim Callan, Thomas Conefrey, John Fitz Gerald, Sue Scott and Richard Tol, amongst many others, have over many years studied the economic and social implications of a carbon tax, including especially the implications of alternative ways of using the revenue. The authors are deeply grateful to them all. The usual disclaimer applies.

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1. Introduction

1. Between 1990 and 2007, Ireland was the fastest growing economy in Europe, with real GDP almost tripling, total employment close to doubling, the unemployment rate falling from 12.9 to 4.6%, and general government debt falling from 93.5 to 11.1% of GDP.

Table 1. Some economic indicators
Ireland, 1990, 2007 and 2012

	1990	2007	2012
Real GDP (EUR billion)	66.8	170.4	159.7
Total employment (Millions)	1.2	2.1	1.8
Unemployment rate (%)	12.9	4.6	14.8
General government net debt (% of GDP)	93.5	11.1	103.4

Source: IMF (2013).

2. All of the ratings agencies and international organisations (European Commission, OECD and IMF) gave almost unambiguous commendation and praise for the performance. But in retrospect it is now clear that key underlying weaknesses were not identified, either by the Irish policy system or its international counterparts. On 15 September 2008, Lehman Brothers Bank collapsed in the United States. On the night and early morning of 29 and 30 September 2008, Irish bank CEOs met with the Irish Taoiseach (Prime Minister), the Minister for Finance and their officials to make the case that they had a liquidity crisis, with the possibility that funds would be withdrawn from the system on a massive scale. The government put in place a guarantee arrangement to safeguard all deposits (retail, commercial, institutional and interbank), covered bonds, senior debt, and dated subordinated debt (lower tier II) in almost all the Irish banks.[2] The Minister for Finance claimed that the bank guarantee scheme would be "the cheapest bailout in the world so far".

3. The institutions covered were all privately owned banks, including not only the two main clearing banks, but also several lesser institutions, two of which – Anglo Irish Bank and the Irish Nationwide Building Society – turned out to be rogue institutions that were catastrophically exposed to losses. The guarantee has turned out to be one of the most expensive in history. A combination of shrinking government income due to the collapse of the property market, and sovereign guarantee of the banks which foreign lenders judged to be financially unsustainable, resulted in Ireland having to seek financial support from the European Commission, the European Central Bank and the International Monetary Fund (IMF), known collectively as 'the Troika'. The dramatic extent of the deterioration can be surmised by comparing the performance data for 2007 with that of 2012 (Table 1). A tax on carbon emissions from those sectors not included in the European Union Emissions Trading Scheme (EU ETS) was introduced in late 2009 to apply from 2010. It has played a not insignificant role in the tax increases necessitated by the adjustment to the fiscal crisis.

2 . The Minister for Finance removed the guarantee, taking effect on 28 March 2013.

4. This paper addresses: the history of carbon tax in Ireland, its role in adjusting to the fiscal crisis, issues of competitiveness and leakage, environmental effectiveness and equity; ending with some general conclusions that may be of interest to others considering the use of such taxes as part of a fiscal adjustment strategy. Because the tax has been in place for only 3 years, the history is short, and so the conclusions are necessarily tentative. The *ex post* analysis is a work in progress.

2. Some history

2.1 Early failure to introduce a carbon tax

5. From 1992 to 1997, the European Commission tried to secure member state acceptance of a European Union (EU)-wide carbon tax. The logic for doing so rests on the proposition that continued use of the atmosphere for disposing of CO_2 imposes substantial – and if it continues, perhaps catastrophic – costs on the global community. Imposing a tax makes the polluter pay, and this in turn is likely to reduce such emissions. The case is well made by Sue Scott (Scott, 2013). The effort to introduce an EU-wide tax did not succeed, being opposed by a number of member states, including Ireland (Clinch and Dunne, 2006). However, the Irish attitude began to change in 1999, when the government's Green Paper on Sustainable Energy (Department of Public Enterprise, 1999) advised that the cost of emissions should be borne by energy consumers.

6. The change was animated in part by events related to the Kyoto Protocol to the UN's Climate Change Convention. This was agreed in 1997, and ratified by the EU. The EU commitment was for a reduction in aggregate emissions of 8% from the 1990 base to be achieved by 2012 by the then 15 member states of the European Union (EU).

7. To help implement this commitment, the EU in 1998 entered into a burden-sharing agreement, whereby the effort required by each member state to reach the overall target was agreed, and made legally binding. Ireland was given what seemed a relatively generous target of +13% above its 1990 emissions. However, it was already becoming clear that under 'business-as-usual' it would be difficult to impossible to meet this obligation. New policies would be needed. While under the flexible mechanism provisions, there was a facility for assisting in meeting the obligation by buying allowances generated by reductions achieved in developing countries via the Clean Development Mechanism (CDM), these would have to be purchased.

8. In 2000, the first National Climate Change Strategy (NCCS) (Department of Environment, Heritage and Local Government, 2000) included a number of proposed initiatives to address the overshoot of the burden sharing obligation, including putting greenhouse gas taxation in place from 2002. As regards the proposed tax, the proposal included a range of possible measures to ring-fence the CO_2 revenue – including a key aim of revenue recycling to reduce direct taxes on labour, and partial tax-rebates for industries sensitive to external competition. There was much opposition from the business community, with the Irish Business and Employers' Confederation (IBEC) producing a report representing the proposed tax in a very negative light (Boyle, 2000).

9. In a Budget Speech on 4 December 2002, the Minister for Finance made specific reference to the prospective introduction of carbon energy taxation in Ireland. However, in 2004, the Minister announced that the Government had concluded its examination and had decided not to introduce such a tax.

10. A study examining the impediments to environmental fiscal reform in Ireland (Clinch and Dunne, 2006) identified a number of barriers to reform, which included: mistrust in government; information asymmetries; the political system; structure of government; the macroeconomic environment; the impact on competitiveness; inequity between sectors; elasticity; terminology; inadequate marketing; and its impact on the most vulnerable, the fuel poor.

2.2 Developments in EU Policy – division of policy between trading and non-trading sectors

11. An important development at EU level was the introduction of the European Union Emissions Trading Scheme (EU ETS) which commenced operation in 2005. It fixed an overall EU-wide cap on emissions from the power sector and heavy industry (cement, refineries, pulp and paper, steel, ceramics and glass, etc.). This cap was distributed in the form of legally binding caps for individual installations across the EU; in the event that an installation exceeded its cap, it could achieve compliance by a combination of abatement, and/or purchasing allowances from others, who had surplus allowances to sell. The transactions produced an allowance price that reflected in some sense the scarcity value of the atmosphere's ability to absorb greenhouse gas emissions. For more details on the design, operation and performance of the EU ETS, see Ellerman, Convery and De Perthuis, 2010. A key feature of the trading scheme is that a carbon tax at member state level that reduced emissions from its traded sectors would have no effect on total EU emissions from these sectors. The introduction of emissions trading meant that policy in the EU and the member states had two strands – trading (EU ETS) and non-trading (NETS).[3]

12. As regards NETS, this reality was recognised in legal terms by the enactment of the effort-sharing directive in 2009,[4] which established legally binding annual targets over the 2013 to 2020 period for emissions from sectors not in EU ETS, i.e. emissions from agriculture, transport (excluding aviation), buildings and waste. (Emissions are limited to the average for non-ETS emissions in 2008-2010 in the year 2013, and that thereafter emissions must fall on a straight line trajectory to the 2020 target). The overall reduction from a 2005 base for the EU is -10%. As in the case of the Kyoto target, the overall target was distributed across member states, ranging from -20% for the then richest states, to +20% for the poorest. Ireland was given a minus 20% target.

13. Some of the recent NETS emissions for Ireland are shown below:

Table 2. Total greenhouse gas emissions and emissions from non-emissions trading sectors (NETS)
Ireland, 2008-2011, Million tonnes of CO_2eq

Sector	2008	2009	2010	2011	% of 2011 NETS total
Total National GHG Emissions	67.6	61.8	61.5	57.3	
Emissions from the Non-Traded Sectors (NETS)					
Residential (combustion for domestic heating)	7.5	7.4	7.8	6.6	15.8
Transport (road, rail, navigation and domestic aviation)	13.7	12.5	11.6	11.2	27.0
Total Residential and Transport	**21.2**	**19.9**	**19.4**	**17.8**	**42.9**
Waste ((solid waste disposal, wastewater treatment and waste incineration)	1.1	1.0	1.0	1.0	2.5
Agriculture (ruminant digestion, agricultural soils, manures, gasoil used on farms)	19.0	18.7	18.8	18.4	44.3
Total (Residential, Transport, Waste, Agriculture)	**41.3**	**39.7**	**39.1**	**37.3**	**89.8**
Total Industry and Commerce (combustion emissions from industrial and commercial activities, industrial process emissions, f-gas emissions)[1]	5.9	7.9	4.5	4.3	10.3
Total NETS	**47.2**	**47.6**	**44.1**	**41.6**	**100**
NETS Limit	40.6	40.6	40.6	40.6	

1. Estimated by deducting total for residential, transport, agriculture and waste (EPA, 2012, p.7) from total NETS (EPA, 2012, p.6). Some of the total industry and commerce emissions listed under this heading by EPA are process emissions that are already included in EU ETS.

Source: Environmental Protection Agency (2012).

3 . Forestry offsets [removal units (RMUs)] for carbon sequestration which were allowable for compliance with the Kyoto Protocol were not allowed for compliance from either ETS or non-ETS sector obligations in Ireland's case.

4 . See http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0136:0148:EN:PDF for details.

2.3 Progress

14. Following a national election, a new government was formed in 2007, comprising the majority party Fianna Fáil (78 seats of out 166 in the lower house) and the Green Party (6 seats). Combating climate change was a key priority for the Green Party and as such became one of the Party's three major planks of policy in the joint Programme for Government (Department of Taoiseach, 2007). The Programme for Government gave a commitment to reduce greenhouse gas emissions by 3% annually over the lifetime of the Government (*Ibid*.) and it also identified the phasing-in of appropriate fiscal instruments, including a carbon levy, on a revenue neutral basis over the lifetime of the Government as a key policy instrument. The leading Irish economics research organisation – Economic and Social Research Institute (ESRI) – in its Medium-term Review 2008, highlighted the "virtual consensus amongst economists that a carbon tax is the most appropriate policy instrument to reduce greenhouse gas emissions" (Fitzgerald et al., 2008). The government document 'Building a Smart Economy' (Department of Taoiseach, 2008) reiterated the commitment to introduce a carbon levy to contribute to Ireland's future growth as a low-carbon country.

15. The new government formed a Cabinet Committee on Climate Change and Energy Security to examine how Ireland could transition to a more carbon-efficient economy. It progressed the second National Climate Change Strategy (NCCS) (Department of Environment, Heritage and Local Government, 2007), which had been established under the former administration.

16. The government also committed to purchase carbon credits to cover the costs of national overshoots on the Kyoto target. The 2006 *Carbon Fund Bill* was enacted in the year the new government took office. The fund was established to manage carbon credits and investments and was allocated EUR 270 million by the exchequer under the 2007-2013 National Development Plan (National Treasury Management Agency (NTMA) Carbon Fund Report 2007).[5]

17. In 2009, the Government set up a Commission on Taxation to report and recommend on the policy for the entire Irish tax system. The terms of reference relative to the carbon tax were specific. The Commission's Report would "assist the Government in assessing the structure and implementation of a carbon levy in the Budget for 2010".

18. Recommendation 9.1 of the final Commission report stated that "a carbon tax on fossil fuels should be introduced" at EUR 20 per tonne of CO_2 to apply to all carbon emissions from the non-traded sectors, and the rate should be linked to the international carbon market price in subsequent years.

3. Features of the Irish carbon tax

19. Irish fiscal measures are typically introduced by the Minister for Finance for approval by the Oireachtas (Parliament) in December, to take effect immediately or in the calendar year following. The detail is then embedded in a Finance Act, which is approved early in the calendar year. This initial carbon tax was approved by parliament in December 2009 and the detail included in the Finance Act 2010. Below, we address the scope, coverage and expected price effects.

5 . The Department of Environment, Heritage and Local Government has subsequently advised NTMA (National Treasury Management Agency) that there is no need to purchase further credits to cover Kyoto commitments as Ireland is currently meeting its obligations. However, they have indicated that they cannot rule out the need to resume purchasing in the period 2013-2020, given that Ireland must meet other obligations under the EU 20-20-20 targets (NTMA, 2011).

3.1 Coverage and rates

20. The tax applied to CO_2 emissions from the non-traded sectors (NETS). This in effect meant that it applied mainly to emissions from combustion for heat for the residential sector, emissions from transport, and from commercial buildings and small industry. Emissions from all of the sectors (power and heavy industry) in EU Emissions Trading Sectors (EU ETS) were excluded, as were most emissions from agriculture (mainly methane and nitrous oxide emissions) which in 2011 accounted for over 44% of NETS; emissions from waste (mainly methane) were likewise not covered. Emissions from agriculture were excluded on the basis of measurement difficulties (monitoring reporting and verification, MRV). Emissions from sectors in the ETS were excluded on economic efficiency grounds – participating firms already face an allowance price; the idea was that the NETS carbon tax would be calibrated close to the allowance price such that all emitters would face the same price incentive to abate. However, this proposition was predicated on the assumption that the EU ETS allowance price would stay in the EUR 15-30 per tonne range. This has not been the case,[6] and so a substantial gap has emerged between the two prices. Coverage in 2011 comprised 38.51% of total emissions, distributed as shown in Table 3.

Table 3. Emissions covered by the carbon tax
Ireland, 2011

Category	Million tonnes of CO_2	% of total emissions covered
Residential	6.59	11.49
Transport	11.23	19.58
Industry and commercial (not in EU ETS)	4.26	7.43
Total NETS covered	22.08	38.51
Total Emissions (including EU ETS)	57.34	

Note: Emissions from peat and coal used for heat were not covered by the carbon tax during 2011. From May 2013, a rate of EUR 10 per tonne applies to coal and peat; there are some exemptions for CO_2 emissions related to agriculture and horticulture.
Source: Derived from data shown in Table 2.

21. As regards the rates, a carbon tax was first introduced under the Irish Finance Act of 2010 at a rate of EUR 15 per tonne, lower than the rate recommended by the Irish Commission on Taxation. The tax applies to petrol, heavy oil, auto-diesel, kerosene, and liquid petroleum gas (LPG), fuel oil, natural gas, coal and peat (Department of Finance, 2010a). It also applies to aviation gasoline, which is aligned to the petrol rate and the rates for heavy oil used for recreational flying and boating, and the auto-diesel rate (Finance Act, 2010). The charge applies, at reduced rate,[7] to heavy oil and LPG that is used for horticultural production in a glasshouse, or for the cultivation of mushrooms.

22. Following its introduction, there have been phased increases of the tax to EUR 20 per tonne on different fuels (Department of Finance, 2012a). The first increase of December 2011 raised the tax on petrol, aviation gasoline and heavy oil as a propellant, in air navigation or private pleasure navigation to EUR 20 per tonne (Finance Act, 2012). The tax increase was then extended to kerosene, fuel oil, other fuel oil and LPG used as a propellant and other LPG in May 2012 (see Appendix A). The natural gas carbon tax was also increased from EUR 3.07 per MWh to EUR 4.10 per MWh.

23. An interesting issue arose as regards the treatment of solid fuel (peat and coal) for heating. Peat fuel is indigenous to Ireland. It is used as a fuel source for the production of electricity at one of the State owned (Bord na Mona) generating companies. It is also used for home heating and is harvested in rural

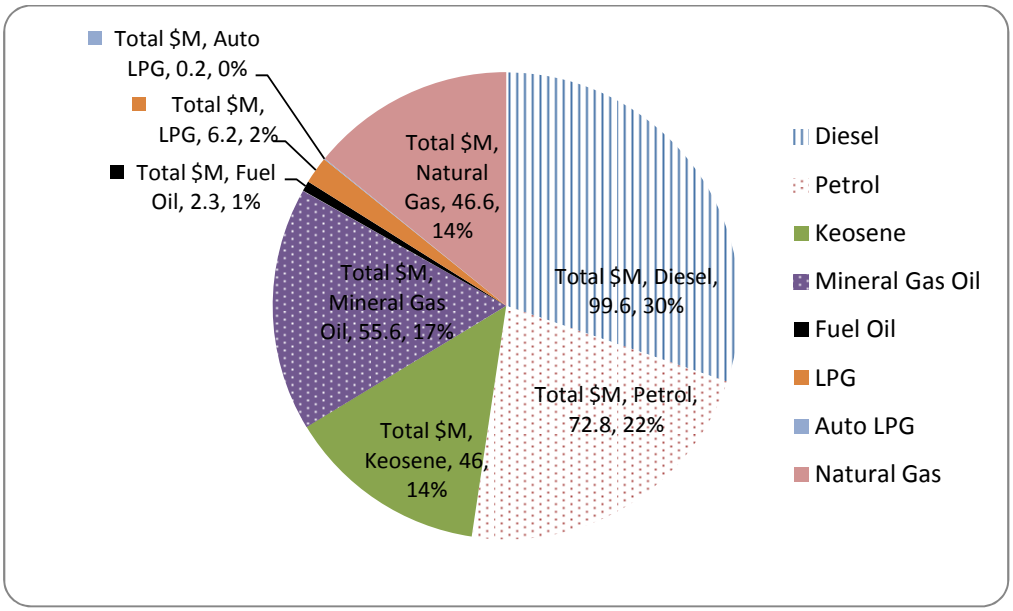
6 . On 24 April 2013, Reuters reports that five European Union countries sold a total of 865 000 spot carbon permits from the second phase of the EU's Emissions Trading Scheme (2008-2012) at EUR 2.99 (USD 3.89) a tonne.

7 . S. 64(1) (h) Finance Act 2010.

bogland areas. The government already had difficulties with land-owners about limiting harvest due to requirements to conserve habitat. It is harvested mainly in the poorer regions of Ireland. Households that use coal for heat are often relatively poor, and there is the further complication that it could be imported via Northern Ireland, which does not apply a carbon tax or the full rate of Value Added Tax to domestic energy. (Equity and leakage is addressed later on). While Budget 2010 provided for the application of the tax in principle, to solid fuel, including coal, and peat fuel at a rate of EUR 15 per tonne, the tax was not so applied until the Finance Act of 2012.[8] From May 2013, the tax will apply to coal and peat at a lower rate of EUR 10 per tonne and provisions are for increasing it to EUR 20 a tonne in 2014 (Department of Finance, 2013). The Government was under pressure to introduce it arising from a commitment in the December 2010 Memorandum of Understanding (MoU) with the Troika bailout team (Department of Finance 2010b, p.25).

24. The revenue raised by source of fuel shows that diesel, petrol and natural gas respectively yielded the most tax revenue in 2011:

Figure 1. Carbon tax revenue by fuel
EUR million, 2011



Source: Gargan (2012).

4. Performance features of the Irish carbon tax

4.1 The carbon tax and the fiscal adjustment

25. Ireland's rapid growth between 1992 and 2008 was shaped by two distinct phases. The first phase (1992-2001) was export led, sustainable growth, with the economy growing by an average of 7.8% per year. The second phase (2002-2007), was also a period of rapid growth, but was based on a bubble economy, characterised by easy access to credit, rapid rise in property values, and a transitory flow of unsustainable revenue to government which was used to fund 'permanent' increases in spending. The current phase (2008 to date) is dominated by addressing regulatory and banking failure and action to correct fiscal imbalance.

8 . See Gargan (2012) for further context.

26. The global financial crisis that commenced in 2008 was followed by a domestic crash, which resulted in successive declines (-2.1, -5.5 and -0.8% in GDP in 2008, 2009 and 2010 respectively), a rise in the unemployment rate from 4.6% in 2007 to 14.8% in 2012, and a rise in general government debt as a per cent of GDP from 11.1% in 2007 to 103% in 2012.

Table 4. Some economic indicators
Ireland, 2005-2013

	Real GDP (EUR billion) Base year 2010	Real GDP, % change	Unemployment rate, % of total labour force	General government net debt, % of GDP	Volume of exports of goods and services, % change
2005	153	5.9	4.4	15.8	4.40
2006	162	5.4	4.4	12.1	5.0
2007	170	5.4	4. 6	11.1	8.4
2008	167	-2.1	6.3	24.6	-1.1
2009	158	-5.5	11.8	42.0	-3.8
2010	156	-0.8	13.6	74.7	6.2
2011	159	1.4	14.4	94.9	5.1
2012	159	0.4	14.8	103.0	2.8
2013	162	1.4	14.4	107.6	3.5

Source: IMF (2013)

27. This escalation in debt, combined with other factors, resulted in Ireland's exclusion from international money markets and the request to the European Union (EU) and International Monetary Fund (IMF) in 21 November 2010 for financial support. Agreement was reached in December 2010, the terms of which are included in the EU/IMF Programme of Support for Ireland.[9] The key element in the agreement is to cut expenditure and raise taxes, a process the previous government had already commenced in 2008:

Table 5. Austerity measures and carbon tax
Ireland, 2008-2015, EUR million, current

	Total tax	Income tax	Tax increases	Carbon tax	Carbon tax as % of tax increases	Spending cuts	Total	Cumulative
July 08	40 777	13 177		-	-	1 000	1 000	1 000
Budget 2009	33 043	11 835	3 500	-	-	2 100	4 100	5 100
Supplementary Budget 2009	n.a.	n.a.	3 500	-	-	1 800	5 300	10 400
Budget 2010	31 753	11 276	1 000	246	24.6	3 300	4 300	14 700
Budget 2011	34 027	13 798	1 400	329	23.5	4 000	5 400	20 100
Budget 2012	36 375	15 300	1 600	344[1]	21.5	2 200	3 800	23 900
Budget 2013*			1 250	Tbc	Tbc	2 250	3 500	27 400
Budget 2014*			1 100	Tbc	Tbc	2 000	3 100	30 500
Budget 2015*			700	Tbc	Tbc	1 300	2 000	32 500
Total Adjustments			12 500	Tbc	Tbc	19 950	32 500	

1. EUR 286.75 million for January through October (Gargan, 2012) factored up to 12 months.
*Future planned adjustments.
Sources: Department of Finance (2010a) (2012b) (2012c) and Gargan (2012).

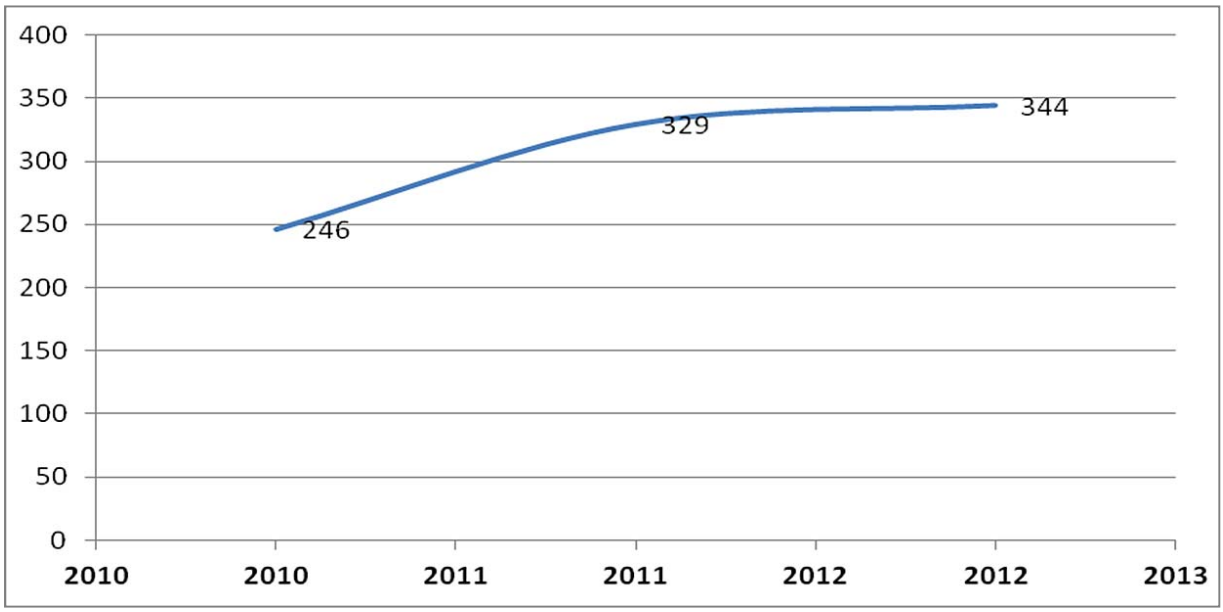
28. It can be seen from Table 5 that total adjustments amounting to EUR 32.5 billion by 2015 are planned, of which (including 2013) EUR 27.4 billion have already been enacted.

9. Available at: www.finance.gov.ie/documents/publications/reports/2011/euimfrevised.pdf. The Troika programme provides up to EUR 85 billion over a three-year period to assist public finance needs and facilitate banking assistance. The package is supported by the European Financial Stabilisation Mechanism (ESFM), the European Financial Stability Facility (EFSF), the International Monetary Fund (IMF) and an Irish contribution through its treasury cash buffer and investments by Ireland's National Pension Reserve Fund (NPRF).

4.2 The significance of the carbon tax for meeting fiscal targets

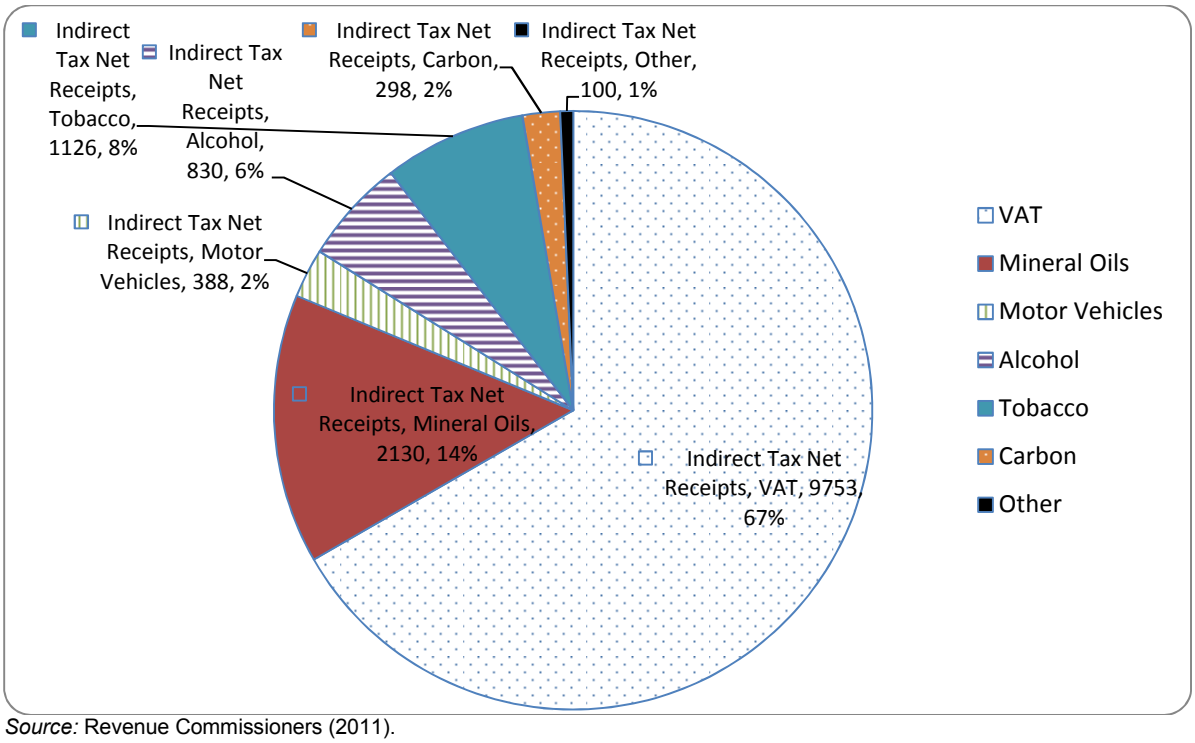
29. The revenue has grown as shown in Figure 2:

Figure 2. Total carbon tax revenue
Ireland, 2010-2012, EUR million



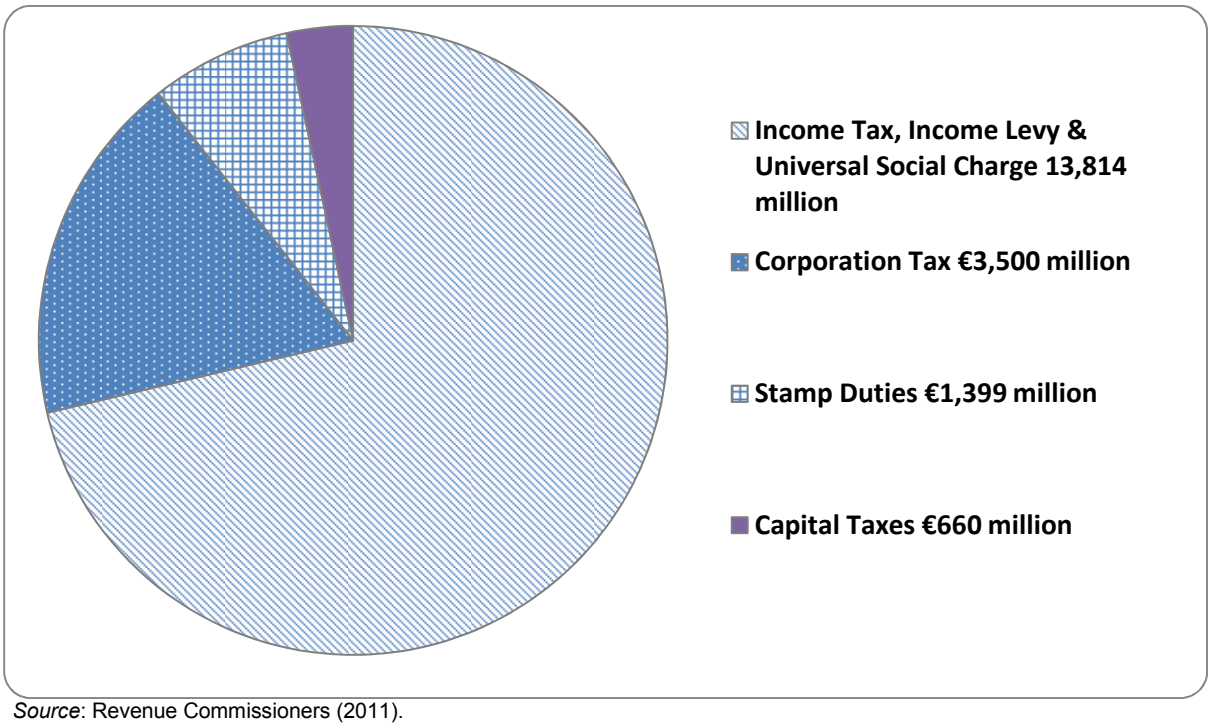
Source: Gargan (2012).

Figure 3. Indirect tax receipts
2011, EUR million



Source: Revenue Commissioners (2011).

Figure 4. Direct and capital taxes
2011, EUR million



Source: Revenue Commissioners (2011).

30. The carbon tax was introduced in 2010. It is clear that the revenue raised makes a relatively small contribution to the total tax take; in 2012, it amounted to just under 1% of the total tax take, and 2.25% of the revenue raised by the income tax. Thus, the scope for the classic form of tax reform – whereby a tax on environmental bads is recycled to reduce labour costs – was modest in scale. However, at the margin, its effect is much more significant. From 2010 to 2012, it contributed between 21.5 and 24.6% of the tax increases required by the Troika. However, the total *cumulative* tax increases required in the 2010 to 2012 period amounted to 7,400 million EUR, while the cumulative carbon tax imposed amount to 919 million EUR, contributing 12.4% of the cumulative total.

4.3 Implication of the carbon tax for competitiveness

31. OECD (2009) concludes as follows: "Corporate taxes are found to be the most harmful for growth, followed by personal income taxes, and then consumption taxes. Recurrent taxes on immovable property appear to have the least impact. A revenue-neutral growth oriented tax reform would, therefore, be to shift part of the revenue base from income taxes to less distortive taxes such as recurrent taxes on immovable property or consumption."[10]

32. Since the economic crash, Ireland has not increased its corporate tax rate, but the tax share from the income of workers and others has risen over the course of the recession. The headline rates have remained unchanged, but tax credits and tax bands have been reduced. A health levy and an income levy, which were eventually combined into the Universal Social Charge (USC) have been introduced, which is essentially a second income tax. For the bulk of workers, the USC currently stands at 7%, meaning for most people income taxes are at least 7% higher than before the recession. On top of this, Pay Related Social Insurance (PRSI) contributions have also been increased.

10 . OECD (2009).

33. Given that taxes had to be raised somehow, it seems plausible that the negative economic impact in terms of jobs and employment would have been more severe if, instead of the carbon tax, income taxes had been raised further, albeit by only 2.5%.

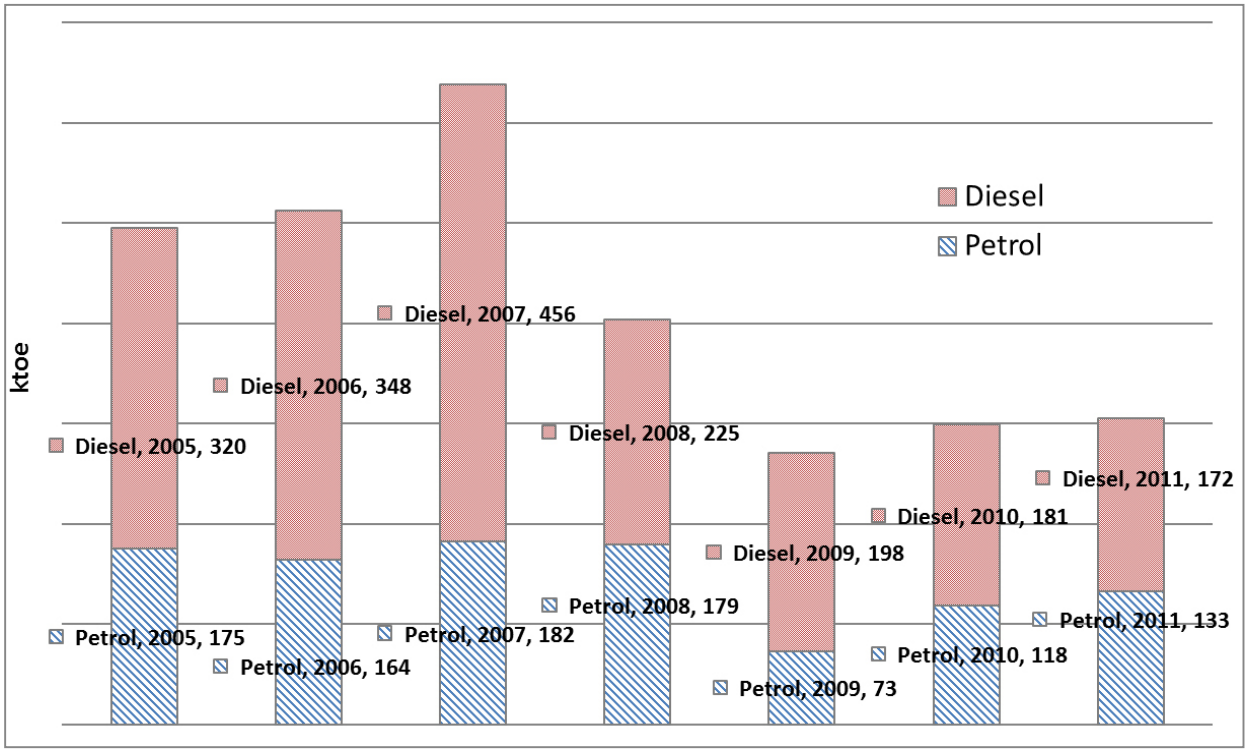
34. The 2009 Commission on Taxation report suggested the carbon tax design should allow for an exemption for companies with legally binding action-based and/or target-based emissions reduction agreements with the Sustainable Energy (Authority) of Ireland (SEAI). SEAI supported this principle for two reasons (Walker, 2010). First, the evidence suggested that agreements-based tax exemptions could achieve enhanced environmental impact, effectively stimulating more emissions abatement than a carbon tax alone could achieve. Second, such exemptions could provide for a more consistent treatment for across both non-ETS and ETS firms. SEAI believed that there was a feasible basis for offering some form of carbon tax rebate or exemption to energy users that were outside of EU ETS. The measure would best be suited to large energy-using installations which fall just below the ETS threshold, rather than on large numbers of small users. Also there was a question of resources available to SEAI should there be a significant increase in demand for agreement participation. In the end, voluntary agreements exemptions were not included in the final design of the tax.

4.4 Revenue leakage – Fuel tourism

35. Ireland shares a land border with the United Kingdom, so if price differences are pronounced between the two jurisdictions, there will be fuel tourism, as vehicle-owners take advantage of the differential to fill up where the fuel is cheaper. For some years, the price differential has favoured the Republic of Ireland, so there was considerable movement from Northern Ireland to take advantage of the cheaper petrol and diesel. It was estimated that in 2005 between 5 and 9% of petrol and up to 20% of diesel sold in Ireland was consumed in other jurisdictions (Northern Ireland and Britain) (Fitzgerald et al., 2008). This estimate is from models, rather than sales figures. The carbon tax was expected to reduce the extent of fuel tourism linked to people travelling across the border between Ireland and Northern Ireland to avail of cheaper petrol in the Republic, as the tax would increase the price of fuel. The ESRI submission to the Commission on Taxation estimated a decline in fuel tourism would result in a reduction in the yield from excise duties of EUR 26 million (Tol et al., 2008). The imposition of carbon tax at EUR 20 per tonne of CO_2 would generate EUR 14 million in revenue for the estimated number of non-residents continuing to buy fuel in the Republic of Ireland.

36. It is clear from Figure 5 that the volume of fuel tourism has declined – fallen by 50% from the peak in 2007 as the differential between prices gets smaller (for example, petrol was approximately 35% cheaper in the Republic of Ireland in 2003, but only 14% cheaper in 2010), but it is clear that the carbon tax has not bridged the gap to the extent of eliminating it. This illustrates that there is scope for further carbon tax increase in the Republic of Ireland, but of course policy in the United Kingdom, and/or changes in the GBP to EUR exchange rate, could alter this.

Figure 5. Fuel tourism in Ireland
1000 tonne oil equivalents

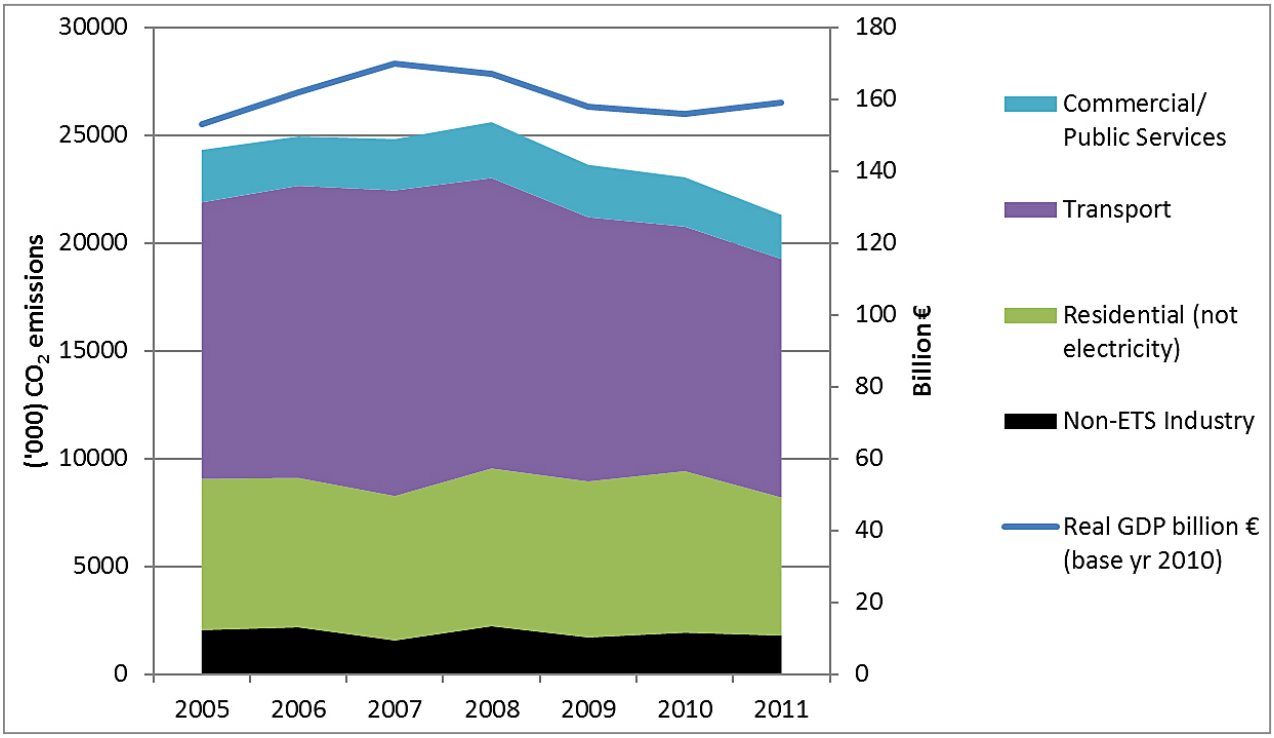


Source: SEAI (2012b), National Energy Balance, 2005-2011.

4.5 Environmental effectiveness

37. Energy consumption and its composition are influenced by many factors, including economic activity and disposable income, weather (especially salient in regard to heating of buildings) and prices. The economic environment in Ireland has been turbulent in the extreme and influences ability and willingness to consume and invest now, but also affects expectations. The weather in 2010 was extremely cold, and this shaped heating behaviour. Finally, independent of the carbon tax, energy prices have been volatile, but generally rising in Ireland since 2009.

Figure 6. Real GDP and CO_2 emissions by sectors subject to carbon tax
EUR billion and 1000 tonnes, not including electricity usage



Sources: SEAI (2012b) and IMF (2013).

Table 6. GDP and CO_2 emissions
EUR billion and 1000 tonnes of CO_2, not including electricity, 2007-2011

	2007	2008	2009	2010	2011
Real GDP, EUR billion, base year 2010	170	167	158	156	159
% change GDP		-2.1	-5.5	-0.8	+1.4
EU ETS total, 1 000 tonnes of CO_2	18 636	18 044	15 684	16 007	14 512
% change EU ETS		-3.2	-13.1	+2.1	-9.3
Non-ETS Industry, 1 000 tonnes of CO_2	1 571	2 231	1 711	1 932	1 796
% change Non-ETS Industry		+42%	-23.3	+12.9	-7
Residential, 1 000 tonnes of CO_2	6 692	7 310	7 230	7 485	6 398
% change residential		-9.2	-1.1	+3.5	-14.5
Transport, 1 000 tonnes of CO_2	14 179	13 472	12 256	11 345	11 062
% change transport		-5	-9	-7.4	-2.5
Commercial/Public Services, 1 000 tonnes of CO_2	2 377	2 594	2 434	2 288	2 050
% change commercial/public services		+9.1	-6.2	-6	-10.4

Sources: SEAI (2012b) and IMF (2013).

4.6 Prices and GDP

38. With only two years of data (except for transport), it is impossible to draw any credible conclusions as to environmental effectiveness, but one can discuss what happened, and the underlying factors, starting first with price:

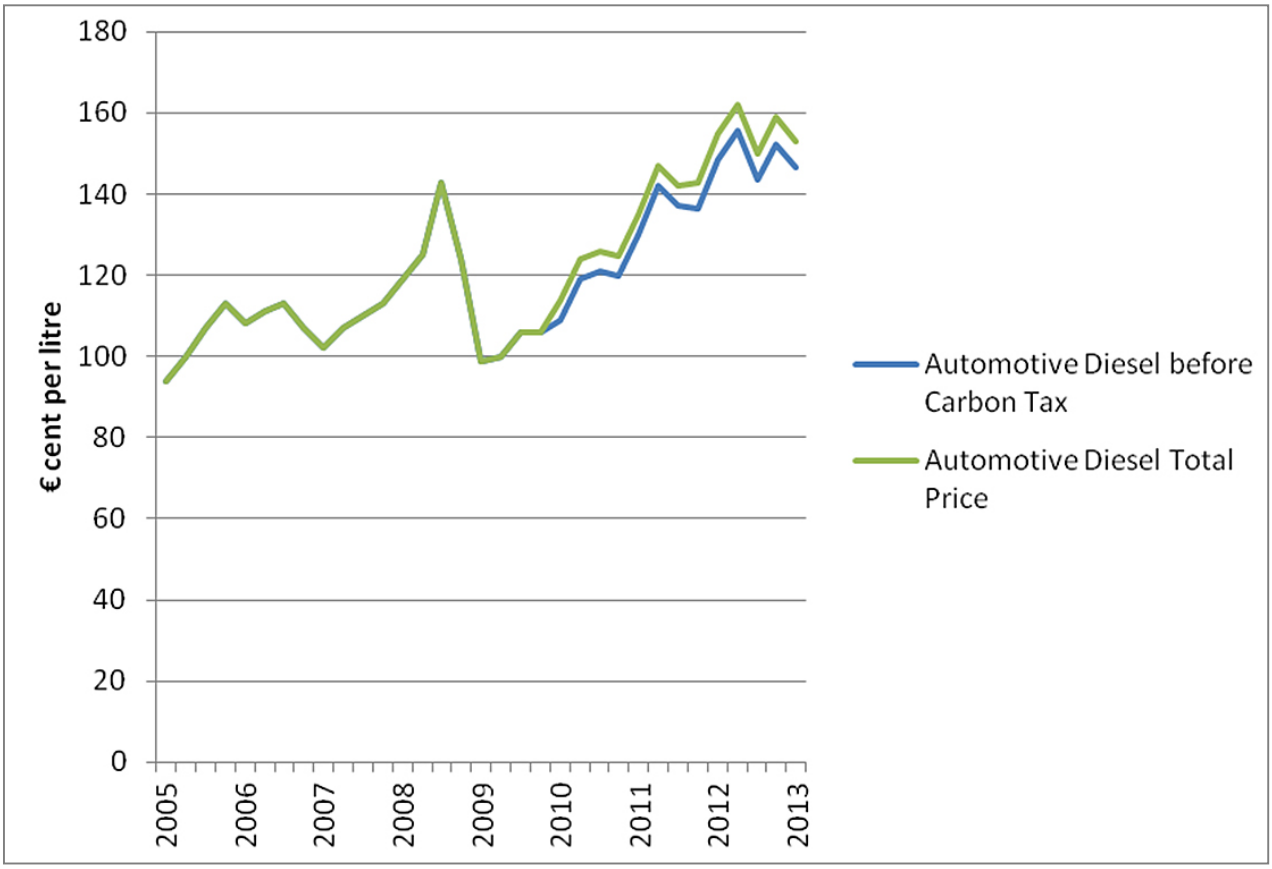
Table 7. Estimated impact on fuel prices of the carbon tax
EUR 20 per tonne CO_2, EUR 10 per tonne CO_2 for coal and peat

Fuel Type	Unit	Pre-tax price in December 2012, EUR	Carbon tax increase (including VAT) EUR	% change in price
Petrol	Litre	1.503	0.056	3.7%
Auto-diesel	Litre	1.454	0.065	4.5%
Kerosene	1 000 litres	880	57.54	6.5%
Marked Gas Oil	1 000 litres	920	62.45	6.8%
LPG	1 000 litres	900	37.30	4.1%
Natural Gas	107 kilocalories GCV	0.068	0.004	5.9%
Coal/Peat	Tonne	365	29.90	8.2%
Peat	Bale	3.9	0.26	6.7%

Sources: Irish Statute Book. Finance Acts, 2010, 2011, 2012; SEAI (2012c).

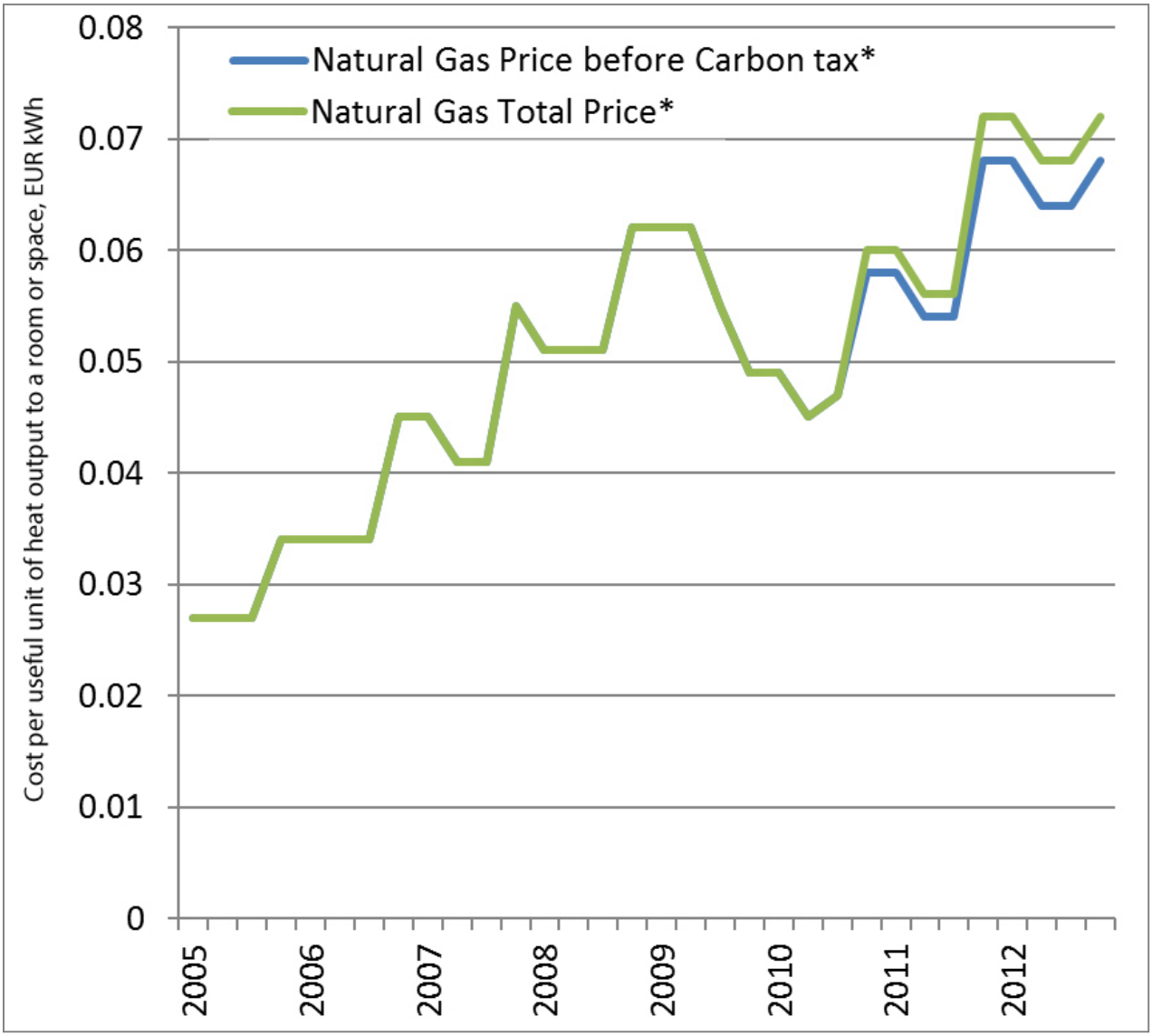
39. It is clear that even at the low rate of EUR 10 per tonne which applies to coal and peat, the carbon tax has a relatively significant upward influence on the price of peat and coal for heating. It provides some incentive to shift from these fuels to wood; a trend that anecdotal observation indicates is already underway. For diesel and natural gas, the carbon tax wedge is relatively modest, and fuel price effects are likely to be more significant in shaping consumption.

Figure 7. Price of Automotive Diesel before and after carbon tax
EUR-cents per litre



Source: www.pumps.ie, 2012; Department of Finance 2010(a), 2012.

Figure 8. Price per unit for natural gas before and after carbon tax
Cost per useful unit of heat output to a room or space, EUR per kWh



Source: SEAI (2012c), Department of Finance (2010(a)), (2012).

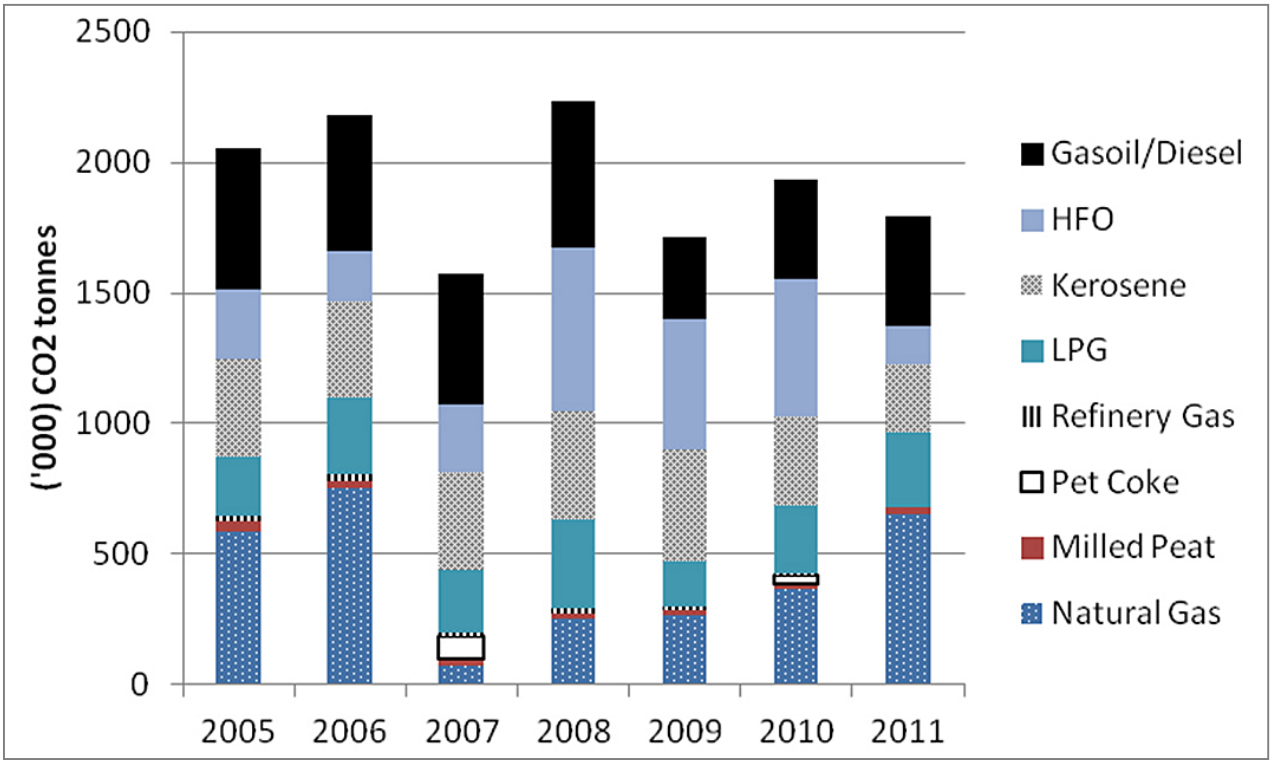
40. The sharp decline in GDP since 2008 has already been noted, with successive declines of -2.11%, -5.46% and -0.77% in 2008, 2009 and 2010 respectively, before some modest recovery in 2011 (+1.43%) and 2012 (0.35%) respectively.

41. Some insight can be offered from a review of sectoral performance.

Industry

42. The National Energy Balance (SEAI, 2012b) was used to estimate the industry emissions by year and fuel type. The ETS emissions were subtracted from the total fuel for a given year, as were the transport, residential, public sector and agriculture where appropriate.

Figure 9. Industry emissions per fuel type per year, not including electricity
1 000 tonnes of CO_2



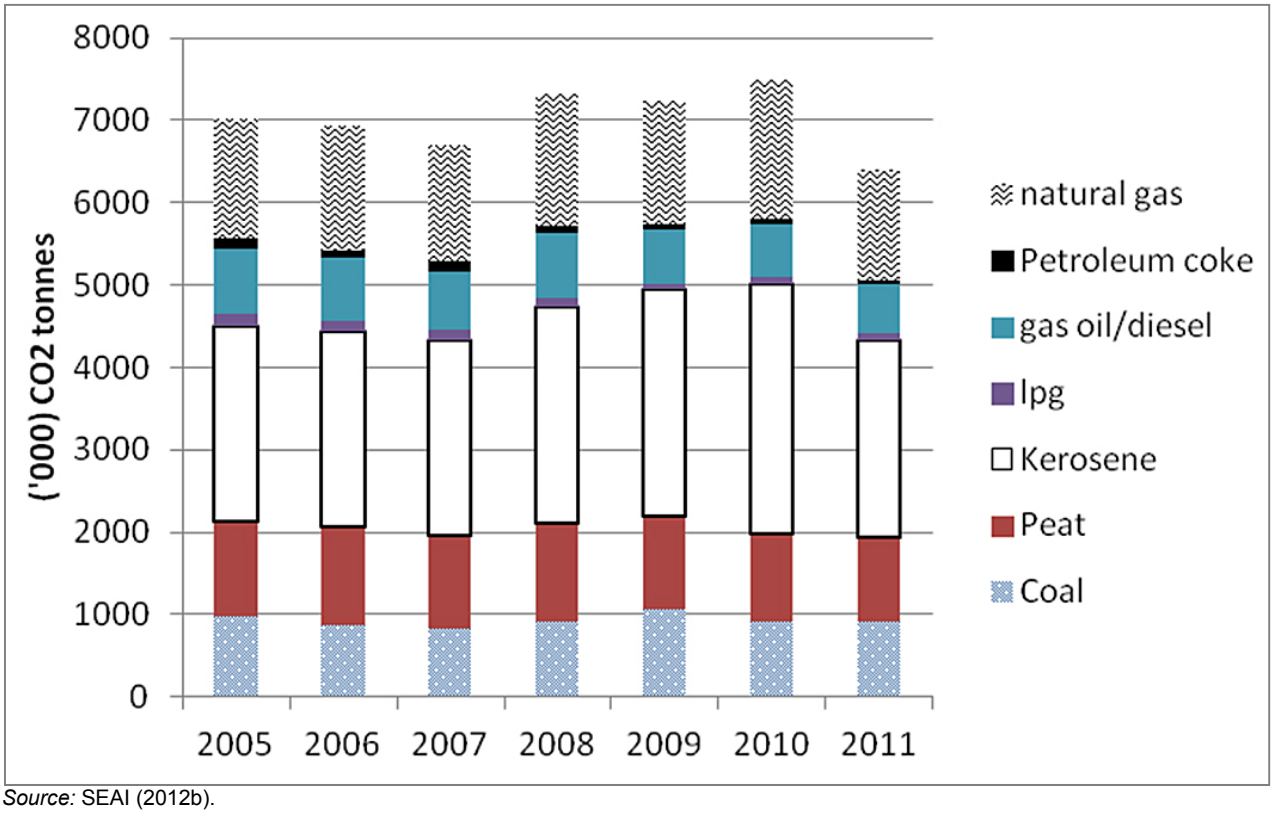
Source: SEAI (2012b), ETS emissions from personal communication with Paul Duffy, EPA.

43. Non-ETS (NETS) industry emissions rose slightly in 2010 and lowered in 2011. However, energy-related CO_2 emissions in 2011 in sectors not included in EU emissions trading (non-ETS) in 2011 were 16% below 2005 levels. Ireland's target is to achieve a 20% reduction in total non-ETS GHG emissions by 2020 (SEAI, 2012a).

Residential

44. CO_2 emissions from the residential sector (not including electricity) went up slightly in 2010 and down by 14% in 2011. When corrected for weather, energy consumption per household was 4.4% lower in 2011 than in 2010. During the period 1990-2011, residential final energy use grew by 26% (1.1% per year) to a figure of 2 836 ktoe in real terms. Corrected for weather, the growth was 19%. During this time, the number of households in the State increased by 64%, from approximately 1.0 million to 1.65 million. During 2011, residential energy use decreased by 13%. However, 2011 was significantly milder than 2010 and when corrections for weather effects were taken into account, there was a decrease of 2.2% overall in residential energy use (SEAI, 2012a, page 5).

Figure 10. Residential CO_2 emissions per fuel type per year, not including electricity
1 000 tonnes of CO_2



Source: SEAI (2012b).

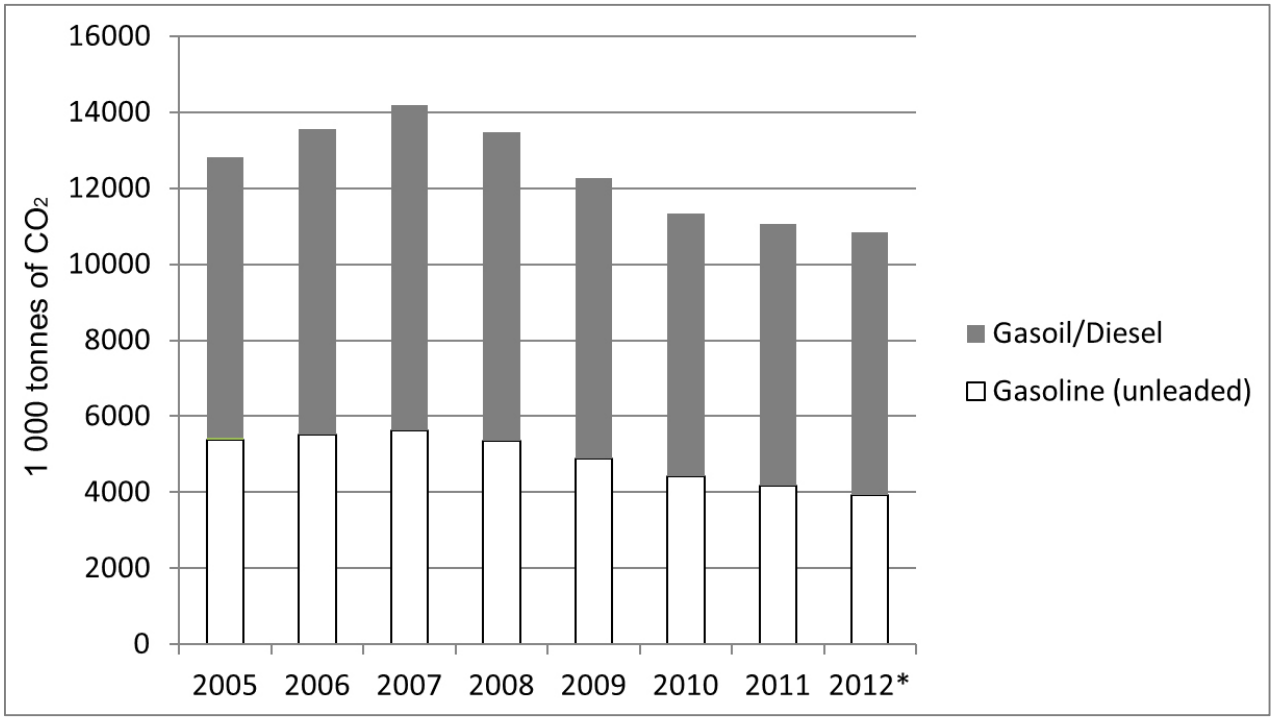
Transport

45. In July 2008 (prior to the introduction of the carbon tax), the Irish government changed both the vehicle taxation (VRT) and annual motor tax systems and shifted the basis of taxation from engine size to level of CO_2 emissions, with seven emission bands. VRT is now charged as a percentage of Open Market Selling Price (OMSP) and per emissions per kilometre. The percentage of new private cars purchased that fell into the lower 3 emissions bands (emissions below 155 CO_2 gram per km) rose from 44% in the first half of 2008 to 92% in July 2012 (SEAI, 2012).

46. The average specific emissions from new passenger cars purchased in Ireland in 2011 were 128 gram CO_2 per km, down from 164 gram CO_2 per km in 2007. This has already met the target of 130 gram CO_2 per km, set by the EU Directive (443/2009) for 2015 (SEAI, 2012). The number of cars on the road peaked in 2008, but has been falling since. The 1.2 to 1.5 litre engine size has the largest share of private cars – 37% of the total in 2011.

47. Transport energy consumption in 2011 was 4.4 Mtoe, representing a 23% reduction on 2007 levels, including a 42% reduction in energy use for freight transport (SEAI, 2012).

Figure 11. Emissions of CO_2 from the transport sector
1 000 tonnes of CO_2



*2012 data from Department of Finance revenue clearances; figures converted to CO_2 emissions per Martin Howley/SEAI data (personal communication).
Source: SEAI (2012b).

4.7 Tentative conclusions

48. Some of the data can be summarised as follows:

Table 8. Real GDP and CO_2 emissions from the residential and transport sectors
EUR billion and million tonnes of CO_2, 2007-2011

	2007	2008	2009	2010	2011
Real GDP, EUR billion	170	167	158	156	159
Residential emissions, million tonnes of CO_2	6.88	7.48	7.44	7.81	6.59
Transport emissions, million tonnes of CO_2	14.48	13.74	12.52	11.60	11.23
Industrial & Commercial (Non-ETS)	6.69	7.31	7.23	7.49	6.4

Source: EPA (2012), SEAI (2012)

49. The most one can say is that one cannot reject the hypothesis that the carbon tax has had some influence on emissions given the very short time the tax has been in place.

5. Equity and related issues

50. A fuel poor household in the UK was defined by the UK government as "one which needs to spend more than 10% of its income on all fuel use and to heat its home to an adequate standard of warmth".[11] In 2005, it was estimated that 15% of Irish households spent over 10% of their income on energy and this was expected to rise to 19% of households in 2010 (due to energy prices rising faster than incomes) (Tol et al., 2008). A carbon tax was expected to be regressive [(Scott and Eakins/EPA (2004),

11 . www.energy-uk.org.uk/policy/fuel-poverty.html.

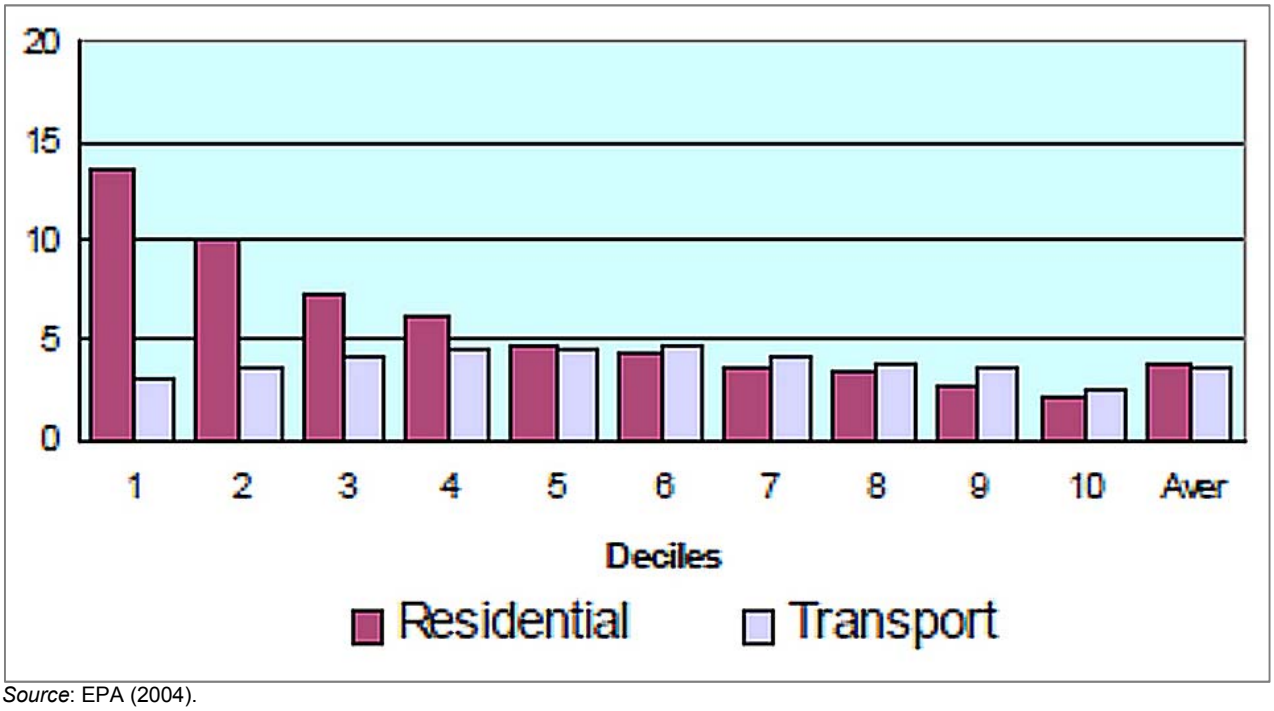
Tol (2008), Combat Poverty Agency (2003), Social Justice Ireland (2012)]. Estimates suggest that 317 000 households experienced energy poverty in Ireland in 2009 or 20.5% of all households (Department of Communications, Energy and Natural Resources, 2011).

5.1 Ex ante *analyses*

51. Studies by the Economic and Social Research Institute (ESRI) on the distributional impact of the tax in Ireland were carried out prior to its introduction in 2010. They showed that there were likely to be some regressive impacts, across different income groups, and between urban and rural households. Indeed many submissions to the Commission on Taxation referred to this issue and were concerned about the impact of the tax, particularly for those on lower incomes (Society of St. Vincent de Paul, 2008).

52. The Irish EPA commissioned research by Scott and Eakins to examine which households could be expected to gain and lose out due to a carbon tax (EPA, 2004). Using the Household Budget Survey (HBS) of 1999-2000 (CSO, 2002) they assessed the possible 'first round', or most visible, effects of a carbon tax of EUR 20 per tonne of CO_2. Taking household spending on carbon tax as a percentage of disposable income it was found that the average spending per year would be EUR 246, with a wide variation between the income deciles[12] from EUR 186 in the lower to EUR 305 in the higher deciles. Examining the split of the tax between residential and transport fuel use, in terms of disposable income, it was found that those in the lower income deciles bore more of the share of the impact than those with more disposable income and in fact, the effect was "steeper than the relative shares of fuel expenditure" because the fuels used by the lower deciles in Ireland are more carbon intensive (coal, peat and turf).

Figure 12. Expenditure on residential and transport fuels in per cent of household income

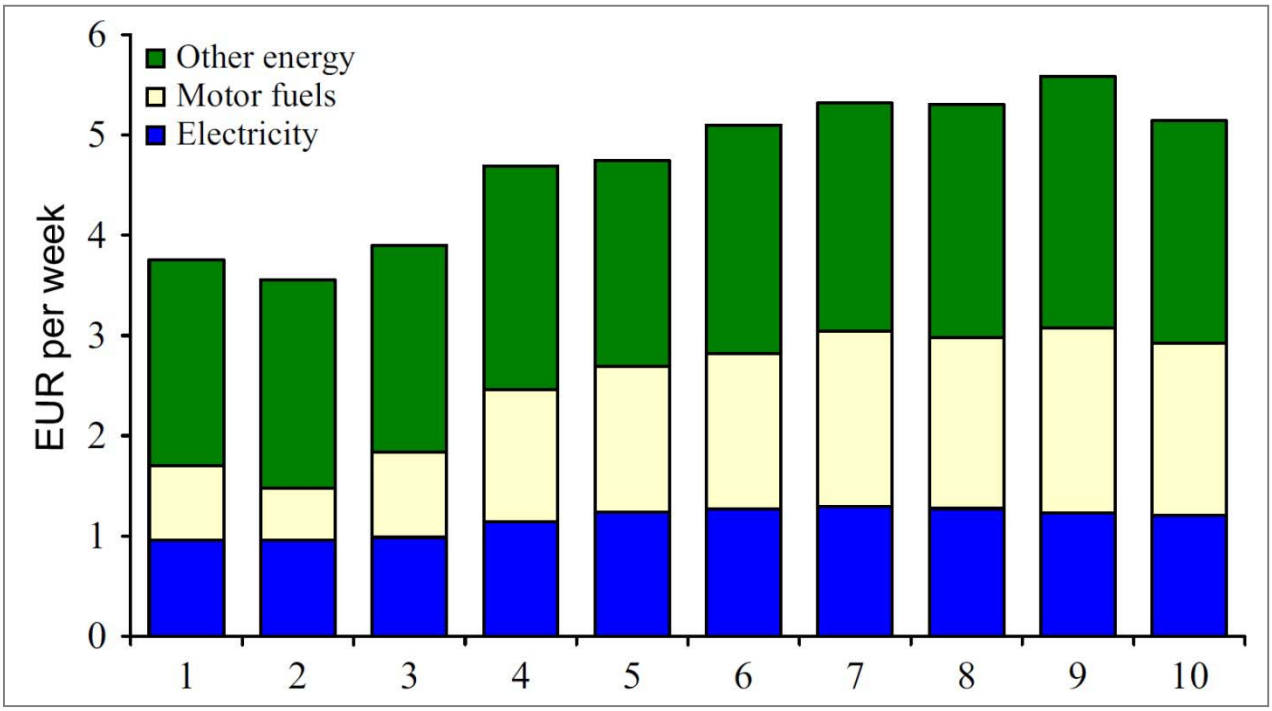


Source: EPA (2004).

12 . Income deciles represent the population of households' equivalent gross income, divided evenly into ten groups (deciles), ranked in ascending order. Each decile has 10% of the population. See www.stat.fi/meta/kas/desiiliryhmat_e_en.html.

53. A further study using the HBS for 2004/2005 found that the richest households, having eight times the disposable income of lower deciles, emitted 37% more carbon dioxide than the poorest – see Tol et al. (2008) and Callan et al. (2009). Transport fuel consumption data for the same period showed that the higher deciles used 132% more fuel than the bottom. It was found, however, that the difference between the top and bottom deciles for electricity consumption was lower, at 26%; and for home heating (other than electricity), the distribution was flatter, with the top decile using only 8% more than the bottom, suggesting there would be a more regressive impact in terms of applying a tax to natural gas, peat and coal home heating fuels.

Figure 13. Impact per household per week of a EUR 20 per tonne CO_2 carbon tax
By income decile, split between electricity, motor fuels and other energy.

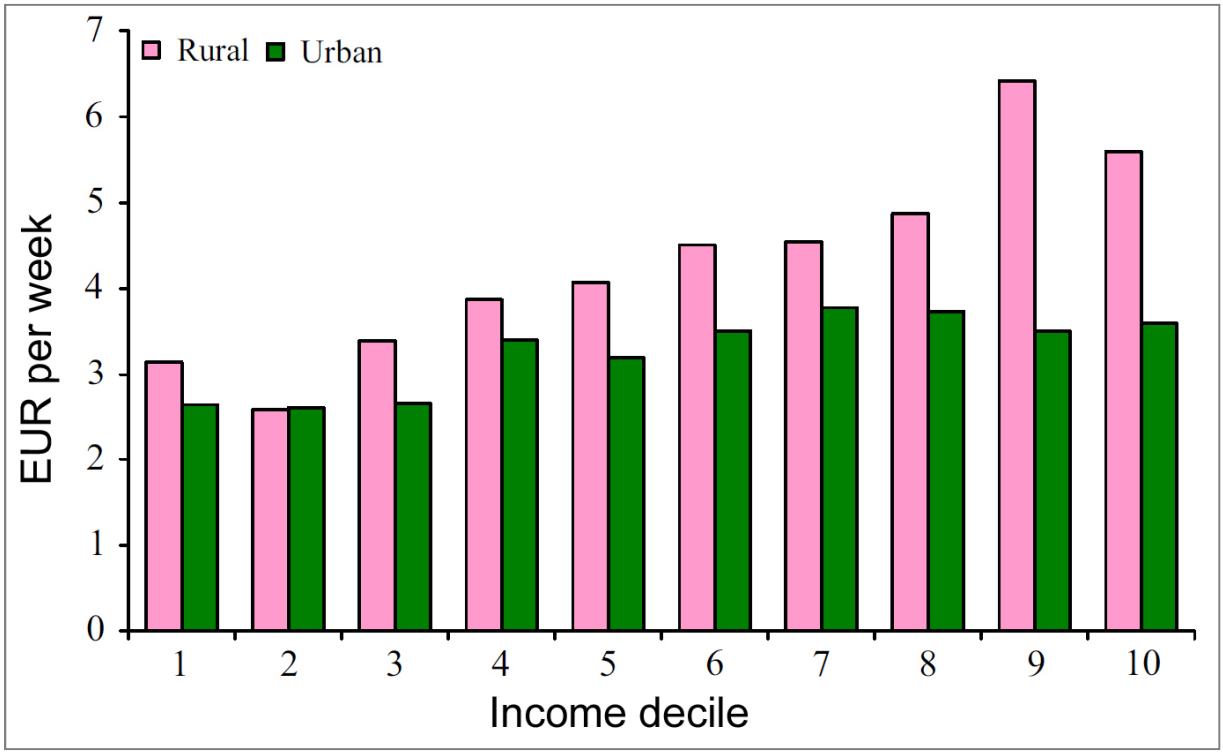


Source: Tol et al. (2008) and Callan et al. (2009).

54. The distributional impact of the tax between urban and rural households was also considered by the ESRI in 2008 and 2009, using the HBS for 2004/2005, with a tax rate of EUR 20 per tonne of CO_2. It was found that rural households spend more per week on non-electric fuels,[13] with lower income deciles spending proportionately more than the higher groups. Tol et al. (2008) outlined that Irish rural dwellers tend to live in larger housing units, in locations where public transport may be limited and therefore rural households will inherently have more carbon intensive energy usage. Scott and Eakins for the EPA (2004) also concluded that those on middle incomes in rural or outlying areas (deciles 4, 5, 6) would be most impacted by a carbon transport tax, as transport fuels as a share of disposable income was highest for this group. This is to be expected as the growth of an expanded commuter belt makes carbon tax regressive for those dependent on private transport for work, where limited alternative public transport services are available, particularly beyond the Greater Dublin Area (GDA).

13 . Ireland's electricity sector participates in the EU ETS since 2005 and therefore is excluded from the carbon tax.

Figure 14. Estimated impact of a EUR 20 per tonne CO_2 carbon tax per income decile,
EUR per household per week, split between urban and rural households, non-electric energy only



Source: Tol et al. (2008).

5.2 Some options for addressing equity issues

55. Given the likelihood that poorer households would be more adversely affected than more well off homes, what policies should be employed to mitigate these effects? Investigations into the options of compensation were also carried out as part of the various studies mentioned. The research work considered combinations of the following:

- measures for compensation at the household level [Scott and Eakins/EPA (2004) and Conefrey (2012)];
- at tax and welfare level [Tol et al. (2008) and Callan et al. (2009)];
- and government debt reduction [Conefrey et al. (2012)].

56. Scott and Eakins (2004) targeted the re-cycling of revenues at the household, rather than individual level, as it was found that although energy spending decreases per head (as household size increases), the decline was not as steep for home-heating fuels. One of the principles underlying their model was that the tax should be 'energy neutral', i.e. it should not be used to support fuel consumption (e.g. free fuel) or distort the price of fuel. Targeting low-income households and using the annual average equivalent household carbon consumption price of EUR 246 as the compensation; their proposal tested the use of a choice-based model (a) by either extending the fuel allowance scheme or (b) income tax reduction, depending on eligibility or capture, at the rate of compensation. The model applied a tapered approach to allow for fairness of distribution across income deciles, with the amount of compensation adjusted accordingly. The results showed that 90% of households in the first five deciles benefitted through welfare/fuel allowance compensation, with middle incomes paying little net carbon tax and high income households gaining little or nothing.

Table 9. Net carbon tax paid after compensation and coverage across income deciles
EUR

	Households income deciles									
	1	2	3	4	5	6	7	8	9	10
Households in receipt of social-welfare benefits (including those also paying tax)										
Net carbon tax after compensation	-92	-65	-38	-32	-14	16	24	75	100	156
Coverage of all households	86	85	72	55	43	30	27	23	20	14
Households paying income tax (but not in receipt of social-welfare benefits)										
Net carbon tax after compensation	30	20	0.39	0.13	48	134	210	273	289	326
Coverage of all households	4	6	16	35	51	66	70	75	79	85
Households in receipt of social-welfare benefits or paying income tax										
Net carbon tax after compensation	-87	-58	-38	-25	20	97	158	227	250	302
Coverage of all households	90	91	88	90	94	96	97	98	99	99

Source: Scott and Eakins (2004).

57. Tol et al. (2008) in the ESRI's submission to the Commission on Taxation (2009) outlined several alternative ways to use the tax revenue, envisaged to be EUR 500 million per year. Looking at the how the tax might impact on the macro-economy using the *HERMES* model, they advised against hypothecating the tax, other than to reduce income tax or pay-related insurance, so as to help reduce wage costs in Ireland, which at the time was affecting Ireland's competitiveness. The ESRI Mid-Term Review 2008/2015 (FitzGerald et al., 2008) tested for a carbon price of carbon at EUR 20 per tonne of CO_2 in 2010, rising to EUR 38 per tonne of CO_2 in 2020, and found that the impact of reducing taxes would balance out any drag on the economy due to higher energy costs, as labour costs are a relatively high component of production costs in Ireland. Tol's model found that a carbon tax, used to reduce income tax, would lead to a slight growth in the economy, with GNP 1.1% higher in 2020. It was suggested the tax revenue should be allocated to a combination of increasing benefits (25%), and to lowering income tax (40%), and lowering Pay Related Social Insurance (PRSI) (35%).

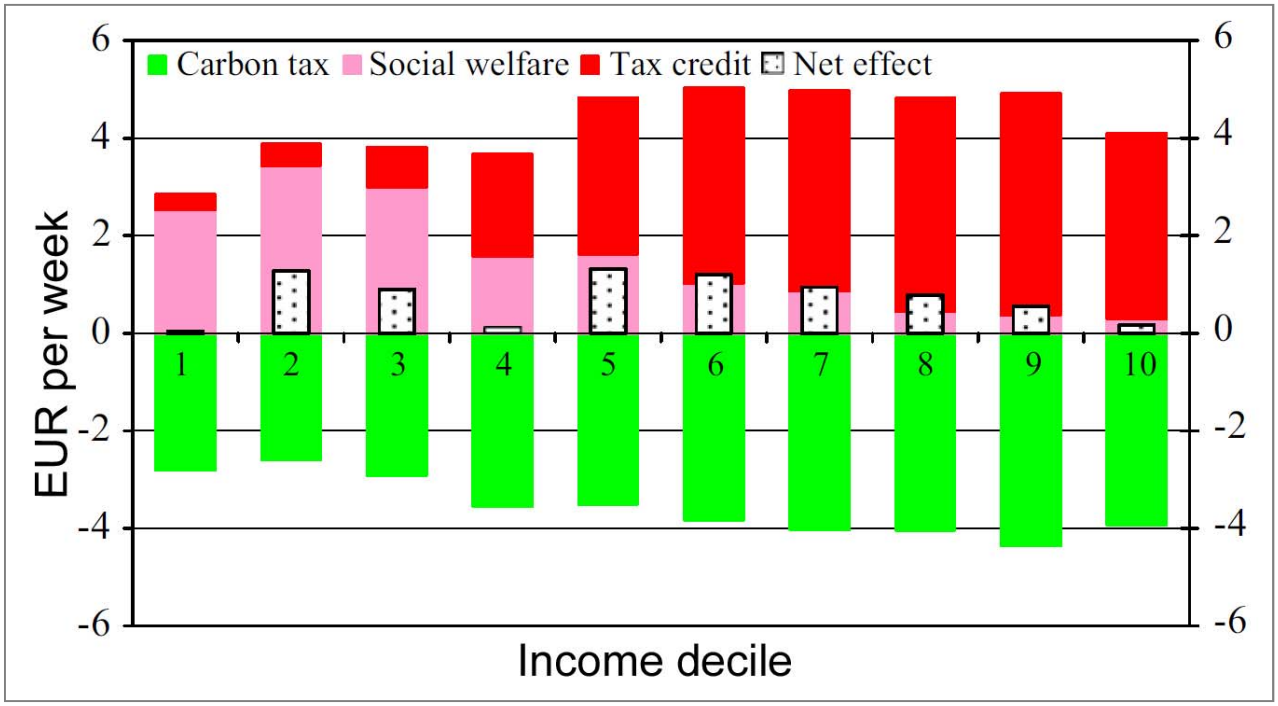
Table 10. Effects of carbon tax recycling scenarios on GNP, output and employment and emissions,
Per cent of 2020 value without a carbon tax

	GNP	Private sector	Employment	CO_2
Income tax	1.11	1.17	1.06	-1.23
Social insurance	1.12	1.17	1.07	-1.25
Lump sum	0.27	0.01	0.04	-1.58
Debt Reduction	0.09	-0.28	-0.11	-1.73
Health education	1.28	-0.20	1.53	-1.36
Permits	-0.12	-0.29	-0.12	-1.77

Source: Tol et al. (2008).

58. Callan et al. (2009) looked at a similar proposal to decrease income tax and include welfare increases through various interventions. Using the *SWITCH* model of direct taxes and welfare payments, based on the Irish CSO/EU Survey of Income and Living Conditions (SILC), it was found that the increases in benefits, tax credits or lowering tax rates benefitted all income deciles, but less so for deciles 1, 4 and 10. Only by extending the welfare allowances were the gains more evenly distributed (Figure 14).

Figure 15. Effect of carbon tax with social welfare or tax credit increase, per income decile
Net effect, EUR per household per week



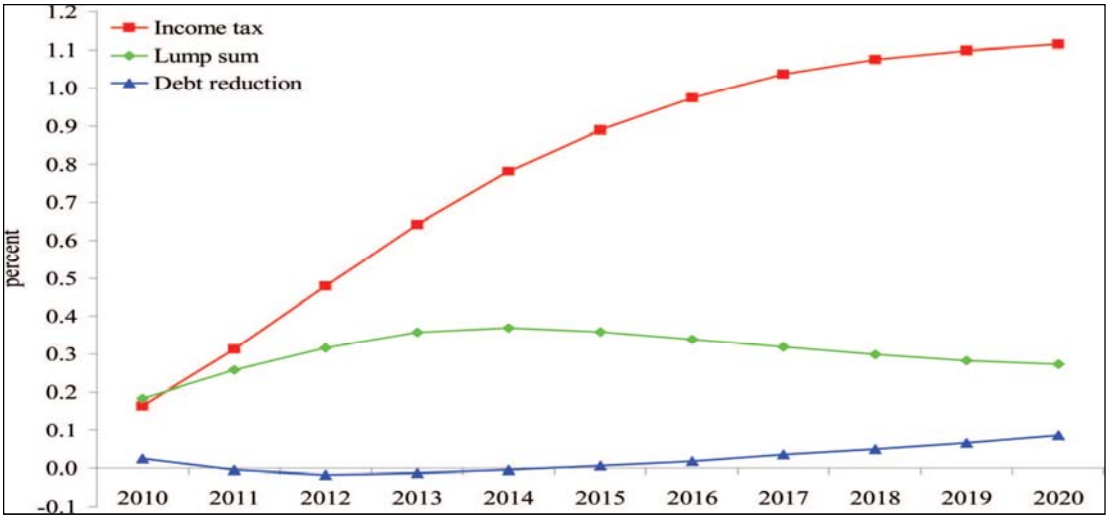
Source: Callan et al. (2009).

59. More recent work by Conefrey et al. (2012), taking 2005 as the baseline year with the tax at EUR 20 per tonne of CO_2 and using the *HERMES* model and National Income and Expenditure Accounts (CSO, 2006), looked at three possible options for revenue recycling of the carbon tax yields:

1. Lump sum transfer to residents;
2. Reduce government debt interest payments abroad;
3. Reduce the income tax.

60. Their findings are summarised in Figure 16. Reducing government debt is estimated to have a negligible effect on GDP, while lump sum transfers have a positive impact, reducing income tax shows the greatest economic growth potential, resulting in an increase of over 1% by 2020.

Figure 16. Effects of three alternative tax reform proposals on GDP



Source: Conefrey et al., 2012

5.3 What happened?

61. Given the extensive literature on what could and should be done, what has happened? Was the tax implemented fairly, were measures put in place to ease the burden of the tax? Was it used to support the economy by lowering personal taxes?

Pre-carbon tax measures

62. Prior to the introduction of the carbon tax in 2010 there were a number of schemes in place to tackle fuel and energy poverty of low-income householders – a Warmer Homes scheme (fuel poverty), delivered by community organisations, and a Home Energy Savings (retrofit grant) Scheme. After the first year of the Green/Fianna Fail coalition government, in 2009, the budget for the Home Energy Savings (HES) scheme was increased significantly. Announced as a Climate Change measure in the budget for 2009, the allocation for the HES grew by EUR 15 million to EUR 20 million (Department of Finance, 2008)). The Warmer Homes scheme was also allocated EUR 5 million at this time and has funded over 50 347 upgrades since 2007 (Houses of the Oireachtas, 2010a)

63. In 2009, the National Fuel Allowance Scheme, which provides a payment to help with the cost of home heating[14] to those dependent on long-term social welfare, was extended (Department of Social Protection, 2009). Fuel allowances were increased by EUR 2 to EUR 20 per week (January 2009), and the duration of payment of the scheme was also extended by 2 weeks to 32 weeks (April 2009).

14 . Details available at: www.citizensinformation.ie/en/social_welfare/social_welfare_payments/extra_social_welfare_benefits/fuel_allowance.html.

Post carbon tax measures

64. The tax was announced for Budget 2010 (Department of Finance, 2010a). The budget statement states that "A vouched fuel allowance scheme will be developed to offset the increases for low income families dependent on such fuels" (coal and peat) to alleviate fuel poverty (Department of Finance, 2009).[15] According to the budget statement "The yield from the Carbon Tax will be used to boost energy efficiency, to support rural transport and to alleviate fuel poverty. The Carbon Tax will also allow us to maintain or reduce payroll taxes" (Department of Finance, 2009). While there was no hypothecation, the added revenue enabled the government to justify additional expenditures on these programmes.[16]

65. The Minister for Finance also took concrete action to address some of the equity and energy poverty issues associated with the introduction of the tax. "The key priority will be to fund sustainable energy programmes for which €98m will be available – including €50 million from the proceeds of the Carbon Tax" (Department of Finance, 2010a). These programmes would be overseen by a new National Energy Efficiency Retrofit Programme. This would assume responsibility for both the Warmer Homes Scheme and the HES. The budgets for both schemes were also increased during this time (Warmer Home Scheme EUR 12 million) and the HES (EUR 28 million) cf. Department of Finance (2010a).

66. In July 2010, the new National Retrofit programme was established to meet the obligations of the EU Energy Use Efficiency and Energy Services Directive (ESD) and Ireland's National Energy Efficiency Action Plan (NEEAP) (Department of Communications, Energy and Natural Resources (DCENR), National RetroFit Consultation 2009). The Programme, covering both home schemes, targets 1 million residential, public and commercial buildings to reduce energy consumption. The Retrofit programme also included a new Energy Efficiency Fund for the roll-out of discounted energy services by energy companies to the public and was to be "closely associated with the carbon tax, thus securing a positive correlation between the tax and opportunities to mitigate its impact" (Department of Communications, Energy and Natural Resources, 2009). EUR 115 million has been spent to date on retrofit (Sustainable Energy Ireland, 2013) which has a clear focus on supporting domestic energy efficiency: 75% of its funding is earmarked for the domestic sector; 40% of which is allocated to energy poverty measures, with the reminder for public sector efficiencies. This portfolio continues.

67. The Department of Social and Family affairs, in its submission to the Commission on Taxation in 2009, anticipated that the carbon tax would increase heating costs and thus would have implications for its budget in two respects (Department of Social and Family Affairs, 2009):

1. There would be an increase in the cost of schemes such as free electricity allowance where claimants receive the allowance by way of unit allocation and the Department directly pays utilities for the units used.
2. There would be pressure to introduce a scheme to compensate low income families for the cost of increased heating costs.

68. As anticipated, costs for fuel-related assistance in Ireland indeed increased since the introduction of the tax and the Department of Social Protection took action to reduce it. In announcing the social protection spend of EUR 20.5 billion for Budget 2012, the new Minister for Social Protection, Joan Burton, described the National Fuel Allowance scheme as "unsustainable", citing a 200% increase in the costs between 2005 and 2011, with costs rising from EUR 82 million to EUR 250 million (Department of

15 . The Vouched Fuel Allowance Scheme was to be linked only to the carbon levy as it applied to solid fuels (coal and peat) and was delayed because these fuels never became subject to the tax until 2013 (Houses the Oireachtas, 2010b).

16 . Personal communication from the Department of Finance, 2013.

Social Protection, 2011). The duration of the scheme as it applies in 2013 has since been cut from 32 to 26 weeks. At present (March 2013), the rate is EUR 20 per week, or EUR 520 in total. Only one Fuel Allowance is paid to a household.

Green shoots

69. The carbon tax was intended to induce a 'double-dividend', whereby the instrument would support both environmental and economic gains. For Ireland, the economic crisis erupted just as the tax was put in place, so the economic gains will be few and far between. There has been some discussion on the benefit and merits of the Retrofit Programme, the only visible economic dividend available, with employment estimates ranging from 5 000 IIEA/SEAI, 2011) to 30,000 (IIEA, 2009).[17] While this programme comes under the new government's *Jobs Initiative*[18] and has helped to provide work for the decimated Irish construction sector, the evidence does not suggest any additional employment dividend; rather it is providing employment to those who would otherwise be out of work.

5.4 Discussion on equity

70. As unemployment has risen and incomes have fallen, the demands for the fuel allowances has risen dramatically, playing the classic role of social stabiliser, helping vulnerable people through hard times. But this runs directly counter to the imperative to cut public expenditure, and so the period to which it applies has been reduced. In terms of implications for keeping warm, the impacts of this are very weather dependent.

71. As regards the double dividend, it is reassuring that, even with a very open economy, the Irish studies show that recycling of the revenues to reduce taxes on labour does seem likely to produce a modest increase in output. However, two interesting questions arise: Is this finding symmetric where the carbon tax *prevents an increase* in taxes on employment, which is the current Irish situation? Secondly, what are the implications for government income? The latter is the dominant consideration for governments of all economies under structural adjustment, and needs to be addressed. It is notable that while some of the modelling indicated that reducing the public debt was the least attractive alternative, this imperative dominates in terms of the real politick facing the government. As regards the subsidies for insulation, they have made an important contribution in both improving the energy efficiency of the older housing stock, and in generating an energy efficiency business.[19] The focus now is on developing a funding model that will sustain the activity without continued support from the Exchequer.

72. Looking ahead, the pressure on low-income households will increase as the carbon tax applied to coal and peat, takes effect.[20] In the event of a sustained period of cold weather – such as was experienced in 2010 – the pressure to intervene will intensify. There will be some income generated by the sale of allowances to the electricity sector under the EU ETS, but at current allowance prices (at the time of

17 . These are costs funded by the Exchequer, but it is likely that the shadow price of labour in Ireland for construction workers is very low at present.

18 . In May 2011, the National Retrofit Programme, including Warmer Homes Scheme, Home Energy Saving Scheme and the Greener Homes Scheme, were subsumed into the Better Energy: the National Upgrade Programme, as part of the new government' Jobs Initiative (DCENR). www.dcenr.gov.ie/Energy/Energy+Efficiency+and+Affordability+Division/Better+Energy.htm.

19 . An important rationale for the carbon tax at the time of its introduction was its potential role in stimulating enterprise and innovation in the 'green economy'.

20 . The government were required to extend the carbon tax to these fuels under the MoU with the Troika (*Ibid.* Department of Finance 2010a).

writing, about EUR 3 per tonne CO_2) and with emissions of the order of 10 million tonnes, this will only yield in the order of EUR 30 million. There is likely to be pressure to extend the carbon tax to the sectors in EU ETS – and notably electricity – if there is no recovery in the allowance price. Callan's work (Callan, 2009) implies that a tax on electricity is less regressive than a tax on heating fuels.

6. Some conclusions and lessons

6.1 Why did it happen in Ireland?

73. There are a number of political circumstances evident that resulted in a carbon tax being proposed and subsequently introduced in Ireland:

- Leadership by the Green Party: From 2007 to 2011 (March), the country had a coalition government which included the Green Party, for which a carbon tax was a priority.

- Limited public opposition: Since 2008, the public have been experiencing economic and financial trauma at several levels – rising unemployment, increasing direct and indirect taxes, wages falling sharply in the public and private sectors, reductions in the quality and extent of public services, and dysfunctional banks. The carbon tax is just a little more noise in a cacophony of bad news.

- Government need for the income. Raising taxes is a requirement of the Troika programme, and these must be met if financial support is to continue and if Ireland is to exit from the bailout programme – the target is to exit this programme by end 2013.

- Support for a 'green' economy: Ireland has been promoting a framework of transitioning to a 'Smart Economy' (Department of the Taoiseach, 2008). This includes a set of environmental goals, including putting the climate and energy agenda at the centre of Ireland's economic revival, moving to a low-carbon economy and radically enhancing energy efficiency

- Support from the academic and wider policy community: There have been good statistics, modelling and forecasting available to government from various think tanks, researchers and NGOs as well as an increasing consensus amongst commentators that the polluter pays principle is an important aspect of dealing with environmental problems.

- Removal from the policy pitch of the main business and farming opponents: The tax does not apply to large emitters in the enterprise sector, many of whom are privately owned companies participating in the EU ETS; they led the business opposition to the earlier (failed) carbon tax proposals. The farming lobby is extremely influential in Ireland. Because the tax only applies to CO_2, and their sector's emissions are mainly methane and nitrous oxide, they are largely exempt. It is notable that they have nevertheless secured reduced rates and exemptions to the tax that does apply to their fuel use.

- Effective engagement and good planning: The lengthy and detailed stakeholder consultation process that the 2009 Commission on Taxation undertook resulted in this new tax being better thought-out, more politically acceptable and nuanced than it would have been without this process.

6.2 Implications for other countries in fiscal crisis considering introducing a carbon tax

74. It is difficult, and dangerous, to draw generalisable conclusions for other countries from one small case study. Every country's culture and circumstances are particular and unique. So the suggestions below are very tentatively advanced:

1. Crisis does indeed create opportunity; and the more severe, the better

75. The public were punch drunk from being hit with bad news; the carbon tax was seen as just one more annoyance, and a minor one in the context of everything else that was happening.

2. The revenue can play a valuable role *at the margin* in meeting obligations for tax increases

76. Carbon taxes in the EUR 15-20 per tonne of CO_2 range will not, on their own, 'solve' the fiscal crisis. The tax increases and expenditure cuts required of Ireland over the 2010 to 2014 period amount to EUR 14.040 billion and EUR 19.95 billion (see Table 5) respectively. If the current Irish tax of EUR 20 per tonne of CO_2 were applied to all greenhouse gas emissions in 2011 (57.3 million tonnes of CO_{2eq}) the revenue would be EUR 1.146 billion, or EUR 5.7 billion over 5 years, which would amount to about one third of the total tax increases required. However, in practice, for good reasons, the tax revenue is only about one third of the hypothetical maximum. It makes a very valuable contribution at the margin, but is not the whole solution.

3. There is a trade-off between the scope and the effective rate of tax

77. By limiting the tax to those sectors outside the EU ETS, and excluding most emissions from farming, it was possible to introduce a tax of EUR 15 and then EUR 20 per tonne of CO_2. If the tax had covered all emissions, then it is almost inevitable that the rate would have been lower, or there would have been multiple exclusions. The evidence for this in Ireland is that the new government taking office in 2011 immediately reduced the liability for farmers.

4. There is a need to revisit the analytics of recycling and the double dividend

78. The Irish *ex ante* work indicates that a modest double dividend would be yielded by recycling the revenue to reduce taxes on labour. However, the key questions for the policy process are: what are the implications for government revenue, and does a double dividend apply symmetrically when the carbon tax revenue is used to prevent an *increase* in taxes on labour?

5. The imperative to raise income and reduce debt, limits the extent to which equity issues can be addressed

79. There can be a trade-off between meeting environmental objectives – in the Irish context, taxing emissions from carbon intensive fuels such as coal and peat – and helping those most negatively impacted. In addition, the fiscal crisis limits the ability to finance the use of social stabilisers, such as fuel allowances, or direct lump-sum transfers.

6. It is difficult in the short run to draw conclusions about environmental effectiveness.

80. In the absence of any tax change, we would expect most emissions to fall with sharp declines in GDP and disposable income. Weather conditions are hugely influential in shaping consumption for heating. Policies introduced in parallel that also influence behaviour (*e.g.* the Irish policy in regard to new cars, where purchase and annual motor taxes are both based on CO_2 performance) are additional confounding factors. And energy prices keep changing independently of the tax. Finally, in times of crisis,

expectations are an important shaper of consumption and investment decisions today. It should be noted that the proportionate price effect will differ depending on whether there is already a significant excise duty in place (as there was with transport fuels) or whether there is not (as in the case of fuels used for heating). Furthermore, it is important to track sectoral performance over time if defensible conclusions are to be drawn. EU policy was radically changed in 2008, with the separation between EU ETS and NETS. In Ireland at least, there is not yet sufficiently good time-series data to distinguish between these two strands, a limitation that applies with particular force to industry.

81. For Ireland, it is notable that, even with the economic crisis and the carbon tax, emissions from NETS in 2011 (41.57 million tonnes of CO_2eq) exceed the limit (40.56 million tonnes) that needs to be achieved. It is estimated that the country's obligations under the EU Effort Sharing Directive (ESD) will be breached in 2015/2016 (EPA, 2013). Ireland, and perhaps some other EU countries, need to keep focussed on legally binding obligations, and what policy mix is likely to be effective and efficient in meeting them. The carbon tax is likely to be an essential element in tackling both international and EU obligations.

7. Pay attention to the 'green economy' performance and issues relating to the tax

82. An important rationale for the Irish carbon tax was that it would stimulate new enterprise in renewables and energy efficiency, encourage innovation and generally drive 'the smart economy'. But the extent to which this outcome has been delivered has not been assessed. It is important that either this analytical gap be filled, or desist from making claims for which no evidence is presented.

Where the alternative is to raise taxes on labour, a carbon tax on NETS in general will not damage competitiveness.

83. This is because it does not apply to the highly capital and energy intensive sectors, where labour is a relatively small share of total costs. Many businesses are likely to benefit from the re-balancing.

8. With any environmentally effective carbon tax, the carbon rate is likely to be higher than the equivalent allowance price in the EU ETS

84. The allowance price in EU ETS in 2013 has fallen sharply, to below EUR 5 per tonne of CO_2, due to the fact that the supply of allowances issued each year is pre-determined, while demand has fallen sharply, mainly due to the sustained recession in the EU. There is a debate – summarised in Convery and Leonard (2013) – as to whether supply reducing or demand increasing interventions should be undertaken or not. Where there is a wide gap between the allowance price consumers face in the trading and non-trading sectors – as is the case in Ireland in 2013 – this introduces inevitable inefficiencies, as consumers are not faced with the same price across the economy.

Exiting the crisis

85. Eventually, crises pass. Europe will once again experience growth and rising employment. As Ireland exits from the crisis, there will be popular and political pressure to undo some or all of the taxes imposed as part of the adjustment. Unless the case for it is made, and continues to be made to both the policy process and the public, there is some prospect that the carbon tax will be 'unwound'.

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APPENDIX A: CARBON TAX RATES IN IRELAND, 2010-2014

Product	2010 EUR 15 per tonne CO_2eq	2012 EUR 20 per tonne CO_2eq	2013 EUR 20 per tonne CO_2eq	2014 EUR 20 per tonne CO_2eq	Rate of relief or exemption criteria
Solid Fuel	Note: This tax was not applied to Solid Fuels until Budget 2013 – at a lower rate than originally proposed				
Coal	39.51 per tonne		10 per tonne	20 per tonne	Partial relief: for installations covered by GHG permits and for environmentally friendly heat and power co-generation
Peat			10 per tonne	20 per tonne	Full relief: for installations covered by GHG permits and for environmentally friendly heat and power co-generation
Peat briquettes (domestic fuel)	27.59 per tonne		10 per tonne	20 per tonne	Section 44: Finance Act 2011 – exempt fuel for manufacture of products from this fuel source
Milled peat	13.50 per tonne		10 per tonne	20 per tonne	
Other peat	20.44 per tonne		10 per tonne	20 per tonne	
Light Oil					
Petrol	34.38 per 1 000 Litres	45.87 per 1 000 litres			
Aviation gasoline	34.38 per 1 000 litres	45.87 per 1 000 litres			
Heavy Oil					
Used as a propellant, for air and private pleasure navigation	39.98 per 1 000 litres	53.30 per 1 000 litres			
Kerosene used other than as a propellant	38.02 per 1 000 litres	38.02 per 1 000 litres 50.73 [1/5/12]			
Fuel oil for generating electricity	45.95 per 1 000 litres	45.95 per 1 000 litres 61.75 [1/5/12]			
Other heavy oil	41.30 per 1 000 litres	41.30 per 1 000 litres 54.92 [1/5/12]			
Liquefied Petroleum Gas					
Used as a propellant	24.64 per 1 000 litres	24.64 per 1 000 litres 32.86 [1/5/12]			
Other LPG	24.64 per 1 000 litres	24.64 per 1 000 litres 32.86 [1/5/12]			

Substitute Fuel					
Used instead of petrol		45.87 per 1 000 litres			
Used instead of diesel		53.30 per 1 000 litres			
Used for other than as a propellant		41.30 per 1 000 litres			
Natural Gas	3.07/MWh	746.00 pa/ 13,750 kWh*			Full relief if fuel if used to generate electricity; chemical reduction or in electrolytic or metallurgical processes. Partial relief if supplied to those who have Greenhouse gas permits
Biofuel					Full relief; and partial relief if blended/mixed with mineral oils if it accounts for more than 10% of the fuel mix.
Combine Heat and Power (CHP)					Partial relief

* Annual average household consumption

Sources: Irish Statute Book (2010). Finance Act, 2010: S. 64 (1) (c), (e) Schedule 2A (p.99-100), S. 78 (p. 106-107); Irish Statute Book (2012). Finance Act, 2012: S.67 (b) (p.103-1040), S. 68(1) (b), (2)(b) (p.134-135); Department of Finance 2010 (a); Revenue Commissioners Statistical Reports – Excise Duties, 2010; Revenue Commissioners Annual Report, 2012; Gargan, E., 2012/ Department of Finance/NESC; Department of Finance, 2013: Summary of 2013 Budget Policy Changes.

ANNEX B: CALCULATION OF THE RATE OF TAX, COLLECTION AND PENALTIES

85. The rate for natural gas is based on the carbon emissions factor (EF) of natural gas.[21] The rate for solid fuel was set at a rate based on the CO_2 emissions content of the combustion of solid fuels[22] (Section 78(3): Department of Finance Act 2010). The rate for mineral oil is based on the NCV (net calorific value) per 1 000 litres.[23] The tax is charged at the point of entry into the country and is passed on to the consumer at the time of supply. It does not apply to the manufacture of solid fuel products. Each supplier must register with the Revenue Commissioners and make returns within the relevant accounting period. The Finance Act of also made it an offence, with a penalty on summary conviction of EUR 5 000, for failure to comply with the provisions pertaining to the carbon tax.

86. Reliefs and Exemptions – biofuels, fuel used to make electricity, ETS participants and for companies with greenhouse gas permits.

87. Exemption from the tax applies to participants in the EU ETS in respect of fuels so covered and on that basis, electricity production is not covered by this tax. There is partial relief for any gas delivered for use in an installation that is covered by a greenhouse gas emissions permit. There is also is relief for biofuel and biofuel that is mixed or blended with mineral oils, where the biofuel accounts for more than 10% of that mixture or blend (S. 89 Finance Act 2010).

88. Finance Act of 2012 brought in a number of new carbon tax measures: (a) an extension of the tax to solid fuels, and allow for increasing this tax on these fuels to EUR 20 per tonne of CO_2 in 2014 (Department of Finance, 2013) (b) to allow for relief from the tax for farm diesel (S. 20(a) Finance Act, 2012) and finally (c) an extension on the scope of the reliefs, to include solid fuels for environmentally friendly heat and power co-generation.

21 . EF is the carbon emission factor of natural gas expressed in kilograms of CO_2 per terajoule. A is the amount, EUR 0.015, to be charged per kilogram of CO_2 emitted, C is 0.0036, the number of terajoules per megawatt hour. The carbon tax is calculated as EF x A x C.

22 . NCV is the net calorific value of the solid fuel concerned expressed in terajoules per tonne, EF is the carbon emission factor of the solid fuel concerned expressed in tonnes of CO_2 per terajoule, A is the amount, EUR 15, to be charged per tonne of CO_2 emitted. The carbon tax is calculated as NCV x EF x A.

23. NCV is the net calorific value of the description of mineral oil concerned expressed in terajoules per 1 000 litres, EF is the carbon emission factor of the description of mineral oil concerned expressed in tonnes of CO_2 per terajoule, A is the amount, EUR 15, to be charged per tonne of CO_2 emitted. The carbon tax is calculated as NCV x EF x A.