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**ENVIRONMENTAL STUDIES RESEARCH SERIES**

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OF MODIFICATIONS TO ENVIRONMENTAL TAX REFORM**

**J. Peter Clinch and Louise A. Dunne**

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**DEPARTMENT OF ENVIRONMENTAL STUDIES,**

**UNIVERSITY COLLEGE DUBLIN,**

**RICHVIEW, CLONSKEAGH,**

**DUBLIN 14, IRELAND**

ENVIRONMENTAL AND WIDER ECONOMIC IMPLICATIONS OF MODIFICATIONS TO  
ENVIRONMENTAL TAX REFORM

BY  
**J. PETER CLINCH AND LOUISE A. DUNNE**  
DEPARTMENT OF ENVIRONMENTAL STUDIES  
UNIVERSITY COLLEGE DUBLIN

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**ABSTRACT**

The most common definition of Environmental Tax Reform (ETR) is the use of the revenue from environmental taxes to reduce distortionary labour taxes. However, the PETRAS project has shown that there are a number of social and political impediments to implementing such reform. This paper firstly outlines some of the environmental and economic implications of environmental taxes generally. It goes on to explore three broad approaches to ETR, based on the allocation of the tax revenues, and explores the environmental and economic implications of each approach and the likelihood of political and social acceptance. Particular attention is paid to ameliorating regressive impacts and impacts on competitiveness. It is concluded that some combination of hypothecating a proportion of revenues to environmental projects and diverting rest to reduce labour taxes is probably the best approach in light of the results of the project. The balance should depend upon local labour market and macroeconomic conditions, the extent to which environmental projects are already funded and the extent of government failure. Funding should only provided to environmental projects if it can be shown that, in themselves, they are economically efficient. In addition, it is most important that a proportion of the funds be used to ameliorate any regressive impacts. It is also important to bear in mind that hypothecation or recycling of revenue is not the same as a tax shift, which is a reform of the entire system, so some of these approaches may take away from the integrity of ETR. The paper concludes with some of the initiatives that are likely to be necessary to facilitate social and political acceptance of this approach to ETR.

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## Introduction

This purpose of the PETRAS project was to assess the social and political responses to environmental tax reform. The exact definition of what 'environmental tax reform' means is mostly dependent on the nature of the use of the revenues from such taxes. Baranzini (2000) has outlined several approaches:

- 'Fiscal reform' (or revenue neutrality) whereby revenues from an environmental tax are used to decrease other taxes, so that the government budgetary position is unchanged and the overall tax burden remains the same. The general underlying principle is to shift taxation from economic 'goods' (like work, income or property) to environmental 'bads' (like pollution). There are several possible options concerning the reduction 'package', such as: decrease taxes on labour, goods, households and corporate income, or property. A particular case of revenue neutrality is sector neutrality, i.e., the additional taxes from one sector are returned only to that sector (Morris *et al.*, 1997).
- 'Earmarked' or 'Hypothecated' whereby revenues are allocated in advance to finance specific environmental programmes (e.g. environmental funds, environmental projects, or research and development activities).
- 'Compensation measures' whereby revenues are used to compensate some of those most affected by the tax. For instance, lump-sum re-distribution to the population could correct for some of the negative impacts on low-income households, while subsidies to introduce less emitting technologies could compensate polluters for additional abatement costs.

Depending on the way fiscal revenues are recycled, carbon taxes may generate some benefits in addition to those resulting from pollution abatement. These additional benefits may be divided in two categories (Hourcade, 1996):

- An 'economic double dividend': recycling carbon tax revenues by reducing distortionary taxes may have positive impacts on economic growth, employment, or technological development.
- An 'environmental double dividend': reducing carbon emissions may be accompanied by a decrease in local pollution.

## Environmental impact of ETR

The OECD (1999) define the aim of (regulatory) environmental taxes as to reduce, through higher prices, the use of scarce resources or emissions of pollutive substances. The effectiveness of an environmental tax is defined (*ibid.*) as its capacity to achieve these goals.

Studies of behavioural responses to environmental taxes are important for future modifications and adjustments of the environmental tax in the country concerned. Econometric methods can estimate price elasticities, which, with precaution, are used to predict these responses. The main advantage of

the price elasticity estimates approach is that it does not require that a tax be implemented, merely that relative prices changed. This is important in view of the fact that environmental taxes have only a short history. Although general price elasticity estimates have been derived for many countries and for several years, empirical data on consumer responses to environmental taxes are scarce (Ekins and Speck, 1998). For this and other reasons it is difficult to anticipate the impact of a carbon tax on emissions in advance. If the tax rate is set at a relatively low level or if energy demand is relatively insensitive to price changes then emissions will not decrease sufficiently to attain a given abatement objective. However, Goulder and Schneider (1999) pointed out that the price signal given by a tax could affect future investment decisions when capital is being replaced.

According to Baranzini *et al.* (2000) the environmental effectiveness of a carbon tax will also depend on at least two other factors:

1. The use of carbon taxes fiscal revenues. With respect to environmental effectiveness, two main options may be considered. First, carbon taxes fiscal revenues could be used to subsidise renewable energy. In the second option, fiscal revenues may be used for investments in energy saving and research and development.
2. The point of imposition of the carbon tax. If the tax is placed 'upstream' in the energy chain, then in principle there is a wide range of available market options to react to the price signal, and monitoring costs could be relatively low.

Factors that might reduce the environmental effectiveness of a carbon tax over time include inflation and the entry of new polluters in the market.

The environmental benefits of an energy tax may be greater than reflected by changes in CO<sub>2</sub> emissions due to secondary effects. Since a reduction in CO<sub>2</sub> emissions is closely associated with a decrease in fossil fuel consumption which also produces air emissions such as SO<sub>2</sub> and NO<sub>x</sub>, local air quality may be improved. Compared to the benefits of climate change mitigation and prevention, which are global and long-term, the benefits resulting from the reduction of these local environmental problems would mainly accrue in the short term and at the local/regional level. Pearce *et al.* (1996) found that the estimates of these additional environmental benefits range from \$3 per ton of carbon abated to over \$500/tC. In some cases, secondary environmental benefits may offset some of the costs of carbon taxes. Alfsen *et al.* (1992; quoted in Pearce *et al.* 1996) calculated that secondary environmental benefits may offset about one-third of the initial abatement costs in Norway. Cifuentes *et al.* (2001) discuss the hidden health benefits of greenhouse gas emissions. They conclude that the adoption of readily available measures to lower GHG emissions in Santiago, Mexico City, São Paulo, and New York over the next two decades would also provide major public health benefits from associated reductions in particulate matter and ozone ambient concentrations. Improved technologies to reduce fossil-fuel combustion could reduce these co-pollutants by about 10%, and thereby avoid some 64,000 premature deaths (including infant deaths), 65,000 chronic bronchitis

cases, and 37 million person-days of restricted activity or work loss in these four cities alone between now and 2020. They hope that if these substantial public health benefits become more widely recognised, and their full economic and social impact are integrated into discussions of climate policy, this could prompt a major rethinking of the climate debate and help break through the current impasse.

The environmental impact of an energy tax can be assessed both *ex ante* and *ex post* analyses. Examples of *ex ante* studies (carried out before the policy is implemented) include the Ministry of Housing, Spatial Planning and the Environment in the Netherlands (1997), which evaluated that their tax on energy could reduce total domestic CO<sub>2</sub> emissions by 1.5%, and a study by the Ministry of Finance in Denmark (quoted in Baron, 1996), which estimated the effect of its carbon/energy tax regime (accounting for the recycling of tax revenues through investment in grants to improvements in energy efficiency) would provide about 4.7% reduction in CO<sub>2</sub> emissions from 1988 levels in the year 2000. *Ex post* analyses are better as they say what really happened as opposed to predicting what they think will happen. Examples of such studies include that carried out by the Swedish Environmental Protection Agency (1997, p. 52), which showed that the CO<sub>2</sub> tax had "...helped to reduce emissions of carbon dioxide in line with Swedish environmental policy" and a study by researchers at Statistics Norway that found that "the total effect of the CO<sub>2</sub> tax on CO<sub>2</sub> emissions was 3-4% for the period 1991-1993" (Larsen and Nesbakken, 1997, p. 287).

### **Impact of ETR on Employment**

Clinch *et al.* (1999) show that, in regard to the employment implications of taxes and charges, the empirical evidence from the past is modest, because these instruments have not been long in use, and such evidence as there is, is 'masked' by a wide variety of other factors. There is a more extensive literature focused on the future, using models, both econometric and general equilibrium, to assess the likely impact on employment of applying taxes and charges. This work was stimulated by a number of coincident forces, including the European Commission's proposal to apply a carbon energy tax, and recycle the proceeds in the form of reduced payroll taxes, the rising unemployment in the Union, and the linking of employment and sustainability in the Delors White Paper. The suggestion is that the revenue from an environmental tax be used to reduce labour taxes, thereby attaining the double-dividend of improved environment and higher employment. With this in mind, Koopman (1994) examined the economic effects for the EU of a 1 percent of GDP general reduction in social security contribution rates financed in a budget neutral manner by a carbon tax. His results suggest the impacts on private consumption, GDP and employment are all modest but positive.

## Evaluation of Alternative Approaches to ETR

The most common definition of Environmental Tax Reform (ETR), which we also adopt here, is the use of the revenue from environmental taxes to reduce distortionary taxes, in particular, taxes on labour. However, this study has shown that there are a number of impediments to implementing such reform due to various social and political responses. Such impediments include mistrust of the government by the public, implausibility of the policy to the general public, unease about the means of hypothecation, information asymmetries, the political system, the structure of government, the macroeconomic environment, the impact on competitiveness, inequity between sectors, regressivity, elasticities and the level of the tax, terminology, and the marketing of ETR. What follows is a presentation of the various means of using the revenues, the economic and environmental implications of the approach and an assessment of their likely social and political acceptance. However, it is important to note that some of these approaches cannot be considered to be ETR as hypothecating revenue to environmental projects etc. is not a tax shift. Below we note three approaches as 'first best', 'second best' and 'third best'. However, this merely reflects the traditional neoclassical economist's implied ranking and, as we try to show, may not be appropriate in reality.

- 'First-best' approach - recycling the funds to the exchequer to reduce labour taxes.

In general, the principal purpose of taxation has been to fund government and to provide funds for the provision of public goods, such as national defence and roads, which would not be provided by the market. The problem is that there is a hidden cost with raising most taxes: higher taxes distort peoples' behaviour. They affect our choices between things that are taxed and things that are not taxed. When the taxes are raised on 'good things' this discourages the good things from taking place. For example, taxes on labour discourage employment. In relation to the environment, the taxes are placed on 'bad things', i.e. pollution, and their strength is that they make the polluting activity less appealing. Therefore, if the tax base can be shifted such that more of the revenues for funding the provision of public services are raised by taxing pollution rather than employment, we reduce the disincentive to employ and increase the disincentive to pollute. Therefore, there is the potential to reduce pollution and, if employment is simultaneously increased, this is known as a 'double dividend'. In addition, some of the funds can be used to ameliorate any regressive impact of the taxes as will be discussed later in this paper.

There has been much debate on the existence or otherwise of a 'double dividend'. There is now an extensive literature, which examines the issues of a double-dividend in a partial or general equilibrium context, and which draws conclusions based both on the basis of theoretical models and on quantitative analysis. One of the most complete renderings of such work in Europe was provided in 13 papers presented at the *International Workshop on Environmental Taxation, Revenue Recycling and Unemployment*, at the Fondazione Eni Enrico Mattei, Milan; this work has been summarised by Brunello (1995). These papers demonstrate that the outcome of such analyses depends on the



assumptions made, in particular the assumptions as to how labour markets work. If the market for labour is reasonably competitive, in the sense that entry and exit is easy, and monopoly power by suppliers and demanders is limited, then the labour market will "clear", and the economy should tend anyway towards full employment. These conditions are presumed to be approximated in the US, where unemployment in recent years has been much lower than in Europe, and where the "double dividend" debate is not on the policy or intellectual agenda. If it is assumed that the labour market is perfectly competitive, then the double dividend is a chimera. But if there are rigidities (as is certainly the case in parts of Europe), then it seems likely that, in the short run, there will be an employment dividend as a result of a recycled carbon/energy tax. But in the long run, such rigidities become less relevant, as real wages adjust to the "gain" represented by the fiscal transfer from environment to labour. The short run is not explicitly defined, but for the unemployed worker, the short run can seem very long indeed; it is clear that, in Europe, the linkage between environmental taxation, overall tax policy and employment is an important policy concern. In addition to the pan European work, there are in addition a number of country reports. Examples include Norway (Norwegian Green Tax Commission, 1996), Sweden (Swedish Green Tax Commission, 1997) and Nordic Council of Ministers (1996).

An article by Fullerton and Metcalf (1998) contains a literature review of studies and models on the double dividend and concludes with four main points:

- The validity of the double-dividend hypothesis cannot be settled as a general matter. Under certain circumstances, a shift to environmental taxes may improve the environment and reduce the overall burden of the tax system. In other circumstances, such a shift may increase the burden of the tax system. Each reform must be evaluated on its own merits.
- The emphasis in the literature on the importance of the revenue is misplaced. They demonstrated that three types of policies can have equivalent impacts on the environment and on labour supply. One of these policies raised revenue from the environmental component of the reform, another lost revenue, and a third had no revenue associated with it.
- The creation of scarcity rents<sup>1</sup> is relevant. Policies that create scarcity rents and leave those rents in private hands will exacerbate pre-existing distortions to a greater extent than do policies that do not create privately-held scarcity rents. Policies that create privately-held scarcity rents raise costs of production beyond what is necessary to mitigate environmental problems.
- They showed that different regulatory approaches are available and that not all regulations create scarcity rents. Thus, policymakers have available to them more policy options than is suggested by the previous literature that focuses only on revenue.

In general then, even if a double dividend exists, the desirability of increasing the demand for labour via the reduction of labour taxes will depend very much on macroeconomic and labour market

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<sup>1</sup> To at least some extent, a restriction on the amount of pollution is a restriction on the amount of the output, which enables firms in equilibrium to charge a higher price for their output. Given this higher price of output, the right to pollute is more valuable. The 'scarcity rent' is the increase in the value of the right to pollute one unit (Fullerton and Metcalf, 1998).

conditions in the country concerned. In Ireland and the UK where unemployment is relatively low, the necessity for increasing the employability of labour is much less pressing than in most European countries. In addition, in 2001 at the height of the Irish boom, such incentives would merely have added to existing wage inflation. Nevertheless, as mentioned previously, raising revenue from taxes on 'good' things causes distortions. Therefore, any shift in the tax base away from taxing good things to taxing bads is, in principal, beneficial.

The findings of the PETRAS project show that a significant impediment to this approach to ETR concept is that the general public does not see it as plausible, rather, many of them view it as some sort of pointless shifting of money from one place to another and even the business interviews suggest a lack of understanding. This may be partly explained by anecdotal evidence of a lack of understanding of the necessity for taxes to fund public goods and a desire to see the money spend where it is raised. In addition, the use of focus groups may condition participants to express a higher concern for environmental issues (the perceived principal concern of the groups) than for issues regarding unemployment and this may explain some of the desire to see revenues recycled to environmental projects. In Ireland and the UK where unemployment is less of a problem, the Focus Group participants were rightly less convinced of the merits of this approach.

A major problem in selling the ETR concept to the general public is establishing trust that the government will honour its promises in terms of using the revenue to reduce labour taxes rather than it just disappearing into a black hole. In general people felt that the government would have to prove itself capable and committed to ETR and convince them of this before any reforms were introduced. This lack of trust in government was considered a key impediment in all countries. Even in Denmark, where ETR has been implemented, there was still scepticism about the government's intentions. The ranking of this strict definition of ETR as 'first best' is very much reliant on the belief that government failure is minimal such that the best use of the funds is made. Certainly, the results of the Focus Groups suggest that the public may not be convinced that this is the case!

Therefore, for this 'first-best' approach to ETR to be socially and politically acceptable, a considerable effort will have to be made to explain the rationale for changing the tax base from labour to pollution. Secondly, a degree of transparency will have to be created such that the public and businesses trust that this change will occur. In France, Ireland and the UK, it was stated by the general public that if revenue distribution was carried out by an independent body such as a Green Tax Commission this would increase trust. In addition, it might be possible to show the revenue recycled to individuals on their pay cheques. This visibility was emphasised from the results of the German empirical work, where ETR has been implemented but there is a lack of comprehension of the labour tax returns. Most pay cheques follow a certain standard format and it would be administratively simple to add a new category which explains the savings or extra income earned as a result of the tax reform.

- 'Second-best' approach - recycling a portion of the funds to environmental projects with the rest used to reduce labour taxes.

Following on from the impediments mentioned above, the results of PETRAS suggest that other methods of recycling the revenue might make ETR more acceptable. The focus groups in particular had great difficulty making the mental connection between environmental taxes and labour and suggested alternative recycling method including:

- that improvements in the energy efficiency of the building stock should be supported by recycling some of the taxes.
- grants for improving energy efficiency in buildings
- recycling into local environmental projects to foster community acceptance of ETR
- recycling to public transport
- subsidising renewable energy and CHP
- subsidising 'cleaner' technology in industry
- subsidising R&D in the area

A second-best approach is to apportion part of the revenue to some of these more obvious environmental measures in order to increase public acceptability while recycling the majority of it to reducing labour taxes. The Finnish ETR makes use of the tax revenue to fund and promote various policy goals involving environmental, energy and transport considerations (amongst other things, tax subsidies and procedures related to combined heat and power production (CHP)). However, administering the system has proved complicated and difficult.

Just how 'second-best' is this approach? In a perfect world the recycling all of the revenues to the exchequer would be the best approach. This would be because, in this world, there would be no government failure and tax revenues would be allocated optimally across the entire economy including an optimal level of expenditure on environmental projects. Then it would simply be a matter of raising tax revenue in the least distorting manner by raising as much as possible by taxing 'bads' such as pollution. In this case, allocating any extra funds for environmental purposes would be a waste of valuable funds. While this may result in greater environmental improvement, the overall economic implications would be negative as there would be an inefficiently high level of funds diverted to environmental projects. However, we do not live in a perfect world. It is quite possible that funding for environmental projects is below the optimal level and due cognisance should be taken of the seemingly higher preference expressed in the Focus Groups for spending more on environmental projects. While, as noted earlier, this may be a product of the Focus Group dynamic, in countries with low unemployment rates and/or high mistrust of the government (concern about government failure), this response by the public would be quite rational.

Sterner (1999) recommends that policymakers should not focus too much on double dividends as they might not exist and will inevitably lead to long discussions. The environmental gains are real and many issues are so serious that they are more than sufficient cause to use policy instruments. If the benefits of spending tax revenues on environmental projects are shown to outweigh the costs, this would indicate that the funds are likely to be efficiently allocated if spent on these projects. Therefore, an ETR regime which uses some of the money for environmental purposes need not be second best at all if it were economically efficient for the state to allocate money to these projects, i.e. if the projects were shown to pass a cost-benefit analysis. Adopting this approach would only have significant negative economic implications were an inappropriately high level of scarce government funds diverted to environmental projects. This could be relatively easily assessed if it were mandatory that project proposals contain such cost-benefit analyses. In addition, some of the funds can be used to ameliorate any regressive impact of the taxes as will be discussed later in this paper.

Ownership of ETR issues needs to be concentrated in one dedicated area in government and backed up by hard research. The finance ministry must be convinced to accept the principle of hypothecation. The environment ministry needs to commission in-depth economic analyses of any proposals it is presenting to other departments (and have sufficient economic expertise in house to co-ordinate such proposals). A significant degree of consultation and agreement with the social partners will be a prerequisite for the introduction of these taxes. Administration and monitoring of the ETR initiatives needs to be effective and simple, and design from other countries might best inform how to proceed with this aspect. The planning processes in some countries need to be changed to allow for greater use of the wind energy potential. While other environmental concerns must not be neglected, at present, attempts to harness this energy source are subject to long delays and difficulties in securing planning permission. A reduction in dependence on fossil fuel based energy is of utmost importance in the coming years.

#### **Box 1. Danish CO<sub>2</sub> Tax**

Denmark has an ambitious energy policy, with the objective of reducing CO<sub>2</sub> emissions by 20 per cent in the year 2005. A mix of instruments are being employed to achieve this end, including direct investment – infrastructure for provision of natural gas and expansion of district heating schemes – and regulation (concerning the use of electric heating in new buildings). A CO<sub>2</sub> tax was introduced, and rates on industry and commerce were increased in 1996, and will increase annually up to 2002. The revenues from the trade and industry sector will be recycled and, in particular, enterprises in energy-intensive sectors will have their tax payments reimbursed provided they enter into a binding agreement with the Danish Energy Agency (Johannsen, 1998).

According to Convery (2001), in cases where tax rates are low, recycling of the revenues to achieve environmental objectives can compensate in part for the inadequate 'first round' effects. The Hungarian 'Environmental Fund' – which is typical of a number of central European countries – is an example, but the revenue from the waste-water charges in the Netherlands and Germany, and portion

of the revenues from the Landfill tax and aggregates tax in the UK are recycled for environmental purposes.

- 'Third-best' approach - recycling all the funds to environmental projects.

A third approach to using the revenues from environmental taxes is to recycle all the revenues to environmental projects. The results of the Focus Groups suggest that this would be their preferred approach. While this is likely to be associated with the most significant environmental improvement, there are a number of potential drawbacks to this approach. Depending on the revenues raised, it may be that an inefficiently high level of funding is allocated to environmental projects. In addition, it would be important that some funding be reserved to enable any regressive effects to be ameliorated. This option is also dramatically different from the original idea of ETR which completely reforms the tax system, discouraging 'bad' behaviour and encouraging 'good.' Hypothecation is not a tax shift.

### **Ameliorating Regressivity**

A system of support needs to be set up to protect the more vulnerable members of the general public from suffering as a result of ETR. People on the margins are very sensitive to fuel pricing. These are often the same people who are not in the tax system and thus would not benefit from a reduction in labour tax. The Focus Groups participants were particularly concerned about the potential regressivity of ETR and it is often used as a justification for avoiding its introduction.

The lessons from the evaluation of other environmental taxes are useful. Scott (2001) shows how the argument of regressivity is groundless in relation to a (hypothetical) water tax. We can compare this argument to a hypothetical domestic carbon tax. An apparent feature of domestic water consumption is that use per head declines with increasing numbers of inhabitants in the households and that it rises with income and ownership of water-using equipment. These facts also hold true in the case of domestic energy consumption. Scott investigates the options for mitigating the potential regressive effects of water charges. Below we modify and add to Scott's suggestions for ameliorating regressivity and relate the suggestions to energy taxes.

1. Reduce or altering indirect taxes.
2. Increase income tax thresholds, or reduce rates of tax on low incomes to confer benefits on low-income households, and also on high-income households.
3. Return an equal lump-sum amount to each household, corresponding to the value of the average energy tax. Lump-sum returns are sometimes held up as the textbook 'ideal' way to compensate. This is because low-income households own less energy-using equipment and consume less heating so that lump-sum compensation would guarantee to remove the regressive effects. This would also compensate the large number of people who are exempt from tax so would not benefit

from a tax credit. The lump-sum compensation for energy would be more appropriate if it were awarded per head, rather than per household or family. Most of this information would be available from the census or the electoral register, however some older teenagers might not be accounted for. However, energy use per head is higher when there are fewer inhabitants. Pensioners and single parents, for example, would be inadequately compensated if average energy use per head were the yardstick. To be progressive and fair, compensation should relate to average water use per head relevant to their household size.

4. Reimburse through the social welfare system so as the tax is 'revenue-neutral'. Pensions, unemployment benefits, family income supplement, etc. can be raised to compensate households.
5. Introduce sliding scales or a certain amount of energy tax-free. With volume-based charging, the burden of the charge can be alleviated by granting a free amount of energy per head to all. The cost of this allowance can be met by a steep rise in the tax above this threshold. Efficiency and equity could be met to some extent if the free allowance had the virtue of being small enough to ensure that few households would face a zero price, so there is still an incentive for careful use.
6. The tariff structure of the energy taxes could be manipulated to be progressive. The supplier could reduce the fixed cost element or a portion of it, where there is such a cost. However, difficulties can arise if pricing principles depart from the underlying economic realities of the supply process. Neither should it represent a bonanza to the supplier if the supplier is a private company that receives compensation from government.
7. No taxes to people below a certain threshold income. Alternatively, a cap can be imposed on the amount that households on certain welfare payments would pay on energy taxes. The government can require companies/utilities to operate this special tariff. In the case of uncompensated private companies, cross-subsidising by other customers would be required to make up the shortfall. Unfortunately, waivers and caps could discourage recipients from learning good environmental habits.
8. The particular problems of those caught in the fuel-poverty trap, i.e. those who are unable to heat their home to a comfortable temperature due to low household income and poor energy-efficiency standards can be ameliorated by providing grants for energy efficient appliances to be retrofitted in houses. However, there are substantial difficulties in overcoming market failure in energy-efficiency (see Clinch and Healy, 2000).
9. In California, if people lower their energy bill by 20% one year, then they also got a 20% reduction in their bill in the next. This sort of system is based on incentives rather than penalisations and could feasibly be very administratively easy if the current billing system was tapped into. Twenty percent rebates are given as a monthly credit on the bill if usage this summer is reduced by 20 percent as compared to the Summer 2000. Specifically, residential, commercial and industrial and agricultural customers who reduce their average daily of electricity by 20 percent each billing period commencing on or after June 1, 2001, through September, compared to last summer, get the rebate. If the 20 percent reduction goal is met, rebates will begin to appear on bills received in July through October 2001. (Southern California Edison, 2001)

10. Another possibility would be to return the money to people in the form of vouchers. These could be for some significant amount that would encourage people to buy newer, more energy-efficient appliances, or towards the cost of energy saving devices such as insulation. Administratively, to fraud-proof these, they could be linked into household addresses. Vouchers that, for example, entitled the holder to purchase energy-saving light-bulbs at a discounted price could be sent out periodically with literature explaining the energy saving costs possible and recommending that people replace all bulbs in their houses with these. Vouchers could also be provided for insulation and towards the purchase of the most energy efficient home appliances (fridges, cookers, washing machines etc).

A crucial element of all measures seems to be to explain to people and to remind them frequently, about energy saving, tax-paying, how the money is returned, the importance for global warming etc. There is an additional point in that saving from reduced energy bills should result from the lower use of energy and the increased energy efficiency behaviour that should be a reaction to the increased cost.

### **Ameliorating Competitiveness Concerns**

The impact of ETR on competitiveness was of some concern to the Focus Group participants, businesses and policymakers. In Ireland and the UK, there was a concern that environmental tax reform could lead to job losses rather than gains. At the firm level, competitiveness may be precisely defined as the firm's ability to maintain or increase international or domestic market shares and profitability (Baranzini *et. al.*, 2000). Firms' competitiveness is influenced by 'micro' factors, such as cost structure, product quality, trademark, service and logistical networks, and 'macro' factors, such as exchange rates and trade regimes (Baron, 1997). The impact of a carbon tax is reflected in a firm's cost structure, and is thus only one factor affecting competitiveness. A carbon tax will imply an increase in costs to which a firm may react in different ways, for instance by (Baranzini *et. al.*, 2000):

- Shifting cost increases to consumers via higher prices, depending on market structure
- Minimising the carbon content of the products. This reaction depends on the incentives given by the carbon tax (i.e., the tax rate and the recycling of revenues) and on the energy substitution possibilities in the production process.
- Avoiding paying the tax, by relocating production and emissions in other countries.

Competitiveness impacts will only arise if environmental policy imposes different levels of costs on competing firms. If countries have different policies or regulations are different among domestic firms or firms have different specific carbon intensities or substitution possibilities, then an energy or carbon tax may impose different compliance costs among firms. A carbon/energy tax may result in competitive losses because not all firms can react in a similar way. However, competitive losses are often more apparent and short-term (in the long-term, when capital is replaced, the impacts on costs

may decrease according to Baranzini *et al.* (2000)), while competitive advantages may be more difficult to quantify and mainly accrue in the long term. Porter (1990) has claimed that properly designed environmental policies can trigger innovation and production efficiency gains that may lead to an absolute advantage over non-regulated firms. This strengthens the argument in favour of economic instruments like carbon or energy taxes over command-and-control measures (Porter and Van Der Linde, 1995).

There is a large literature on the impact of environmental regulations on competitiveness which we do not summarise here. The bottom line is that the principal concern should be with those industries on the extremes. The most energy-intensive companies are the ones who will be hardest hit, but also tend to be important to the economy and politicians are reluctant to jeopardise their position or employment numbers. These companies also tend to be the loudest voice in the business confederations and sector bodies, with the smaller companies with less extreme opinions forced to support them. Exemptions will reduce the effectiveness of any energy tax, but compromises of this nature may be necessary in the first few years of introduction. However, Böhringer and Rutherford (1997) found that losses associated with exemptions could be substantial even when the share of exempted sectors in overall economic activity and carbon emissions is small. Alternative recycling options, such as wage subsidies to export-and energy-intensive sectors, can give better results in terms of employment and are less costly than tax exemptions. However, removing exemptions could be relatively costly for those sectors that benefited from them. Godal and Holtmark (1998) estimated that removing exemptions in the Norwegian CO<sub>2</sub> tax regime and replacing them by a uniform CO<sub>2</sub> tax on all CO<sub>2</sub> emissions would decrease profits in the emission-intensive industry by 18%.

Different directions in taxing offer possibilities. Taxing resource use or resource and land rents, for instance, offers some potential (Bosquet, 2000). Taxes on resource use are singled out as further candidates for ETR as they induce materials internalisation (first dividend) and have sufficient revenue potential to finance the reduction of other taxes (second dividend).

Voluntary agreement schemes offer some possibilities, such as the very high energy users negotiating some kind of compromise (e.g., installing a CHP plant to reduce energy consumption) and thereby being exempt from (at least some of) the tax. Legislation, targets and analysis around energy use and energy audits were all mentioned as aids to successful ETR introduction.

### **Box 2. Examples of European Exemptions**

In the case of the Swedish NO<sub>x</sub> tax, all of the revenues are refunded to the firms in the sector, thereby mitigating any negative competitiveness effects. Industry in the Netherlands that abstracts its own water pays a lower water abstraction charge than others, and the water supply tax in Denmark does not apply to industry. In the case of the carbon taxes implemented in 8 countries, industry is either exempted, or the rates are very low (Convery, 2001).



Most businesses and policy makers surveyed in the PETRAS project seemed to feel that a gradual phasing in of ETR was essential. Businesses were anxious to get as much notice as possible about forthcoming policy initiatives that would affect their profit margins in order to have time to implement necessary changes. Interestingly, overall in the European countries considered, while competitiveness concerns were mainly an issue for policy makers and business groups, it was possibly even more important to the policy makers than businesses although it is important to note the small numbers of business people interviewed.

## **Conclusion**

Some combination of hypothecating a proportion of revenues to environmental projects while maintaining the original intentions of ETR and facilitating a shift in the tax burden away from labour and onto environmental 'bads' is probably the best approach given that it is likely to be more socially and politically acceptable and, if the appropriate balance is struck, need not result in any significant economic losses. This would maintain the integrity of the essential shift in the tax system that ETR embodies. The balance should depend upon local labour market conditions, the extent to which the environmental projects are already funded and the extent of government failure. In countries with low unemployment and flexible labour markets there is less benefit from diverting funds to reduce labour taxes. However, it is important that funds spent on environmental projects will be spent efficiently. This can be aided using both *ex ante* and *ex post* cost-benefit analyses. It is most important that a proportion of the funds be used to ameliorate any regressive impacts of the environmental taxes. In addition, exemptions can be provided to those firms/industries as deemed necessary for economic and/or political reasons although this will always be an area for debate. It is important to note an added complication with the hypothecation of revenues earned on pollution taxes is that, since the goal of such taxes is to discourage polluting activity, if the tax is successful, the revenue should be lowered over time as consumer choice changes. This lowers the potential money that can be recycled to other projects and/or the exchequer.

The results of our interviews and focus groups show that quite a bit of work remains to be done to make the ETR policy approach that we have recommended acceptable to the public in particular. Policymakers, business groups and the general public all cited lack of public awareness of ETR as a major impediment to its political acceptance. However, an improved understanding of the environmental implications of everyday activity is required in the first instance. For example, there seemed to be a poor understanding of the connection between energy use, greenhouse gas emissions and climate change. The public would be unlikely to support the introduction of an energy tax if they do not understand the environmental implications of using energy. The generation of a climate of support is necessary for political success in this arena. Schooling, environmental training for politicians, workshops for the public and community group participation provide opportunities for

reducing the 'information gap' (a proportion of the revenue from ETR could be used for such). The terminology used is of great importance with regard to enhancing the acceptability of ETR - taxes have particularly negative connotations. For an ETR policy to be acceptable amongst businesses and the public it is likely that a marketing strategy will be required in order to address the information asymmetries and lack of understanding.

A major potential impediment to environmental tax reform is the structure of government. Responsibility for environmental performance tends to rest with the ministry for the environment. However, the finance ministry is usually responsible for tax policy. A major stumbling block may be the unwillingness of some finance ministries to accept the principle of hypothecation. In addition, the composition of the parliament in a country and the relative strengths of the various parties will have a significant impact on the success or otherwise of an ETR policy. In those countries where coalitions are common, it is more likely that the smaller Green parties will have more influence and this may speed the introduction of ETR.

Macroeconomic conditions are likely to influence the acceptability or otherwise of ETR. If the world economy were to move into recession and unemployment to increase in Europe, policies that provide incentives to take on workers are likely to become more attractive to policymakers. However, it is harder to introduce environmental taxes if people's real earnings are falling. Closely related to macroeconomic conditions are concerns regarding the impact of ETR on competitiveness. A gradual phasing in of ETR will help to ease such concerns but it will be necessary to concentrate on the extremes. The most energy intensive companies are the ones who will be hardest hit, but also tend to be important to the economy and politicians are reluctant to jeopardise their position or employment numbers. As pointed out previously, these companies also tend to be the loudest voice in the business confederations and sector bodies. Exemptions will reduce the effectiveness of any energy tax, but compromises of this nature may be necessary in the first few years of introduction.

Finally, a comprehensive system of support is required to protect the more vulnerable members of the general public from the potential regressive effects of ETR. Those on the margins are very sensitive to fuel pricing. These are often the same people who are not in the tax system and thus would not benefit from a reduction in labour tax. However, there are a number of ways of ensuring that we protect these sections of society and these concerns need not render ETR politically or socially unacceptable.

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