Discussion Paper

for

CONFERENCE ON ENVIRONMENTAL FISCAL REFORM

(Berlin, 27 June 2002)

1.0 INTRODUCTION

1.1 Purpose of meeting and scope of paper

1. OECD countries face a range of well-known environmental challenges. Over the last decade, in policies aimed to meet these challenges economic instruments – including environmentally related taxes – have become markedly more prominent. These instruments have a number of advantages (see Box 1). While all OECD countries have introduced a variety of environmentally related taxes or fiscal measures, an increasing number of countries, in particular in the European Union, have implemented comprehensive “green tax reforms” where new or increased environmentally related taxes are “compensated” by the reduction of other existing distortionary taxes such as taxes on labour. In these countries, this implementation process is continuing.

2. Environmentally related taxes introduce a price signal that helps ensure that firms and households take into account the costs on the environment when they make production and consumption decisions. There is growing evidence on the effectiveness of these levies as a means to reduce damage to the environment.

3. The recent OECD report (OECD 2001) on environmentally related taxes, underlines that, whilst significant progress has been achieved in the introduction of environmentally related taxes and green tax reforms, further progress is hindered by two main obstacles: the fear of reduced international competitiveness (quoted as a “major obstacle”) and the possible regressive income distribution impact of these taxes.

4. The purpose of the present discussion paper is to examine these obstacles and ways of overcoming them, so that their benefits in terms of environmental improvement and economic efficiency can be more fully realised.

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2 Large parts of this paper have been culled from the recent OECD (2001) report Environmentally Related Taxes in OECD Countries: Issues and Strategies. I thank the OECD for its willingness to let me use extensive parts of this report, and internal documents as well, when preparing the present paper.
Box 1. The advantages of economic instruments

Taxes are only one type of market based instrument available to policymakers. Other economic measures include tradable emission permits, deposit-refund schemes and environmentally motivated subsidies. But also the phasing out and restructuring of environmentally harmful subsidies is an important instrument in environmental policy. All these instruments differ from command and control regulation in that they provide an incentive to polluters to modify their production and consumption behaviour via price signals.

One of the theoretical advantages of economic instruments is that economic agents have the flexibility to choose how to respond to the price signal, and the assumption is that they do so at the lowest costs and therefore efficiently. In contrast, command and control regulation often takes the form of uniform emission standards across an industry because regulators lack the necessary information about firm-specific pollution abatement costs to design an efficient pattern of abatement among regulated firms, that is a pattern where the marginal abatement costs between firms are equalised (static efficiency). Another advantage of taxes and tradable permits is that they create an ongoing incentive to reduce pollution abatement costs (dynamic efficiency). To comply with command and control regulation firms must meet set emission limits or use specific technologies, but they have no incentive to reduce emissions beyond the set limits. In contrast, taxes create a continuous incentive for firms to further reduce polluting emissions, through innovations and restructuring.

For the purpose of the present paper, an environmentally related tax is defined as any compulsory, unrequited payment to general government levied on a tax base deemed to be of particular environmental relevance. Taxes are unrequited in the sense that benefits provided by government to taxpayers are not normally in proportion to their payments. Fees and charges, on the other hand, are examples of requited payments to the government. They are levied more or less in proportion to services provided, for example the level of wastes collected and treated (OECD definition).3

1.2 Organisation of the paper

Section 2 of the paper discusses the context of environmentally related taxes. To that end, the subsection 2.1 summarises the standard view on key principles of tax policy; subsection 2.2 introduces the concept of green tax reform, and subsection 2.3 discusses briefly the use of revenues from environmentally related taxes. Section 3 takes a closer look at international competitiveness concerns. Section 4 reviews policy options to address these concerns. Next, Section 5 turns to income distributional concerns. Section 6 presents policy options to address distributional concerns. The final section concludes and advances some personal views to stimulate fresh thinking and contribute to a constructive exchange of views on the merits and limitations of environmentally related taxes and the phasing-out and restructuring of environmentally damaging subsidies.

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3 Detailed information can be found in the OECD/EU database on environmentally related taxes, available on: www.oecd.org/env/tax-database
2.0 ENVIRONMENTALLY RELATED TAXES

2.1. Some Key Principles of Tax Policy

7. Governments of OECD countries have many fundamental economic and social objectives that require public spending. Public outlays must in turn be financed through taxation. Because taxation inevitably impinges on most aspects of economic activity, careful consideration must be given to the design of individual taxes – including environmentally related taxes – in addition to the overall tax level and hence the level of related expenditure. Three principles of taxation are especially important.

8. First, so long as taxation affects incentives it may alter economic behaviour of consumers, producers or workers in ways that reduce economic efficiency. These effects should be taken into account when the costs and benefits of public expenditure to be funded are being assessed. A useful guideline is that the tax system should be as neutral as possible, i.e. it should minimise discrimination in favour of or against any particular economic choices. In practice, this points to building tax systems substantially around broad income and expenditure bases and minimising differences in tax rates that can be applied. As a rule of thumb, in the absence of compelling considerations to the contrary, improvements in efficiency can be achieved by:

(a) broadening tax bases by eliminating exemptions and special regimes;
(b) flattening rate structures; and
(c) integrating or aligning different tax rate structures to avoid arbitrage opportunities.

9. However, neutrality need not always be an overriding consideration. Some other factors that can usefully be taken into account are:

(a) It may be desirable to use the tax system to enhance welfare by correcting market failure. This may involve taxing ‘bads’, such as alcohol and tobacco. Taxing polluting substances such as fossil fuels presents yet another example. Where demand for such goods is rather inelastic there will be substantial revenue benefits which allow distorting taxes elsewhere to be lowered.

(b) Allowing taxes to differ across local jurisdictions permits the supply of local public goods and services to be aligned with the particular, but differing, preferences and circumstances of their constituents – although there are different views across countries as to which taxes could usefully be decentralised.

(c) Tax systems influence the (personal) income distribution and may have a role to play in the pursuit of equity goals. The resulting loss in neutrality, e.g. due to progressive taxation, may involve efficiency losses but may also contribute to the perceived fairness of the system.

10. Second, the distribution of taxation’s impact across the population raises issues of equity, or fairness, which must be given substantial weight even if it entails costs in terms of economic efficiency.

11. Third, the practical enforceability of tax rules and the costs arising from compliance are important considerations, the more so since these are both affected by, and have implications for, the efficiency and public perceptions of the fairness of tax systems. The key challenge for tax policy is to strike the best possible balance among these issues.
2.2 Green Tax Reform and the Role of Environmentally Related Taxes

12. Many fiscal policies can affect the environment. Environmental taxes can be instrumental in reducing pollution, waste and resource depletion, but other taxes, tax expenditures and direct subsidies also impact on the environment. The impact of government interventions on the environment should therefore be considered in the context of comprehensive reforms of existing tax and subsidy systems. Such reforms are sometimes referred to as green tax reforms or environmental fiscal reforms.

13. An increasing number of countries are implementing green tax reforms, while others are contemplating doing so. Green tax reforms can be implemented by a series of complementary measures, such as restructuring existing taxes, for example on energy or transport, to reflect the polluting characteristics of various products and economic activities. Alternatively, countries may introduce new taxes, for example on water use, or beer and soft drink containers. It is similarly important that policy makers contemplate options to remove or adjust environmentally harmful fiscal provisions, such as tax exemptions or subsidies having detrimental effects on the environment, while giving due notice to the non-environmental objectives those provisions were meant to serve.

14. Currently, the revenue from (pollution oriented) environmentally related taxes averages roughly 2 per cent of GDP in OECD countries. Given that the total tax to GDP ratio in the OECD area is about 37 per cent, the share of ‘green’ taxes in the tax mix is still limited to some 6 per cent. In 1995, revenues from taxes on petrol, diesel fuel and motor vehicles accounted for 90 per cent of total environmentally related tax revenues.

15. When implementing environmentally related taxes, the environmental and other objectives of such policy measures should be clearly stated from the outset. Often environmentally related taxes can be usefully implemented as part of more comprehensive policy packages, that is in combination with other policy instruments such as scaling back public subsidies for goods that have detrimental effects on the environment.

2.3 The Use of Revenues from Environmentally Related Taxes and from Subsidy Reductions

16. Each country will decide on the use of revenues from environmentally related taxes – and resources freed through reductions in environmentally harmful subsidies – according to its specific economic, fiscal and environmental situation. Several options are available. The additional revenues from “green” taxes and spending cuts could alleviate a budget deficit, contribute to a budget surplus, or finance discretionary increases in other government expenditures. The revenues can also provide room for discretionary cuts in (other) taxes to reduce distortions (efficiency losses) in labour or capital markets, to address competitiveness concerns, or to increase public acceptance of environmental taxes. Certain forms of spending and tax reductions have the potential to undermine the polluter pays principle, and therefore require careful consideration.

17. A typical feature of environmental tax policy is earmarking of certain tax revenues for environmental projects or some other purpose. In itself, this approach is a source of efficiency losses. If there are worthwhile projects, the source of finance should not be a motivating or constraining factor for realising them. Earmarking fixes the use of tax revenue in advance, which may create an obstacle for the re-evaluation and modification of existing tax and spending programmes. Therefore, the economic and environmental rationale of such measures should be evaluated regularly to avoid inefficient spending that would otherwise not be financed from general

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4 Barde and Braathen (2002, 14-16) provide a good overview of green tax reforms in OECD countries.

5 The joint OECD/EU database on environmentally related taxes identifies the earmarking of 82 different taxes and 125 fees and charges in OECD countries.
tax revenues. For example, allocating the proceeds from transport taxes to road construction may lead to over-investment in that sector.

18. Where the revenues are used to enable reductions in other taxes this can limit the efficiency loss generally incurred by the collection of tax revenues if the taxes being reduced are more distorting than the environmentally related taxes being introduced. This question depends on the final incidence of the taxes in question, where different taxes may have different tax burden effects.6

19. One particular, and often debated option, is a shifting of the tax burden from labour to pollution, with the expectation that a lower tax burden on labour would encourage work effort and thereby contribute to a decrease in unemployment, while improving the environment. This is the double dividend hypothesis. The term “double dividend” refers to the possibility that a revenue-neutral tax shift – from employing labour to polluting activities – could generate two possible benefits. The first “dividend” is in terms of a more effective environmental protection, while the second “dividend” arises from the reduction of other distortionary taxes.

20. A full discussion of the double dividend hypothesis is not the purpose of the present paper. However, it should be noted that the double dividend literature casts doubt on whether in each instance a double dividend will result from a shift away from labour or capital taxation in favour of environmental taxes. For example, with nominal wage rigidities, the introduction of an environmental tax that raises production costs and general price levels can have negative employment effects that offset positive employment effects stemming from a personal income tax or payroll tax reduction. The theoretical and empirical evidence for a double dividend is, however, not conclusive (OECD 2001, 37-39). Estimates of potential job growth are uncertain. Also, the primary aim of environmental taxes is to improve the environment and stimulate energy conservation, not to create jobs. Nevertheless, a number of governments are implementing revenue-neutral green tax reform, inter alia with the intention of realising a double dividend (OECD 2001, 51-52). If it could be demonstrated conclusively that positive employment effects follow from switching the burden of taxation from labour to pollution, this evidence could counterbalance the competitiveness and equity arguments used against implementing new or higher environmentally related taxes.

3.0 INTERNATIONAL COMPETITIVENESS CONCERNS

21. In many cases, a major obstacle to the implementation of environmentally related taxes is the fear of reduced international competitiveness in the most affected economic sectors, as underlined in OECD (2001). Where the introduction of environmental taxes forces higher prices on internationally traded goods, tending to make exports less attractive and imports more so, domestic production generally would be expected to decline, at least in the short run, implying job losses and other adjustments in the national economy. Potential job losses are also cited as an argument to continue public subsidies for the production of goods or services with detrimental effects on the environment.

22. The concept of “competitiveness” has several different levels. It is important to differentiate between the competitiveness of individual firms and sectors and the whole economy of a country. A company or sector is competitive if it is able to compete in international markets, with an adequate rate of return. For a country as a whole, the concept of competitiveness is more complex: at the economy-wide level, correcting for market failures provides an improvement in the overall economic outcome, and what represents increased costs for

6 All taxes, including taxes imposed on pollution, are ultimately borne by individuals as consumers, workers, employers or investors. However, final tax incidence – that is, how its burden gets passed on to individuals through some combination of higher prices, lower wages, and/or lower returns to capital – can differ depending on the specific tax and the characteristics of the affected markets.
one firm of sector of industry may lead to reduced costs for others. A prime example is the introduction of higher energy taxes, if the revenue is recycled through lowering labour taxes. In this case the competitiveness of labour intensive production will improve.

23. Competitiveness concerns are likely to be strongest where an environmentally related tax is imposed on products or key factors of production where the goods are traded widely in the international market without import protection or other border tax adjustments. Substitution possibilities are also a critical factor, as limited scope for identifying and financing cleaner production technologies and processes implies an inability to substitute away from environmental taxes. In contrast, competitiveness concerns are likely to be less pressing where an environmental tax is levied on a product or service that cannot be readily imported or exported, and where substitution possibilities are feasible. Since the bulk of environmentally related taxes are levied on energy use and transportation, the impact of these taxes will to a great extent vary between different sectors according to their energy – and transport – intensity.

24. To date, environmentally related taxes imposed by OECD countries have not been identified as causing significant reductions in the competitiveness of any sector, although this can in part be due to the fact that countries applying environmentally related taxes have provided for total or partial exemptions for energy intensive industries. Indeed, the joint OECD/EU database shows that environmentally related taxes are levied almost exclusively on households and the transport sector.7

25. Exemptions and rebates (see Box 2) are one form of response to the competitiveness issue. The design of these measures tends to create inefficiencies in pollution abatement and to undermine application of the polluter pays principle. Indeed, blanket exemptions for polluting products along with rebates for heavy polluting industries can significantly reduce the effectiveness of environmentally related taxes in curbing pollution and similarly reduce incentives for developing and introducing new technologies.8

<table>
<thead>
<tr>
<th>Box 2. Exemptions and rebates in energy taxes</th>
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<tbody>
<tr>
<td>All countries have numerous exemptions and rebates in their energy and fuel taxes, or subsidise environmentally harmful energy sources (for example, coal) and economic activities (for example, heating of greenhouses in the Netherlands and Sweden). These provisions are introduced with a number of policy objectives in mind, but will generally reduce the environmental effectiveness of green taxes and other policy instruments. Some examples of exemptions and rebates in energy taxes include:</td>
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<tr>
<td><strong>Germany</strong>: if payments on energy products exceed DEM 1,000 per year enterprises in manufacturing pay only one-fifth of the standard rate on electricity and of the tax increase for heating oil and gas. Further, if tax payments exceed by 20 per cent the savings made by reduced contributions to the pension insurance, employers can claim a refund.</td>
</tr>
<tr>
<td><strong>The Netherlands</strong> applies both tax rebates and a “tax limit”. The tax rate on electricity has three brackets, with the first 10,000 kWh of annual electricity use taxed at € 0.06 per kWh, the next 40,000 kWh at € 0.02 per kWh and consumption over 50,000 kWh at € 0.0061. The excess of electricity consumption over 10 million kWh (during a 12-months period) is completely exempted from taxation. A similar provision applies when consumption of natural gas exceeds 1 million m³. The rate of the natural gas tax has also three brackets,</td>
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</table>

7 The OECD/EU database is available at www.oecd.org/env/tax-database.
8 For example, a study by the Institut für Systemanalyse und Innovationsforschung, Karlsruhe, Germany indicates that the number of patents for energy-efficient products increases with the level of energy prices.
with the first 5,000 m$^3$ of annual use taxed at € 0.124 per m$^3$, the next 165,000 m$^3$ at € 0.058 per m$^3$ and consumption over 170,000 m$^3$ at € 0.0107.

**Norway** exempts manufacturing industries from electricity taxes, and certain energy products only used by industry are taxed at lower rates – if they are taxed at all.

**United Kingdom**: Energy-intensive firms that have signed up to binding negotiated agreements on energy efficiency receive an 80 per cent discount on the “Climate change levy”. The country is, however, somewhat special in that business use of energy is taxed, while household energy is use tax free.

Source: OECD (2001, 62); Belastingwetten (2002, 1138 and 1141)

26. Those strongly opposed to introducing environmentally related taxes on competitiveness grounds sometimes tend to forget that alternative policy instruments used to reduce pollution, such as regulations, also affect firm’s costs and impact on the competitive position of individual sectors and the country as a whole. By enhancing the economic efficiency by which a given target is reached, properly designed taxes will help minimise adverse effects on competitiveness nation-wide – compared to e.g. direct regulation or “voluntary approaches”.

27. Furthermore, the opposition tends to overlook that environmental taxes are one of a number of factors determining a firm’s overall competitiveness. Research on economic performance shows that skills and capital investment largely determine sectoral competitiveness.

28. Lastly, where the competitiveness of certain firms is negatively affected and output is reduced and accompanying jobs are lost, it is important to recall that reduced domestic production and use of environmentally damaging products is an intended outcome of a policy decision to use taxes to ensure that the social costs of environmental degradation are reflected in market prices and behaviour. Where a given product can no longer be profitably produced as a result of a green tax reform, other sectors of the economy producing near substitutes would be expected to see increased demand for their output.

29. Unilateral efforts of national governments will be frustrated where environmental taxes can be avoided due to importing products from other jurisdictions which do not impose similar taxes or levy the green tax concerned at lower rates. In many cases, production in those tax free jurisdictions will entail substantial environmental damage, given that producers – in the absence of government action – do not have to take into account the (full) costs of environmental degradation associated with producing the particular good. As a result, unilateral efforts by an environmentally ambitious government may increase total damage to the environment, unless the ‘leakage’ of intended environmental impacts is stemmed, for example by introducing tax border adjustments, such as corrective import duties.
4.0 ADDRESSING COMPETITIVENESS CONCERNS

4.1 Two strategies, four instruments

30. The OECD report *Environmentally Related Taxes in OECD Countries*, released in 2001, was prepared under the supervision of the two Committees most directly involved, i.e. the Committee on Fiscal Affairs and the Environment Policy Committee. The report amply demonstrates that at present all OECD countries that have introduced CO₂ and energy taxation apply differentiated tax rates and offer some sectors and products complete exemptions in order to mitigate any negative impacts on the competitive position of domestic industry. The OECD report suggests several options for a more effective imposition of environmentally related taxes without reducing the given country’s competitiveness.

31. In addressing competitiveness concerns, countries can adopt two strategies (Barde and Braathen 2002, 20). The first is to wait and see whether other countries will take any initiatives. But if no country is willing to go ahead, no action is taken, even though all countries concerned may be convinced that the introduction of a new environmentally related tax would be the best way to tackle an urgent environmental problem. The second strategy is to introduce environmentally related taxes, but with special provisions to protect sectors vulnerable to international competition. Without exception, OECD countries that have introduced green taxes have also used one or more of the following instruments to soften the impact on sectors most affected: (1) revenue recycling; (2) exemptions for specific activities, sectors or products; (3) reduced tax rates for certain sectors, products or inputs; or (4) border tax adjustments.

32. *Revenue recycling* means that the revenues from the environmentally related tax are entirely or partially channelled back to the affected firms. Ploughing back revenues can take the form of targeted spending programmes, for example direct subsidies for energy saving or pollution reducing investments or R&D in pollution control technologies. Alternatively, countries may opt to give tax refunds to certain sectors or categories of economic activity.

33. *Tax exemptions* for specific activities, sectors or products take many forms and are widely used. Some sectors or industries may be fully exempted, in other cases exemptions can only be claimed if certain energy users or polluters meet additional requirements.

34. *Reduced rates* or *zero rates* for certain sectors, products or inputs are also widely in use.

35. In certain markets, *border tax adjustments* can be usefully applied to soften the competitiveness impacts of unilaterally imposed green taxes. Normally, these adjustments would assume the form of imposing equivalent taxes on imported goods and waving the environmentally related tax on exported goods. Such taxes on imported goods could be based on product characteristics or – within certain limitations – on characteristics of the technology used to produce the goods concerned. However, import or export border tax adjustments tend to be imprecise. Similarly, the administrative and compliance costs with establishing border tax adjustments could be large. Countries may also be tempted to use border tax adjustment to favour domestic

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9 Under the earlier German “coal penny”, applied until 1996, a tax was levied on electricity. If the tax burden endangered the survival of a company, reductions could be granted on a case by case basis. Only a few dozen firms applied for such relief, although at the time the tax burden was higher than the electricity tax which applies today.
producers. In those cases the World Trade Organisation could eventually be asked to rule whether some of these measures constitute undue protection of national industries.\textsuperscript{10}

4.2 Policy options for more effective green taxes

36. Revenue recycling, exemptions and reduced rates of environmentally related taxes are all instruments which tend to erode the effectiveness of these taxes. This subsection considers ways in which countries may stem the “leakage” of intended environmental impacts and thus work towards more effective green taxes.

37. The OECD (2001) report suggests several options for a more effective imposition of environmentally related taxes, without reducing a country’s competitiveness:

(a) Integrate environmentally motivated reforms better with broader fiscal reforms (see paragraph 38).

(b) Announce the introduction of new taxes and tax rate increases well in advance, and phase out existing rebates and exemptions gradually, thus enabling a smooth adaptation of economic agents over a period of time.

(c) In instances where exemptions and rebates are currently given for competitiveness reasons: Impose full tax rates on industry, but channel part of the revenues back to industry in such a way that marginal abatement incentives are maintained; for example by providing subsidies to industrial polluters for R&D or investments aimed to reduce pollution levels.\textsuperscript{11}

(d) The negative environmental effect of exemptions and rate reductions can also be limited by ensuring that firms that currently benefit from exemptions and reduced tax rates sign up to stringent mitigation measures.\textsuperscript{12}

(e) A two-tier rate structure, with lower rates for more internationally exposed sectors, would be a better option than full exemptions for some sectors; for example, an energy tax could have higher rates for the health care sector and domestic building industry, and lower rates for the petrochemical industry.

38. Countries would benefit from exploring better integration of environmentally motivated reforms of their fiscal systems with broader fiscal reforms. It is the combined effects of these reforms that will determine the impacts on sectoral and nation-wide competitiveness. Possible negative competitiveness impacts on some sectors from the environmentally related part of a broader reform might thus be reduced. And while some sectors may face a net loss in competitiveness if countries expand environmentally related taxation unilaterally, other more environmentally benign sectors of the economy could improve their competitiveness. This will partly depend on how revenues generated in the reform are redistributed.

39. A number of governments have implemented environmentally related taxation in a revenue-neutral manner: revenues raised are fully recycled back to taxpayers. If revenue recycling is based on factors that are

\textsuperscript{10} Under the U.S. taxes on ozone-depleting chemicals, a wide range of imported products are taxed according to the amount of such chemicals assumed to have been used in their production. If importers can document that a smaller amount of ozone-depleting chemicals has been used in the production process, taxation will be based on the actual amounts. For a further discussion of U.S. experiences with border tax adjustments in environmentally related taxes, see OECD (2001), Davie (1995) and Hoerner (1998).

\textsuperscript{11} Another possibility is to base payments back to industry on some measure of production. For example, under the Swedish NO\textsubscript{x} charge, power plants pay 40 SEK per kg NO\textsubscript{x} emitted. All the revenues are, however, recycled back to these plants in proportion to their share of total energy output.

\textsuperscript{12} However, available evidence on the effectiveness of voluntary approaches is not conclusive (see OECD 1999).
relatively independent of the current amount of environmental damage, the environmental effectiveness of the
tax reform will be greater than in the case of exemptions and reduced rates, since the price signal to polluters
is not diluted (the tax burden increases with environmental damage done).

40. Note that if revenues from environmentally related taxes are recycled back to polluters on the basis
of their emissions in the past, this would be equivalent to allocating grandfathered emission permits under a
tradable permits scheme based on historical pollution levels.

41. A further option open to governments is to press for international harmonisation of domestic
environmentally related taxes. This option seems, for now, politically not feasible. It would imply
governments giving up one of their basic sovereign rights: the right to tax in a way that best suits the political
realities, economic needs and social values within each country. But countries should certainly explore the
perspective for moving towards greater coherence in the design of their green taxes to reflect commonly
agreed environmental objectives.

42. Unilateral efforts towards environmental protection could be strengthened through greater co-
operation amongst countries contending with similar competitiveness pressures. Thus, one way to address
international competitiveness concerns is for countries to share information, experiences and best practices as
regards possible options and opportunities for expanding the application of environmentally related taxes.
Countries should consider the important progress that may be achieved by giving up some of their autonomy
in tax matters for the common goal of effectively tackling environmental challenges. One option would be to
strive for a “gentlemen’s agreement” under which all countries promise to introduce minimum tax rates on
environmentally relevant tax bases. There are many other instances of successful international co-operation,
both in the tax area (e.g. the sixth VAT Directive) and in other areas as well (air control, postal and telephone
services), that could serve as an example here.

5.0 INCOME DISTRIBUTION CONCERNS

43. Some environmentally related taxes are income regressive (OECD 2001, 87-88). That is to say,
poorer households pay a disproportionate share of their income in these taxes relative to richer households.
This has led the distributional incidence of environmental policy measures to become a key issue in the policy
debate. In addition to impacting more on low-income households, environmentally related taxes can also
increase regional income disparities. However, a complete assessment of distributional effects should also
include the secondary impact of any compensation payments, tax reductions, and the induced employment
effects. Furthermore, the distribution of the environmental benefits resulting from the tax should take into
account. Environmental benefits as a result of government interventions might be identified and quantified
using “hedonic price methods”, for example by studying the variation in housing prices between areas of
different environmental quality.

44. In response to income distribution concerns, governments may adopt various mitigation and
compensation measures. The OECD defines mitigation as an ex ante measure to reduce the effective rates of
environmentally related taxes and therefore alleviate the tax burden for specific groups. For example, the
Dutch regulatory tax on small energy users previously had a zero rate band (or “tax floor”) for the first 800 m³
per year for gas and 800 kWh per year for electricity. In 2001 the Dutch replaced these tax-free allowances by

13 The sixth VAT Directive was instrumental in harmonising the VAT tax bases of EU countries and introduced
minimum VAT rates as a weapon against a potential ‘tax race to the bottom’.
a fixed tax reduction for each household connected to the electricity network. In many cases, households in the Netherlands with income equal to the official subsistence level do not pay municipal waste collection and sewage taxes either, for income political reasons. As part of the decentralisation effort, local councils decide whether this tax waver applies. The OECD defines compensation measures as basically ex post and outside the realm of the taxes as such, so they do not affect the tax base or rate structure of environmentally related taxes. Compensatory measures limit the initial negative impact of the green tax on household income. For example, the Swiss tax on the sulphur content of heating oil is refunded to households on a per capita basis.

45. The terminology adopted by OECD can lead to confusion, because in many cases compensating measures will be taken at the same time as a green tax is introduced, and not afterwards (ex post). What distinguishes the two strategies is a reduction of the impact of the tax on low-income households by provisions in the tax legislation itself (mitigation) or by reducing other taxes or introducing transfer payments (compensation).

<table>
<thead>
<tr>
<th>Box 3. Income distribution based exemptions and rebates</th>
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<tbody>
<tr>
<td><strong>Germany</strong> offers a 50 per cent rebate on the electricity tax for storage heaters, installed before April 1999. Such heaters are concentrated in low-income households.</td>
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<tr>
<td><strong>The Netherlands</strong> has a tax on domestic energy use (natural gas, electricity) with a fixed tax reduction of €142 (in 2002) per household connected to the electricity network.</td>
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<tr>
<td>The <strong>United Kingdom</strong> exempts domestic use of energy from its “Climate change levy”.</td>
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</tbody>
</table>

Source: OECD (2001, 64)

6.0 ADDRESSING INCOME DISTRIBUTION CONCERNS

46. The preceding section shows that strategies to mitigate the impact of environmentally related taxes for low-income households include:

1. Establishing a consumption “floor” below which no tax is levied.
2. Introducing a dual rate structure with a reduced or zero rate for low-income households.

47. Mitigation measures in the form of a consumption floor and reduced tax rates for lower incomes to address regressivity concerns reduce the environmental effectiveness of the tax by cancelling out some or all of the incentives to change consumption and investment behaviour. The first option, establishing a consumption floor, also benefits higher-income households not in need of income support. The second option, introducing a dual rate structure, allows targeting the tax reduction to the group policymakers want to help foremost. However, the option of an income-tested green tax rebate has several drawbacks. First, in most cases the government agencies concerned will use taxable income as a point of reference. Taxable income may not always reflect ability to pay, notably in cases where households claim significant deductions (mortgage interest) and exemptions (tax-exempt capital gains). For households outside the tax net no taxable income can be established. Next, under the second option, as household income increases, the tax reduction is gradually phased-out implying an implicit tax on additional income. Thus, an income-tested tax rebate increases the

14 In 2002, the reduction amounts to 142 per year (see Box 3). The recent policy change in the Netherlands represents an interesting example of a shift from “mitigation” to “compensation”.

15 The case for and against income-tested transfers to households is discussed in Garfinkel (1982).
“wedge” between labour costs to employers and the corresponding net take-home pay of employees. The economic literature associates a large wedge with less demand for labour because labour costs are higher and with reduced labour supply because – in net terms – work pays less. Reduced labour supply seems to be the impact of greatest relevance here. Finally, the determination of household income for the purpose of the green tax rebate will involve substantial administrative and compliance costs, especially in countries where personal income tax is assessed on an individual basis.

48. For all these reasons, governments should seek other, and more direct, measures if low-income households are to be given special treatment. Compensation measures can maintain the price signal of the tax, whilst reducing or eliminating the impact of the tax on household income (for average polluters). A compensation mechanism that retains the incentive effect of the tax is to use lump sum transfers within the tax and benefit system. In economic terms, these transfers are similar to a lump sum rebate of an environmentally related tax. However, using the tax and benefit system will often be more cost-effective, because the agencies entrusted with carrying out these programmes already possess much information about households that may be needed, for example to target financial compensation.

49. Three strategies to compensate low-income groups include:

(a) **Lump sum compensation**, calculated on the basis of average green tax payments per household, in the form of cash transfers or credits against income tax. Cuts in income taxation may not benefit groups of low-income households because they pay little or no income taxes (Smith 1998). To assist the households concerned, countries can use **tax credits**. Tax credits are amounts deductible from tax payable (as distinct from deductions from the tax base). Two types of tax credits are distinguished, those (referred to as wastable tax credits) which are limited to the amount of the tax liability and therefore cannot give rise to a payment by the government to the taxpayer, and those (referred to as non-wastable tax credits) which are not so limited, so that the excess of the credit over the tax liability can be paid to the taxpayer (OECD 2001a, 265). To compensate poorer households for the impact of environmentally related taxes, non-wastable tax credits are the preferred option because the revenue service pays out the excess of the credit over the tax liability can be paid to the taxpayer (OECD 2001a, 265). To compensate poorer households for the impact of environmentally related taxes, non-wastable tax credits are the preferred option because the revenue service pays out the excess of the credit over the tax liability can be paid to the taxpayer (OECD 2001a, 265). To compensate poorer households for the impact of environmentally related taxes, non-wastable tax credits are the preferred option because the revenue service pays out the excess of the credit over the tax liability can be paid to the taxpayer (OECD 2001a, 265).

(b) **Income-tested compensation**, with two further options (see also Box 4). One way to calculate the amount in compensation would measure the green tax due by **average energy users or polluters against household income**. A second, more complicated mechanism would calculate the compensation by comparing **actual** green tax payments of households to household income. The rationale for this variant might be that poor households have sometimes limited options to reduce their energy use, such as in the case of block heating. However, if it were decided that households need not pay more than say 2 per cent of their income in a given green tax, the price signal would be ineffective once a household had exceeded this threshold. The case for and against income-tested transfers was already discussed in paragraph 47.
(c) Reduction of other taxes, sometimes referred to as “tax shifting”. In this situation, the regressive impact of an environmentally related tax is (partially) offset by a reduction in the marginal rates of other taxes, specifically taxes on labour. Box 5 describes the application of this policy mix in the Netherlands in the years 1996–2001.

### Box 4. Income-tested compensation for green tax

Assume a country introducing an electricity tax. The tax base is kWh of electricity consumed. The tax rate is € 0.06 per kWh, which happens to be the current rate of the energy tax in the Netherlands. Given that households use on average 2,500 kWh of electricity per year, the lump sum payment through the national tax or benefit system should amount to € 150 if – on average – households are to be fully compensated. Furthermore, assume policymakers want to target compensation payments to low-income groups. Once annual household income is over € 10,000 the lump sum payment is therefore reduced at a rate of 2.5 per cent. Suppose the initial household income of € 10,000 rises by € 200. The tax credit would then be reduced by € 5 (2.5 per cent of € 200) to € 145. It follows that households with annual income over € 16,000 no longer qualify for compensation.

Policymakers may hold that some low-income households are not able to reduce their electricity consumption by very much, because they lack resources to invest in energy saving equipment. They might amend the programme so that households with income of € 10,000 or less and with an above average electricity bill receive full compensation for the energy tax. In the previous example, if electricity use is kWh 3,000, the tax actually paid (€ 180) would be fully refunded. This entitlement to extra compensation would similarly be reduced at a rate of 2.5 per cent as household income rises above € 10,000. In this case, qualifying households with above average energy consumption and income below € 10,000 would have no tax incentive at all to reduce their electricity consumption, insofar as they had any opportunity to do so. For households with income in the range € 10,000 to € 16,000 the tax incentive to save on electricity would be reduced (see table).

<table>
<thead>
<tr>
<th>Annual income (€)</th>
<th>Energy tax (€)</th>
<th>Compensation (€)</th>
<th>Net impact of energy tax (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8,000</td>
<td>180</td>
<td>180</td>
<td>0</td>
</tr>
<tr>
<td>10,000</td>
<td>180</td>
<td>180</td>
<td>0</td>
</tr>
<tr>
<td>12,000</td>
<td>180</td>
<td>120</td>
<td>60</td>
</tr>
<tr>
<td>14,000</td>
<td>180</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td>16,000</td>
<td>180</td>
<td>0</td>
<td>180</td>
</tr>
</tbody>
</table>

In the second case compensation can only be provided after the year has ended and actual electricity consumption has been measured. It is also clear that this programme design implies high administrative costs to deliver limited amounts of compensation to a relatively small group of households.

50. Compensation measures could be improved if they were targeted at low-income groups and other factors that cause the equity problems. For example, although low income is a factor that influences energy efficiency in households, there are other factors, like tenure (renting, not owning) and lack of capital to invest in more energy efficient heating and electrical equipment. Therefore, where the root cause is not low income, other policies, for example direct regulation and subsidies, might be more effective than mitigation and compensation measures.
Box 5. Case study: the Netherlands

In 1996 the Netherlands introduced a regulatory energy tax (RET) on the use of natural gas and electricity. In later years, the rates of the RET were raised several times. Box 2 reports the rates that apply in 2002. As RET-rates went up, the rate of the first bracket of the personal income tax was stepwise reduced by 2.5 percentage points, explicitly to redress in part the distributional impact of the RET. The table below shows the cumulative impact of the RET-PIT switch in years 1996–2001 on net disposable income of several socio-economic groups, including the average production worker (APW). At first sight, the numbers in the table suggest that all groups were made worse off. However, during the five-year period under consideration gross wage levels rose continuously and benefit payments were regularly increased. As a consequence, although the isolated impact of the RET-PIT switch was slightly negative, the large majority of Dutch households saw an overall increase of net disposable income between 1995 and 2002.

The administrative costs associated with this compensation mechanism were negligible, since the compensation measures were a part of the annual revision of the personal income tax rate structure. This revision takes place anyway, notably because the brackets lengths are fully adjusted for inflation every year.

<table>
<thead>
<tr>
<th>Household type</th>
<th>Net disposable income (2001, in euro)</th>
<th>RET a (in % of net disposable income)</th>
<th>PIT a (in % of net disposable income)</th>
<th>Balance a (in % of net disposable income)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers (couple, 2 kids)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal minimum wage</td>
<td>14,855</td>
<td>-2.6</td>
<td>1.1</td>
<td>-1.5</td>
</tr>
<tr>
<td>APW</td>
<td>20,870</td>
<td>-1.8</td>
<td>0.9</td>
<td>-0.9</td>
</tr>
<tr>
<td>2 x APW</td>
<td>33,000</td>
<td>-1.6</td>
<td>0.6</td>
<td>-1.0</td>
</tr>
<tr>
<td>Benefit recipient b (couple, 2 kids)</td>
<td>13,700</td>
<td>-2.7</td>
<td>1.3</td>
<td>-1.4</td>
</tr>
<tr>
<td>Pensioner b (couple)</td>
<td>12,210</td>
<td>-2.2</td>
<td>0.9</td>
<td>-1.3</td>
</tr>
</tbody>
</table>

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a In percent of net disposable income.
b At “official” subsistence level.
Source: Ministry of Finance, Netherlands.

7.0 CONCLUSIONS AND ISSUES FOR DEBATE

7.1 Competitiveness concerns

Dealing with international competitiveness concerns raises a number of difficult and complex issues that should encourage policymakers to rethink choices over appropriate environmental tax bases, tax rates and exemptions. In certain situations competitiveness arguments currently being advocated do not hold, and environmentally related taxes can be introduced unilaterally and without extensive rebates and exemptions, in particular where the taxed item is not widely traded. Even in those sectors where international trade is a factor, unilateral action can proceed where feasible options are available to affected firms to reduce their tax burden, for example by fuel switching in response to a carbon tax or investing in abatement technology and clean product/production development. Too often in such cases these responses are delayed by the granting of rebates and exemptions with no strings attached.
52. Phasing out rebates and exemptions and pre-announcing the introduction of new environmentally related taxes and tax rate increases are two policy options that would improve the environmental effectiveness of these taxes in such circumstances.\textsuperscript{16} As noted, border tax adjustments can be usefully applied to address competitiveness concerns in certain markets. Such adjustments may be based on characteristics of products or the technology used to produce them. However, technical, administrative and legal constraints may apply in using border tax adjustments, implying that such mechanisms cannot be relied upon in each instance to offset potentially negative impacts on the sectors in question from competitiveness pressures.

53. Various shortcomings with unilateral approaches in certain cases raise the prospect of considering a co-ordinated approach. For a start, countries should be encouraged to share information, experiences and best practices concerning options and opportunities for using environmentally related taxes and similar instruments to address common environmental concerns.

For discussion: Competitiveness implications

54. Please review and assess how your country has addressed international competitiveness concerns for major environmentally related taxes now in place. Discuss what political and administrative considerations have motivated policymakers to opt for measures currently in place to address such concerns. Have environmentally related taxes been blamed for any significant plant closures and/or relocations? Flag any environmentally related taxes under serious consideration, over the last five or ten years, that were not adopted, mainly or solely for competitiveness reasons.

55. An option is that countries give up some of their autonomy in tax matters for the common goal of tackling environmental challenges more effectively. Please explain and discuss the obstacles that must be overcome in the case of your country to achieve greater effective international cooperation in matters of environmentally related taxes.

56. Potential job losses are also cited as an argument to continue the application of environmentally harmful subsidies. Please review what considerations have motivated policymakers to introduce and continue the more important of these subsidies in your country until now. Discuss how a reduction of these subsidies might be achieved with limited negative impacts on employment.

7.2 Income Distributional Concerns

57. Although most studies show environmentally related energy and CO\textsubscript{2} taxes to be somewhat income regressive, it is possible to compensate the lower income groups. Indeed, in many cases the impact of environmentally related taxation has been softened by various mitigation and compensation measures. However, the impact of the tax alone is only part of the story, since a full assessment would also include the secondary impact of any compensation payments, tax exemptions, induced employment effects and the distribution of the environmental benefits resulting from the tax. Mitigation practices reduce the environmental effectiveness of taxes. In the case of regressivity, governments should seek other, and more direct, measures if lower-income households are to be compensated. Such compensation measures can maintain the price signal of the tax whilst reducing the negative impact of the tax on household income.

\textsuperscript{16} However, a yearly focus on the “agreed” tax hikes can increase the political difficulties of undertaking the reform.
For discussion: Distributive implications

58. Please describe and discuss how your country has addressed income distribution concerns for major environmentally related taxes now in place. What political and administrative considerations have motivated policy-makers to opt for mitigation and/or compensation mechanisms currently in place? Flag any environmentally related taxes under serious consideration that, over the last five or ten years, were not adopted, mainly or solely because of income distributional concerns.

59. Please comment on the conclusion of this paper that lump sum compensation through the tax and benefit system is to be preferred over mitigation measures in the environmentally related tax itself (exemptions from tax base, reduced or zero rates), because the latter reduce the price signal and thus the environmental effectiveness of the tax.

60. Please comment on the conclusion that lump sum compensation through the tax system will generally (1) lead to a greater number of households being compensated and (2) prove to be more cost-effective, given that the revenue service runs the most complete administration, unless the compensation is procured directly by the provider of the taxed product (energy) or service (waste collection and handling).

61. Do you agree that lump sum compensation in the form of non-wastable tax credits against personal income tax offers the best guarantee that all qualifying households are compensated for the environmentally related tax?

7.3 The way forward

62. The recent OECD report (OECD 2001, 11) states that “one way to address international competitiveness concerns is for countries to share information, experiences and best practices as regards possible options and opportunities for expanding the application of environmentally related taxes. Countries concerned with competitiveness implications of adjusting certain environmentally related taxes on a unilateral basis could consider possible concerted policy options and changes, decided and implemented at the national level, but within a framework which provides for a multilateral dialogue.”

For discussion: The way forward

63. What kind of internationally co-ordinated and concerted action could be implemented to help overcome the competitiveness obstacle?

64. What type of action – and at what level – should be given priority?
REFERENCES

Barde and Braathen (2002)

Belaastingwetten (2002)

Davie (1995)
Bruce F. Davie, Border Adjustments for Environmental Excise Taxes: The U.S. Experience. Paper prepared for the Allied Social Science Associations, 8 January 1995. The author can be contacted at bruce.davie@do.treas.gov.

Hoerner (1998)

Garfinkel (1982)

OECD (1999)

OECD (2001)

OECD (2001a)

Smith (1998)