

Unclassified

CCNM/CHINA/EPOC(98)4



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

OLIS : 04-Sep-1998

Dist. : 08-Sep-1998

PARIS

Or. Fre.

CENTRE FOR CO-OPERATION WITH NON-MEMBERS  
ENVIRONMENT POLICY COMMITTEE

CCNM/CHINA/EPOC(98)4  
Unclassified

**Programme of Dialogue and Co-operation with China**

**WORKSHOP ON ENVIRONMENTAL TAXES IN CHINA AND OECD MEMBER COUNTRIES**

**BACKGROUND PAPER No. 1: ENVIRONMENTAL TAXES IN OECD COUNTRIES: AN OVERVIEW**

(Paris, 5th and 6th October 1998)

*This paper was prepared by Mr. Jean-Philippe Barde, Principal Administrator, Environment Directorate, OECD.*

68779

Ta. 19097 - 07.07.98 - 31.08.98

Document complet disponible sur OLIS dans son format d'origine

Complete document available on OLIS in its original format

Or. Fre.

## ENVIRONMENTAL TAXES IN OECD COUNTRIES: AN OVERVIEW

Jean-Philippe Barde<sup>1</sup>

While the use of economic instruments to protect the environment (such as taxes, charges or tradable permits) has spread considerably in OECD countries, it may be said that the emphasis placed by some countries on environmental taxes, especially as part of new "green" tax reforms, reflects the latest generation of economic instruments. This tendency is due to many factors [Barde (1992, 1997), OECD (1994)], particularly the need to improve the effectiveness of policies based to a great extent on rigid and cumbersome regulations, which are costly both for the public authorities and for the regulated sectors, and which are difficult and sometimes impossible to implement. It has also appeared that "integrating" environmental policies effectively with sectoral policies (such as energy, transport or agriculture) is the best way of making such policies more effective [OECD (1996a)]. In this context, fiscal instruments provide an ideal means of injecting appropriate signals into the market, of eliminating or reducing structural distortions (such as unsuitable energy and transport tariffs) and of internalizing externalities, while at the same time improving the efficiency of existing measures. The end result is a real structural readjustment of economies.

Other factors which account for the tendency include the need for more tax revenues to finance the general government budget, as well as specific environmental funds or programmes, and the search for "alternatives" to traditional regulations, as part of the move towards "regulatory reforms" or "deregulation" which currently prevails in most industrialized countries [OECD (1997a)].

### 1. ENVIRONMENTAL TAXES AND FISCAL REFORM

Most countries, and OECD countries in particular, urgently need to introduce more flexibility and efficiency in their economic structures. This implies, *inter alia*, adjusting tax systems in order to reduce distortions and increase market flexibility, and making environmental policies more effective. Most OECD countries have undertaken significant tax reforms since the end of the 1980s, chiefly in two ways: first by reducing tax rates in the higher income tax brackets (which fell on average by ten points between 1986 and 1995) and lowering corporate tax (down 8.5 points over the same period); secondly, by broadening the tax base, especially for indirect taxes (VAT and consumption taxes)<sup>2</sup>. This thorough overhaul of tax systems has provided an excellent opportunity to introduce an environmental dimension in taxation, a policy which is now referred to as "green tax reform" or "greening tax systems".

This greening of taxation may consist of three complementary policies: eliminating tax distortions, restructuring existing taxes, and introducing new environmental taxes, or "ecotaxes".

---

<sup>1</sup> Environment Directorate of the OECD. The views expressed in this text are those of the author and do not necessarily reflect those of the OECD.

<sup>2</sup> However the share of income taxes in total tax revenue decreased only slightly because of the broadening of the base of these taxes.

### 1.1 Eliminating tax distortions

Many fiscal measures can either directly or indirectly produce adverse effects for the environment. One such measure is *direct subsidies*. For example, *farming subsidies* (estimated at 297 billion dollars a year in OECD countries in 1996, or 1.3 per cent of GDP) are one of the causes of overfarming of land, excessive use of fertilizers and pesticides, dry soil conditions and other problems [OECD (1996b)]. Similarly, irrigation water is often charged below its real price, which leads to wastage (in the United States, irrigation water is subsidized to the extent of 75 per cent). In the area of *energy*, subsidies on coal, the most polluting fuel, still came to 7 billion dollars in 1996 in six OECD countries, which admittedly was lower than the 16.5 billion dollars for 1989. It is estimated that subsidies to industry amounted to 49.3 billion dollars in 1993; when subsidies encourage the use of certain raw materials and greater energy consumption, there can be negative fallout in terms of recycling and waste.

**Table 1. Changes in support levels in some countries**

<i>Support for :</i>	1986-1988 <sup>a</sup>	1989	1991	1993	1995	1996	<i>Remarks</i>
<b>Agriculture</b>							
Total transfers	279	264	332	337	333	297	US\$ billion
	253	239	269	287	255	234	ECU billion
Total transfers as % of GDP	2.2	1.8	2.0	1.9	1.5	1.3	
PSE % <sup>b</sup>	45	37	42	42	40	36	
<b>Coal output</b>	13.2	16.4	10.3	8.0	8.1	6.7 <sup>p</sup>	Total PSE <sup>b</sup> in Germany, UK, Spain, Belgium and Japan (US\$ billion)
<b>Industry<sup>c</sup></b>		39.0	54.2	49.3			Declared net public expenditure in OECD countries (US\$ billion)

**p** - preliminary

<sup>a</sup> 1987 for coal output statistics.

<sup>b</sup> Production subsidy equivalent: measure of the value of monetary transfers to producers, determined by policies in any given year, including transfers from both consumers and taxpayers.  
PSE % is total gross PSE expressed as a percentage of output value.

<sup>c</sup> Support for industry overlaps other estimates, such as support for energy.

*Source:* OECD (1998).

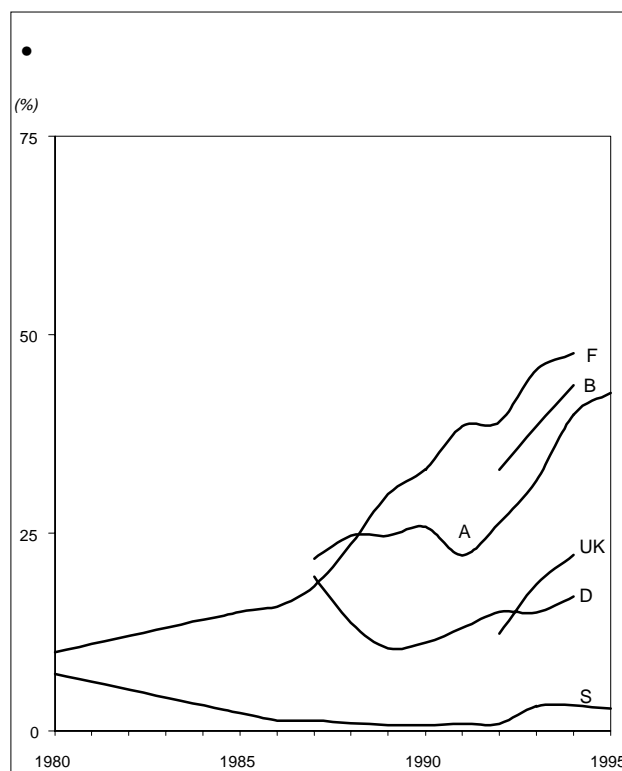
A second category of distortion arises from tax measures (tax variations or exemptions). For instance, *coal*, the most polluting fuel, is also the least taxed; in OECD countries in 1995, the average coal tax per barrel of oil equivalent was 0.3 dollars in 1995, compared with 22 dollars for oil (IEA). The *transport* sector, a major source of pollution and other harmful effects, is affected by many distortions (see box 1). For instance, the virtually systematic undertaxing of diesel oil in many countries has led to a constant increase in the number of diesel vehicles, which are more polluting and noisy, and to undue development of road transport of goods. In countries of the European Union, the proportion of diesel fuel comes to between 30 and 61 per cent (except for Finland, where it is only 16 per cent) [EUROSTAT (1996)]. Figure 1 clearly shows that the proportion of diesel vehicles rises in countries where the tax differential is highest. In France, diesel vehicles accounted for 47 per cent of the market in 1994.

There are many more examples of that kind. It is clear that the "greening" of taxation has to start with a systematic inventory and a correction of fiscal measures (subsidies and taxes) which are harmful

for the environment. This tidying up should be done before any thought is given to introducing ecotaxes. The OECD report on *Improving the Environment Through Reducing Subsidies* [OECD (1998)], presented at the ministerial-level OECD Council meeting in April 1998, concluded:

“If an environmentally detrimental activity is subsidized, the method which consists in creating a price differential in favour other solutions less harmful to the environment, by subsidizing less detrimental activities, is only second best. It is preferable to remove all support for the environmentally detrimental activities and to internalize any external costs they may entail.” (p. 41).

**Figure 1. Diesel vehicles as % of new registrations  
(selected EU countries)**



Source: EUROSTAT(1996a)

**Box 1. Environmentally detrimental tax measures  
in the area of transport**

Parking space	Free (or reduced-cost) parking space provided by employers is often not included as taxable income (benefit in kind).
Company cars	The use of company cars for commuting is not considered a taxable benefit in some countries.
Deductibility of commuting expenses	The costs of commuting may be deductible from taxable income and in many countries no distinction is made between the use of public transport and private cars.
Refund of commuting costs	Commuting costs (by private car or public transport) are reimbursable on a non-taxable basis in a number of OECD countries, which allow employers to reimburse employees using private cars (according to the distance from home to work) free of income tax.
Under-taxation of diesel oil	In the European Union, diesel oil is always taxed less than lead-free petrol (except in the United Kingdom).
Tax exemption of aviation fuel	Encourages growth of air transport.
No VAT on airline tickets	Same effect.

Source: OECD, EUROSTAT

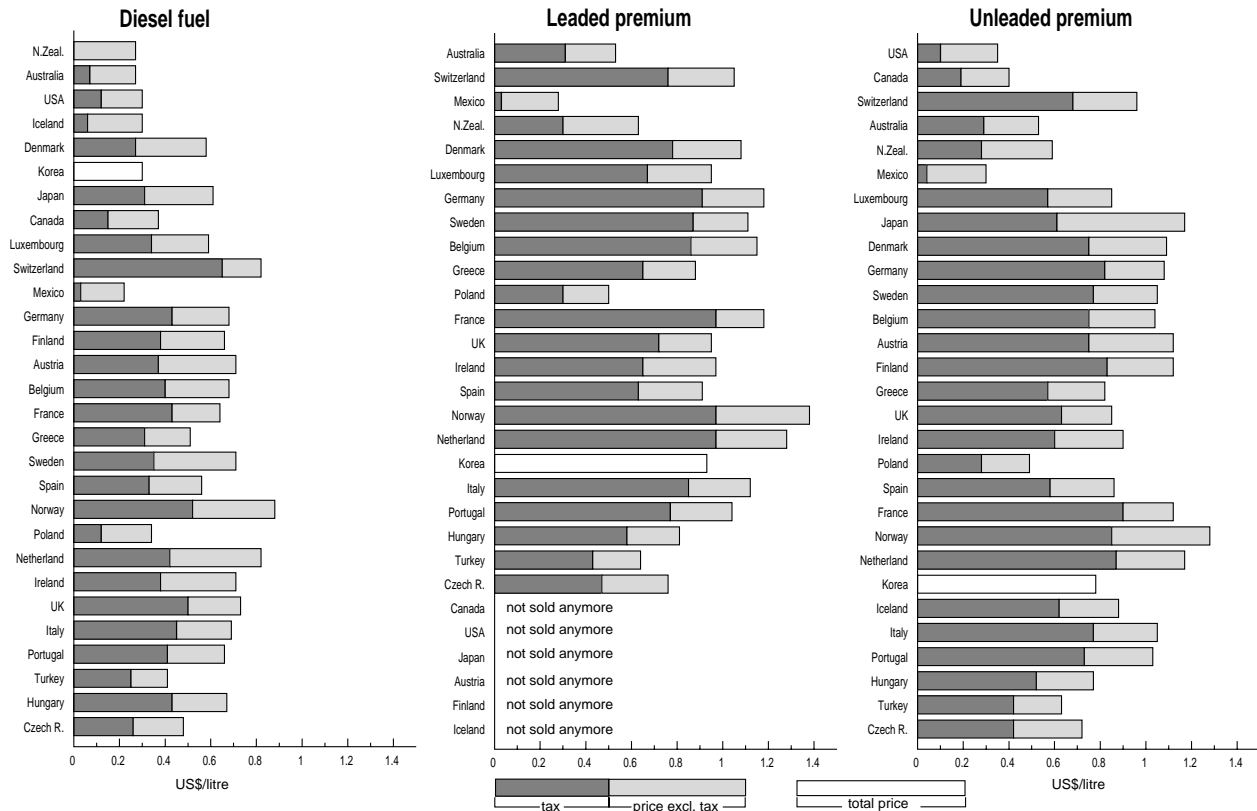
### **1.2 Restructuring existing taxes**

Many existing taxes could be changed so as to benefit the environment. It is a question of adjusting relative prices by increasing taxes on the most polluting products and activities. Since energy is one of the main sources both of pollution and of tax revenue, an "environmental" restructuring of prices and taxes is essential. The possibilities are to restructure existing energy taxes and/or to introduce new environmental taxes. For instance, in most OECD countries, taxes on petrol account for over 50 per cent of the pump price (Fig. 2). This leaves plenty of scope for restructuring taxes on the basis of environmental parameters, such as carbon or sulphur content, as the Nordic countries and the Netherlands have done.

The environmental impact of such measures will depend both on the total tax burden on taxed fuels and on the availability of substitute products. Thus most OECD countries have introduced a tax differential between leaded and unleaded petrol. This has led to a marked fall in the proportion of leaded petrol (less than 25 per cent of the market in Germany and the Netherlands) and in some cases to its disappearance from the market (Austria, Denmark, Finland, Norway and Sweden). In 16 countries, car sales taxes and/or annual car taxes have been adjusted in such a way as to stimulate the use of less polluting vehicles. Since 1994, Sweden has applied different taxes to two types of unleaded petrol,

according to their sulphur, benzene and phosphorous content. This has been leading to a gradual reduction in the use of the most polluting petrol.

**Figure 2. Fuel prices and taxes in OECD countries in US\$ (1995)**



Source: IEA

In fact, many studies show that while fuel taxes generally cover or more than cover infrastructure costs, they are not enough to internalize the external costs of road transport (Table 2). According to ECMT estimates, in order to cover external costs, fuel taxes should on average be increased as follows: car petrol, +0.83 ECU; car diesel, +1.04 ECU; truck diesel, +0.74 ECU (ECMT, 1998).

**Table 2. Revenues generated by road usage as a percentage of road-related expenditure, including and excluding external costs, in France, Japan and the United States in 1991**

	France - urban areas (billion FF)	France - rural areas (billion FF)	Japan (billion Yen)	United States (billion US dollar)
<b>Revenues</b>	57.0	100.2	9 530	62 747
<b>Expenditure</b>	44.2	61.2	11 665	78 260
<b>Balance</b>	+12.8	+39	-2 135	-15 513
<b>Revenues as percentage of expenditure</b>	127 %	164 %	82 %	80 %
<b>External costs<sup>a</sup></b>	56 to 92.7	33.8 to 48.2	2 742	117 800 to 371 700 <sup>b</sup>
<b>Balance - external costs</b>	-43.2 to -79.9	- 9.2 to +5.2	-4 877	-356 187 to -102 287
<b>Revenues as percentage of expenditure + external costs</b>	42 % to 57 %	92 % to 105 %	66 %	14 % to 32 %

(a) In all three studies, external costs include costs related to the following factors:

France: local and regional pollution; greenhouse effects; congestion; accidents; noise.

Japan: pollution; greenhouse effects; accidents; noise; disappearance of natural areas.

United States: effects of air pollution on human health, materials and crops; climatic changes; congestion; accidents; noise; vibrations.

(b) These external cost estimates do *not* include non-taxable parking space for employees, which represents an estimated total cost of US\$ 19 billion.

Source: OECD (1998), Part II.

### 1.3 Introducing new environmental taxes

The most obvious and widespread practice is to introduce new taxes whose prime purpose is to protect the environment. These may be taxes on *emissions* (for instance on atmospheric pollutants or water pollution) or taxes on *products*. The latter are more frequent. Since the beginning of the decade, many ecotaxes have been introduced on products ranging from packaging to fertilizers, pesticides, batteries, chemical substances (solvents), lubricifiers, tyres, razors and disposable cameras.

### **Box 2. Defining environmental taxes and charges**

A distinction should be drawn between charges and taxes.

-- **Taxes** (according to the classification in OECD's "Public Expenditure Statistics") are defined as "compulsory *unrequited* payments to general government. Taxes are unrequited in the sense that the benefits provided by governments to taxpayers are not normally in proportion to their payments."

According to OECD, what defines an *environmental tax* is not so much the formal description of the tax as "environmental" as the real and potential effect of a tax on the environment, regardless of what it is called. From an environmental point of view, it is the effect of a tax on behaviour patterns that matters. In other words, any tax affecting the price or cost of an environmentally detrimental product or activity is considered to be an environmental tax.

-- **Charges** are compulsory *requited* payments, i.e. a service is provided in proportion of the payment (for instance, sewerage charges). Charges can also be paid into specific "funds" and earmarked for specific environmental purposes, without necessarily having a direct proportionality to the service rendered.

-- **Emission charges or taxes** are direct payments based on the quantity and quality of pollutants discharged. For instance, *water effluent charges* are used to varying degrees in many countries. *Air pollution charges and taxes* are also used in a few OECD countries. *Noise charges and taxes* are levied on aircraft in a few countries, in systems ranging from crude to more elaborate.

-- **Product taxes** are applied to, and thus increase the relative prices of, products which create pollution when they are manufactured, consumed or disposed of. This constitutes a major part of the taxes with an environmental impact in most OECD countries. Taxes on energy (e.g. carbon and sulphur taxes on fuels) form a large category. Other examples are taxes on fertilizers, pesticides and batteries.

*Source:* OECD (1997) "Environmental taxes and green tax reform" and OECD statistical framework for ecotaxes.

## **2. REVENUES FROM ENVIRONMENTAL TAXES**

### **2.1 Evaluating ecotax revenues**

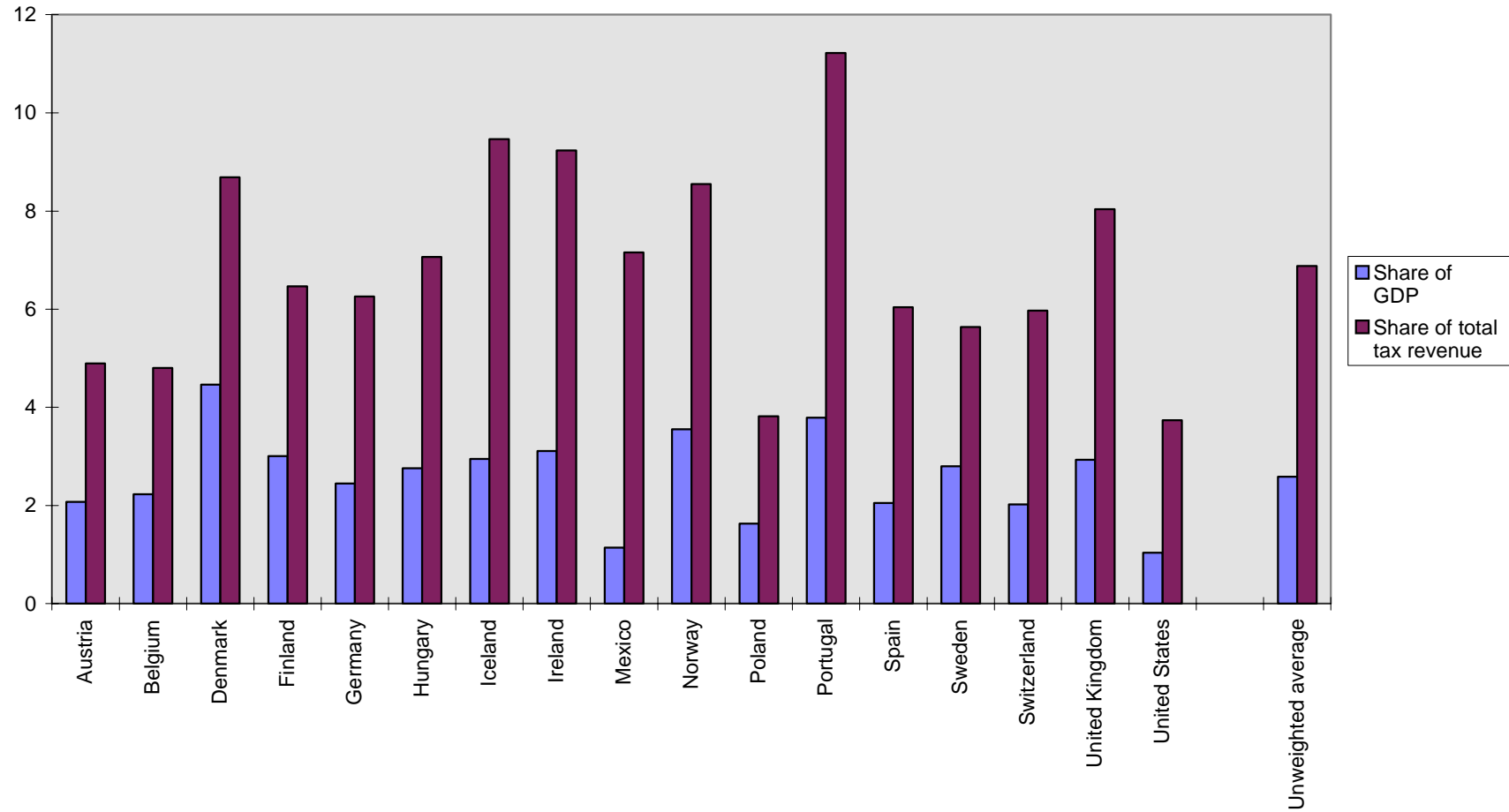
The OECD, EUROSTAT and IEA have developed a joint statistical framework for data on ecotaxes, defined as any tax likely to produce a beneficial impact on the environment, regardless of its initial objective. Thus energy taxes, which have a purely fiscal purpose, are considered to be ecotaxes because of their beneficial environmental impact. What matters most is the tax base and the *price signal*, so that it would really be preferable to refer in such cases to "environmentally-related" taxes.

On that basis, preliminary results for 17 countries (1995 figures) indicate that "environmentally-related" taxes account for between 3.8 and 11.2 per cent of total tax revenue, depending on the countries concerned, or 7 per cent on average. As a percentage of GDP, these taxes vary between 1 and 4.5 per cent.

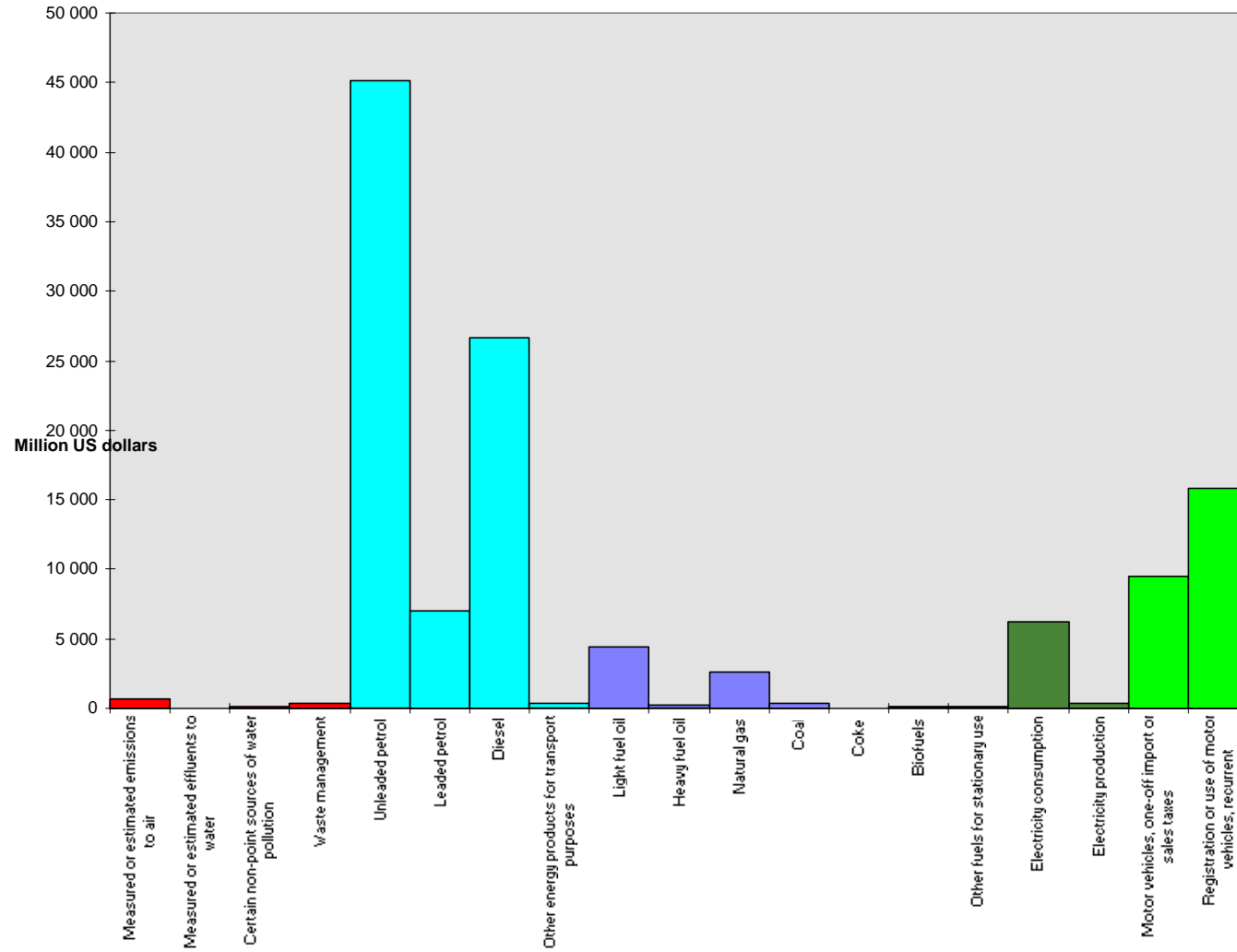


Practically all the revenues arise from taxes on petrol and diesel fuel (2/3 of revenues), transport and electricity. Very few taxes are levied on heavy fuels used by heavy industry. Next come revenues from vehicle taxes. The proportion accounted for by other ecotaxes (such as pesticides, detergents, etc.) is negligible. Another feature is that industry is relatively little affected, owing to various exemptions.

**Figure 3. Revenues from environmentally-related taxes in per cent of total tax revenue and GDP (1995)**



**Figure 4 : Revenues from environmentally-related taxes (million US dollars)**



## 2.2 *The sustainability of revenue*

From a fiscal point of view, a "good" tax is one that produces maximum revenue with efficiency, stability and simplicity. In the case of ecotaxes, this configuration may turn out to be complex or even paradoxical. The tax rate has to be sufficiently high to have an incentive effect.<sup>3</sup> However, the more the incentive works, the more pollution will diminish and therefore the less tax revenue will be collected. For instance, taxes on polluting fuel oils in Sweden have led to their virtual disappearance from the market. Again in Sweden, the revenue obtained from the sulphur tax has fallen rapidly owing to the environmental success of the tax: before the tax was introduced, annual revenue was estimated at 0.5 - 0.7 billion Swedish kronor. Between 1991, when the tax was introduced, and 1997, revenue fell from 0.3 to under 0.2 billion Swedish kronor. For the same reason, leaded petrol has disappeared altogether in several countries.

In other words, there is a contradiction, at least once rigidities and reaction times have been allowed for, between the environmental effectiveness of the tax and its fiscal effectiveness, leading to a potential conflict between the ministries of finance and the environment. In practice, however, the conflict between effectiveness and revenue is not so clear cut. In order to ensure that revenue is sustainable, there will be a tendency to tax products with low demand elasticity, such as energy products. Moreover, when ecotaxes produce long-term or gradual effects, the fall in revenue is deferred or gradual, which allows for appropriate tax adjustments and smoothing of revenue in good time. One last point is that the stability of the tax base is never guaranteed for any tax, as illustrated, for instance, by the fall in revenue from labour taxes and the difficulties affecting social security financing as a result of rising unemployment in many countries.

## 2.3 *The use of revenues*

How should ecotax revenues be used? This is a key question which has not only fiscal, but also environmental implications. There are three main categories where the use of ecotaxes is concerned.

a) The first way such tax revenue can be used consists in paying it in to the general government budget, in accordance with fiscal orthodoxy. The revenue can then be used to reduce public sector deficits, to increase public expenditure or, the tax burden remaining equal, to reduce other distortionary taxes (see in section 4.3 the approach known as the "double dividend").

b) Secondly, the tax revenue can be *allocated* to specific purposes, some of which may be environmental, especially by setting up funds or mechanisms for reallocating the revenue to environmental protection programmes. There are many examples in waste management and water management (through the financing of public equipment or the payment of depollution subsidies). In most cases, this category concerns *charges* rather than taxes, i.e. required payments (see Box 1). The amounts involved are far from negligible: in France, over the period 1992-1996, water charges (pollution and levies) came to an annual average of 8 billion French francs (or 1.6 billion dollars); in the Netherlands, revenue from water pollution charges came to 1.9 billion guilders (1.2 billion dollars). Strictly speaking, taxes may also be allocated, as in the case where fuel taxes are allocated to road building.

Allocation entails serious drawbacks, however. Fixing the use of a tax revenue *in advance*, without evaluating its economic or even environmental rationale *beforehand*, may lead to economic wastage. This situation may prevent an optimization of public expenditure. In the case, for instance, of the

---

<sup>3</sup> Considering that we are in a "second best" universe, below the ideal of a "Pigovian" tax.

considerable revenue generated by energy and transport taxes, allocation may prove dangerous and may introduce rigidities. For instance, allocating taxes to road infrastructures may lead to overinvestment in that sector. Programmes may last longer than their optimal period as a result of habits, administrative slowness, situation returns or other "acquired rights". If the allocation of a certain proportion of public revenue creates a precedent, the public authorities may over time find themselves unable to redefine priorities.

Nevertheless, allocating revenues does have its advantages. First of all, *the political acceptability* of taxes and charges will be enhanced thanks to transparency of use, clearly dedicated to the popular cause of environmental protection. Similarly, payers feel, rightly or wrongly, that the revenue from such taxes or charges is in some way returned to them in the form of subsidies or public investments.

### 3. THE EFFECTIVENESS OF ECOTAXES

While the theoretical advantages (especially the static and dynamic efficiency) of ecotaxes are well known, few data are available. There are several reasons for this. In the first place, experience is often too recent to allow for an objective evaluation. Secondly, there is a shortage of data and practice when it comes to policy evaluation. Everything, or practically everything, still remains to be invented, particularly a methodology and technical and institutional mechanisms for collecting and analysing data. The problem of evaluating ecotaxes is all particularly complex insofar as they are generally applied simultaneously with other instruments (such as regulations), which makes it difficult to isolate the impact of a tax. Some countries, however, have started to evaluate their ecotaxes. The results indicate that they are definitely environmentally effective, even though there are still not sufficient data to gauge the economic efficiency of the taxes (cost reduction). Some of the data have been collected in an OECD study [OECD (1997b and c)]<sup>4</sup>.

For example, the Swedish sulphur tax (introduced in 1991) led to a fall of more than half as much again in the sulphur content of oil-based fuels *beyond the legal standards*. The sulphur content of light oils has now fallen below 0.076 per cent (i.e. less than half the legal limit of 0.2 per cent). The tax also stimulated emission abatement measures in combustion plants. It is estimated that yearly emissions of SO<sub>2</sub> have been reduced by around 19 000 tonnes by virtue of the tax [Swedish Environmental Protection Agency (1997)]. Also in Sweden, a tax differentiation was introduced in 1991 on *diesel fuels* in order to stimulate the use of less polluting fuel oils. From 1992 to 1996, the proportion of "clean" diesel sold in Sweden rose from 1 to 85 per cent, which led to a reduction of more than 75 per cent on average in the sulphur emissions of diesel-driven vehicles.

In Norway, CO<sub>2</sub> taxes introduced in 1991 lowered CO<sub>2</sub> emissions of some stationary combustion plants by some 21 per cent, whereas in other sectors the fall was less. It is estimated that CO<sub>2</sub> emissions produced by mobile household combustion devices fell by 2 to 3 per cent as a consequence of the CO<sub>2</sub> tax [Larsen and Nesbakken (1996)]. It is also estimated that CO<sub>2</sub> emissions per unit of oil produced by the Norwegian oil sector fell by 1.5 per cent due to measures taken by the industry in response to the CO<sub>2</sub> tax [ECON (1994)]. The Swedish CO<sub>2</sub> tax led to a reduction in emissions of 5 million tonnes in 1994, or 9 per cent of total emissions [Swedish Environmental Protection Agency (1997)].

The tax differentiation between *leaded and unleaded petrol*, combined with a series of measures such as regulations making it compulsory for service stations to offer unleaded petrol and introducing new emission standards for motor vehicles, based on such requirements as catalytic converters, led to a heavy

<sup>4</sup> See also Barde and Smith (1997).

fall in consumption and in the share of leaded petrol, which was actually withdrawn from sale in Denmark, Austria, Finland, Norway and Sweden. The fiscal incentive greatly speeded up the process, despite slow penetration of new vehicles equipped with catalytic converters.

In Denmark, the tax on non-hazardous waste had the effect of doubling the cost of waste dumping and increased the cost of incineration by 70 per cent. Between 1987 and 1993, household waste fell by 16 per cent, construction waste by 64 per cent and "miscellaneous" waste by 22 per cent. Industrial waste, however, increased by 8 per cent. Recycling also increased considerably: +77 per cent for paper and cardboard, +50 per cent for glass [Andersen (1998)].

In the United States, about 3 400 local communities in 37 States apply taxes on household waste, which are calculated according to the volumes discharged. The result was a significant reduction in the volume of discarded waste and a significant increase in recycling [Anderson *et al.* (1997)].

Not all taxes have been successful, however. The effects of ecotaxes in Belgium (on disposable razors, etc.) were hardly noticeable. Similarly, the Swedish tax on pesticides, which was too low, produced no incentive effect [Swedish Environmental Protection Agency (1997)].

#### 4. IMPLEMENTING GREEN TAX REFORMS

##### 4.1 *Base, rate and revenue: the "tragic triangle"*

In fiscal terms, a "good" tax is one that produces maximum revenue with efficiency, stability and simplicity. In the case of ecotaxes, however, this configuration can be complex and even paradoxical.

*In the first place the tax base has to be simple and stable.* In the case of emission taxes, the measure may be complex, for instance when pollution arises from a combination of substances, such as organic materials, particles or heavy metals, in the case of water discharge. It may also be difficult and costly to measure the quantities emitted. A compromise will therefore have to be found between complex tax bases and excessive simplification, which would not reflect the real pollution situation. This problem of the "linkage" between pollution and the tax paid is crucial. The looser the link, the weaker the incentive effect of the tax<sup>5</sup>. But complicated arrangements will make it difficult to implement the tax and will encourage tax evasion. The tax base therefore has to be explicit and simple. It is generally easier to determine the tax base in the case of product taxes (e.g. the sulphur content of a fuel).

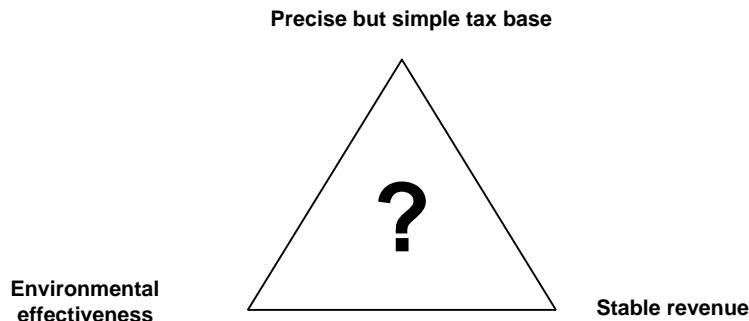
The tax *rate* must be sufficiently high to have an incentive effect<sup>6</sup>. However, the more incentive the effect is, the more pollution will be reduced and hence the less tax will be collected. In Sweden, for instance, taxes on polluting fuel oil caused them virtually to disappear from the market and the revenue from the sulphur tax has fallen rapidly as a result of the environmental success of the tax (see above, section 2.2).

These contradictions between the environmental effectiveness and the fiscal efficiency of the tax may be illustrated by the "tragic triangle" (Figure 5).

---

<sup>5</sup> Notwithstanding the incentive effect related to the tax *rate*.

<sup>6</sup> Considering the fact that we are dealing with a "second best" universe, below the ideal of a "Pigovian" tax.

**Figure 5. The tragic triangle of ecotaxes**

#### 4.2 What tax neutrality?

It is clear that any "green" tax reform entails many aspects, ranging from the in-depth reform of existing taxation to the introduction of new taxes. This means that the objective pursued by the reforms is not only environmental. Many other benefits may be obtained, in fiscal terms (a better return), in economic terms (greater efficiency by internalizing externalities and eliminating distortions), and in terms of employment (lower unemployment thanks to a lowering of labour taxes financed by new ecotaxes - see below).

This approach is opposed to the dogma of "fiscal neutrality", whereby the sole objective of taxation systems is to obtain maximum revenue with minimum distortion and minimum impact on behaviour patterns. Some tax experts view mixed objectives with suspicion and are often opposed to the use of taxation for other than strictly fiscal purposes. Yet there are very few taxes which either accidentally or deliberately do not exert some influence on behaviour or on economic structures. In some countries, many tax measures cover related objectives (e.g. in France the cost of heat insulation for housing is tax deductible as a means of encouraging energy savings). Environment is a case in point, and many taxes are observed to produce negative effects in this respect. Similarly, a growing number of ecotaxes are deliberately aimed at altering behaviour patterns.

But while ecotaxes, by definition, are not fiscally neutral, green fiscal reforms are generally implemented in a context of a *constant tax burden*, in the sense that new ecotaxes tend to offset reductions in existing taxes. In fact, a constant tax burden is an essential condition of the *acceptability* of ecotaxes. Industry in particular is strongly opposed to ecotaxes on the grounds of a possible loss of competitiveness (see below). Similarly, consumers may fear that ecotaxes might lead to price increases; it is then essential to show clearly that other taxes are being reduced to ensure the political acceptability of green tax reforms.

In Sweden, the 1991 tax reform consisted in a significant reduction in income tax, which was largely offset by a series of new ecotaxes, especially on carbon, sulphur and nitrogen oxides, by a restructuring of energy taxation and by a broadening of the VAT tax base. The net effect was a 6 per cent redistribution of GDP, including about 1 per cent related to ecotaxes. Denmark has also been engaging in a general reform of its tax system, over the period 1994-1998. The main objectives of the reform are the reduction of marginal tax rates in all income brackets; the elimination of a series of loopholes in the tax law; and a gradual transfer of tax revenue from income and labour to pollution and rare environmental

resources [Danish Ministry of Finance (1995)]. Since 1996, the authorities have introduced new ecotaxes on industry's use of energy (on CO<sub>2</sub> and SO<sub>2</sub>), rising gradually until 1998. The revenue produced by these taxes is reverted entirely to industry in the form of investment aids for energy saving and reduced employers' social security contributions.

Between 1971 and 1996, the Dutch system of environmental taxes and charges gradually evolved from being essentially a means of financing environmental protection programmes to consisting in a series of unallocated ecotaxes. For example, an "energy regulating tax" on small energy consumers (households, small businesses, office blocks, etc.) was introduced in 1996; by 1998, this tax is expected to yield 2.1 billion guilders. The revenue is to revert to households in the form of reduced income tax and to employers in the form of reduced social security contributions.

Switzerland has introduced two new ecotaxes: from 1 July 1998, on extra light heating oils, and from 1 January 1999, on volatile organic compounds (VOCs). The revenue is to be fully returned to households in the form of reduced compulsory sickness insurance premiums. A general green tax reform is being considered for 2001.

#### 4.3 *Is there a "double dividend"?*

As was explained earlier, a double benefit may arise from fiscal reforms: firstly, in terms of a more efficient economy, rid of distortional taxation; secondly, in terms of more effective environmental protection. According to Bovenberg and Mooij (1994), this concept of a "double dividend" may have three meanings: in one sense, the double dividend arises from greater economic efficiency due to the ecotax, compared with direct controls (the static efficiency concept of taxes); in a second sense, the double dividend is related to the notion of a "no-regrets policy", based on the supplementary environmental benefits obtained by a carbon-energy tax beyond the targeted gains and objectives (e.g. through greater energy efficiency, less road transport congestion, less emissions of other air pollutants produced by fossil energy combustion); in the third sense, the double dividend relates to efficiency gains obtained with an ecotax, which both internalizes external costs and replaces existing distortional taxes. In this third case, the really burning question at present is whether this type of fiscal reform could extend to the drive against unemployment by financing a reduction in labour taxes (including employers' social security contributions) with new ecotaxes, especially on energy (CO<sub>2</sub> tax). This question of a double environment-employment dividend has generated prolific literature and lively controversy, which is far from over. There may be three main questions which are worth mentioning at this stage.

1. *Can lower labour taxes favour employment?* There are many factors involved, such as the flexibility of the labour market and the mobility of capital. Most models (though not all) seem to indicate some potential for employment creation by reducing the so-called "tax wedge" on labour (i.e. the burden of employers' social security contributions and income taxes) in low income categories in countries where this tax burden is high. Majocchi (1996) has shown that the results of many models converge to indicate that a carbon-energy tax would yield a double employment-environment dividend. The effect, however, would be limited (a rise in employment of the order of 2 per cent).
2. *Will ecotaxes be high enough to finance a significant fall in the tax wedge on employment?* The more the employers' social security contributions are reduced, the greater the effect will be on employment. New taxes are needed, therefore, to produce sufficient income to offset the drop in contributions. In the case of the introduction of an energy ecotax, which is also intended to reduce polluting emissions, the "double dividend" possibility should be considered in both a



short-term and a long-term perspective. In the short term, one essential variable is the price elasticity of the demand for energy and energy-intensive goods. In the event of high elasticity, the ecotax will cause a strong drop in demand, and will therefore have a favourable effect on the environment, but it will produce relatively low revenue, which will perhaps be insufficient to offset a significant fall in employers' social security contributions. Low elasticity will have the reverse effect: high tax revenue, but weak environmental effect (see also section 2.2). This means there is if not an actual contradiction at least some conflict between the two objectives of employment and environmental protection. In any event, it is worth maintaining a dynamic view and management of the process.

3. In the longer term, technological innovations may lead to greater energy efficiency and therefore to lower tax revenue. A simulation by OECD's GREEN model of the revenue trend of the old projected community tax on carbon and energy (10 dollars a barrel, or 40 dollars per tonne of carbon) shows a long-term decreasing tax return [OECD (1995)], which may not yield sufficient revenue to offset the fall in social security contributions. In any event, taxes on carbon are few and far between and revenue derived from them still fairly limited, owing to low rates and exemptions. Apart from *existing* taxes on energy and transport, the *new ecotaxes* on products such as pesticides or batteries yield negligible revenue (see section 2.1), which is unlikely to finance a significant reduction in the tax burden on labour.

Nevertheless, there is bound to be a *potential* double dividend, even though it may be limited. One then has the feeling that this is a typical case of "no regrets policy", in the sense that the ecotax, which is anyway good for the environment, might in addition be good for employment. There is also a "political dividend" to the extent that the potential effect on employment may help the political legitimacy of the ecotax. This is not to be underestimated, considering the vociferous opposition by industry to any form of ecotax, especially in the energy sector. In fact, some countries have in one way or another already bet on the double dividend effect, or are considering doing so (Box 3). How effective these mechanisms really are, however, still remains to be seen.

<b>Box 3. The double employment-environment dividend: current practice</b>	
<b>Countries</b>	<b>Tax shift</b>
Belgium	The revenue of a "special levy on energy" (introduced in 1993) is paid into a special fund to finance social security expenditures.
Denmark	New or increased environment-related taxes will increase revenues by DKr 12.2 billion by 1998, with a simultaneous lowering of income tax. Since 1996, part of the revenue of the newly increased CO <sub>2</sub> tax on industry has been allocated to reducing employers' social security contributions.
Finland	Starting in 1997, lower taxes on income and labour (Fmk 5 600 million in cuts in 1997), offset in part by new ecotaxes (e.g. a landfill tax, Fmk 300 million per year) and energy taxation.
Netherlands	A large part of the revenue of the new "regulatory tax on energy" goes towards reducing employers' social security contributions. The current fiscal reform should accentuate this tax shift.
Norway	A CO <sub>2</sub> tax has been in effect since 1991. Part of the tax on oil products and mineral oils applies to emissions. On the basis of the Green Tax Commission report in June 1996, the government proposed to parliament reducing payroll taxes by 0.1 per cent (April 1998).
Switzerland	Revenue from new ecotaxes on VOCs and extra-light heating fuels will be redistributed to households in the form of reduced compulsory sickness insurance contributions (1999).
Sweden	A tax reform in 1991 resulted in a SKr 15 billion tax shift to environment-related taxes, leading to a reduction <i>inter alia</i> in marginal income tax rates. A reduction in employers' social security contributions is being considered.
United Kingdom	Revenue from a landfill tax introduced in October 1996 (£450 million/annum) is to be used to reduce employers' social security contributions by 0.2 percentage points.

Source: OECD (1997e) and update.

## 5. DISTRIBUTIONAL IMPLICATIONS OF ENVIRONMENTAL TAXES

Are ecotaxes socially regressive? This question is increasingly being asked and has become a preliminary to the introduction of any such tax. In so far as many ecotaxes apply to mass consumption products, such as motor-driven vehicles and energy, they can have a substantial effect on low-income households. The distributional effects of ecotaxes, especially those on energy, may be observed in three ways [Smith (1998)]:

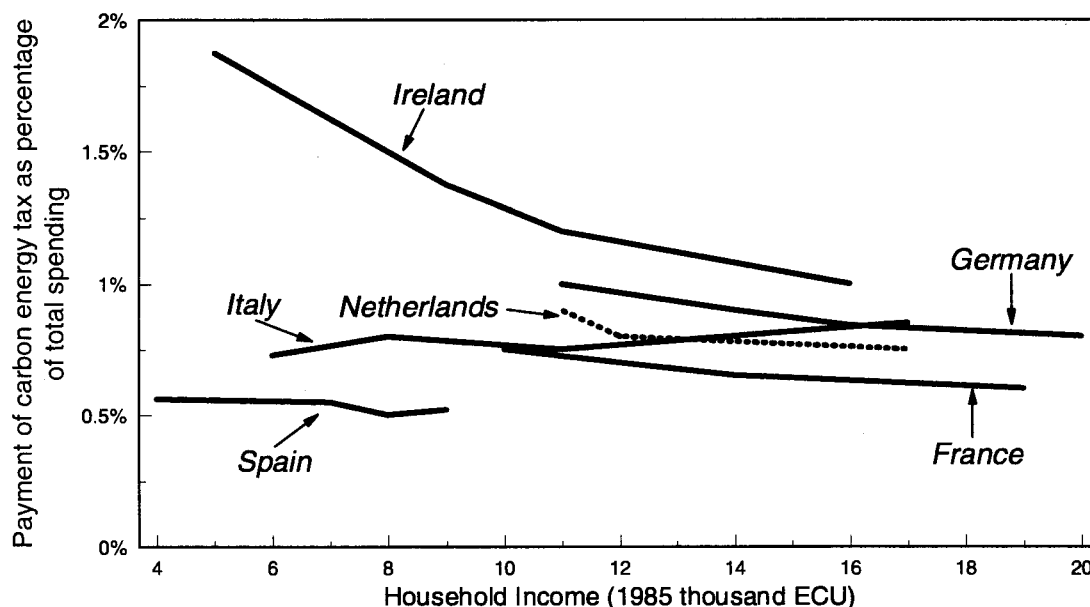
1. There will be a *direct* distributional impact related to the structure of household energy expenditure (on heating and transport) for different income brackets. The bigger the proportion of low-income household expenditure devoted to energy, the more regressive the impact of the tax will be.

2. *Indirect* distributional effects will emanate from the taxation of production inputs. The more the processes are energy intensive, the greater will be the incidence of a tax on the goods produced. Of course, the more the products fall into the prime necessity category, the more regressive the tax will be.
3. Lastly, the distributional impact will be related to the *incidence* of the tax. An energy tax may affect end consumers, but it may also affect energy producers or production factors (e.g. through a fall in wages or lower return on capital). At the same time, part of the tax may be borne by energy consuming countries, and another part by energy exporting countries, according to the elasticities of supply and demand.

A distinction needs to be drawn, however, between relatively low ecotaxes on products such as detergents, fertilizers, batteries and pesticides, and large-scale and fiscally heavier ecotaxes, such as those on energy. In the first case there is no observable distributional impact, while in the second case, some studies indicate a risk of regressivity.

For example, an analysis of possible distributional effects of the carbon-energy tax in the United Kingdom, initially proposed by the European Commission, shows that the impact of this tax would be distinctly more marked on poorer households (Fig. 6). While a tax of 10 dollars a barrel (i.e. \$88 per tonne of carbon) would reduce total household energy consumption by 6.5 per cent, the reduction would be 10 per cent for the poorest 20 per cent of households [Pearson and Smith (1991)]. The figures vary considerably from country to country [Pearson (1992)]. In most cases, ecotaxes seem to be mildly regressive [Scott (1992)]. To be effective, however, an ecotax on energy should be much higher: according to the OECD GREEN model, a tax of \$215 on average per tonne of carbon (\$308 for OECD countries) would be needed to stabilize CO<sub>2</sub> emissions at their 1990 level by the year 2000.

**Figure 6. Income distribution impacts of a carbon tax in six European countries**



Source: Pearson and Smith (1991).

In its 1997 report, the Swedish Green Tax Commission estimated that doubling the CO<sub>2</sub> tax (from a 1997 rate of 0.37 to 0.74 Kronor per kg of CO<sub>2</sub>) would have a fairly marked regressive impact; in order to maintain the same consumption level, the lowest incomes would need to receive compensation of 1.24 per cent of their consumption expenditure, and the highest revenues only 0.78 per cent. A Danish study (1996) of the distributional impact of taxes on water, electricity and petrol also found a regressive effect.

As far as *developing countries* are concerned, a World Bank study, reported by the GIEC (1995), shows mixed findings based on a study by Shah and Larsen (1992) on the impact of a carbon tax in Pakistan [see also OECD (1995b)]. According to hypotheses, this tax would have a mildly regressive or even progressive impact (Table 3). The surprising hypothesis that the impact in developing countries would be mildly regressive is related to two opposite effects: on the one hand, high carbon tax revenues would lead to a lowering of income tax, thus in effect (partly) substituting a regressive tax for one which is by nature progressive; on the other hand, tax evasion and the incidence of urban taxes on rural workers would make the income tax less progressive in practice. All in all, the impact of a carbon tax could be proportional to the income level, or even progressive.

**Table 4. Institutional effects on carbon tax incidence in developing countries**

Institutional Considerations	Implications for tax shifting	Tax Incidence with Respect to		
		Income	Expenditure	Lifetime Income
(a) Foreign ownership and control	Borne by foreign treasury through foreign tax credits	Nil	Nil	Nil
(b) Full market power Perfectly inelastic demand or perfectly elastic supply	Full forward shifting (100% on final consumption)	Regressive (pro-rich)	Less regressive	Less regressive
(c) Price controls and legal pass-forward of the tax disallowed  Completely inelastic supply  Import quotas and rationed foreign exchange	Zero forward shifting (100% on capital income)  Reduced rents  No effect on prices (100% on capital income)	Progressive (pro-poor)	Progressive	Progressive
(d) An intermediate case of (a) and (b) above	Partial forward shifting (31% on capital income, 69% to final consumption)	Proportional	Progressive	Progressive

Source: Shah and Larsen (1992), as reported in IPCC (1995), Chapter 11, p. 67.

If an ecotax is manifestly regressive, it is possible to consider corrective measures, such as *lump sum compensation*, calculated on the basis of average tax payments per household. In this case, compensation would have a progressive incidence on the assumption that the poorest households on average pay less tax than the richest households. The new Swiss taxes on VOCs and light heating oil are refunded to households.

Another approach consists in *reducing other taxes*, such as labour and income taxes (see section 4.3). The net distributional implication of this approach is not sure, considering that the poorest households pay the least income tax, unlike wealthy households, who will benefit most from any lowering of income tax. According to Smith (1998), this form of compensation may even prove to be strongly regressive.

Another approach, known as "mitigation", consists in reducing ecotax rates for low-income categories. If such an approach is at all feasible, however, the outcome would be to weaken the desired environmental impact of the ecotax.

To sum up, there is no simple or uniform answer to the problem of the distributional impact of ecotaxes, which needs to be analysed on a case-by-case basis. In any event, vigilance is called for, especially if ecotaxes are to become more popular.

## **6. ENVIRONMENTAL TAXES AND COMPETITIVENESS**

### **6.1 A snag?**

The main obstacle to implementing new ecotaxes is the possible loss of international competitiveness. Countries tend to adopt a wait-and-see attitude: who will go first? How can sectors exposed to international competition be protected? Is there a need for international harmonization in this area and if so how should one go about it? Industry is strongly opposed to environmental taxes on the grounds that they can cause a significant loss of international competitiveness. The greater the "visibility" of ecotaxes compared with other environmental policy instruments, the more outright the opposition will be, insofar as they are a direct levy which is additional to the costs of other antipollution measures. Another problem, which may turn into an explicit threat, is the "relocation" of activities to countries which are less fussy about environmental protection or to other "pollution heavens". Like the "double dividend", this question is the subject of heated debate.

The concept of "competitiveness" can be apprehended in different ways. It is important, for instance, to differentiate between the competitiveness of individual companies and sectors of the economy and of the economy of a country. Similarly, competitiveness may have a national or an international dimension (Box 4).

#### **Box 4. The concept of competitiveness**

It is important to distinguish clearly between the competitiveness of individual companies and sectors of the economy and that of the whole economy in general. Competitiveness will have a different meaning at each level. A *company* or *sector* is competitive if it is able to compete in international markets, with a satisfactory 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 one firm or industry may lead to reduced costs for others. One should also distinguish between a shorter and a longer time perspective. In the shorter run, exchange rate levels will be of importance. In the longer run, the country's ability to sustain a satisfactory wage level should also be taken into consideration. So also should its balance of payments and its ability to use its resources efficiently (including its labour resources). One definition of competitiveness, from the International Institute for Management Development (IIMD), is "the ability of a country to create added value and thus increase national wealth by managing assets and processes, attractiveness and aggressiveness, globality and proximity, and by integrating these relationships into an economic and social model" [IIMD (1996)]. When evaluating a particular policy, the effects on the economy are in general more important than the effects on certain individual sectors.

*Source: OECD (1997c).*

## **6.2 Some available data**

Currently available studies and data show no significant impact of environmental taxes on international trade. Jaffe *et al.* (1995) examined over 100 studies on the potential effect of environmental regulations (and therefore not only taxes) on the competitiveness of American industry. They concluded that: "Overall, there is relatively little evidence to support the hypothesis that environmental regulations have had a large adverse effect on competitiveness, however that elusive term is defined". This conclusion is based on a number of arguments: 1) generally speaking, environmental protection costs are relatively modest and in any case too low to affect competitiveness; 2) environmental constraints in OECD countries are comparable (which is not necessarily the case in other regions of the world); in most cases, whenever environmental constraints are less restrictive in a given country, outside investors tend to apply stricter standards than those of the host country.

Several other studies tend to agree. [Adams (1997)] concludes: "In general terms, the point of view whereby there is a conflict between competitiveness and environmental protection must be rejected". The OECD study on *Economic Globalisation and the Environment* [OECD (1997d)] reaches the same conclusion.

## **6.3 The case of carbon taxes**

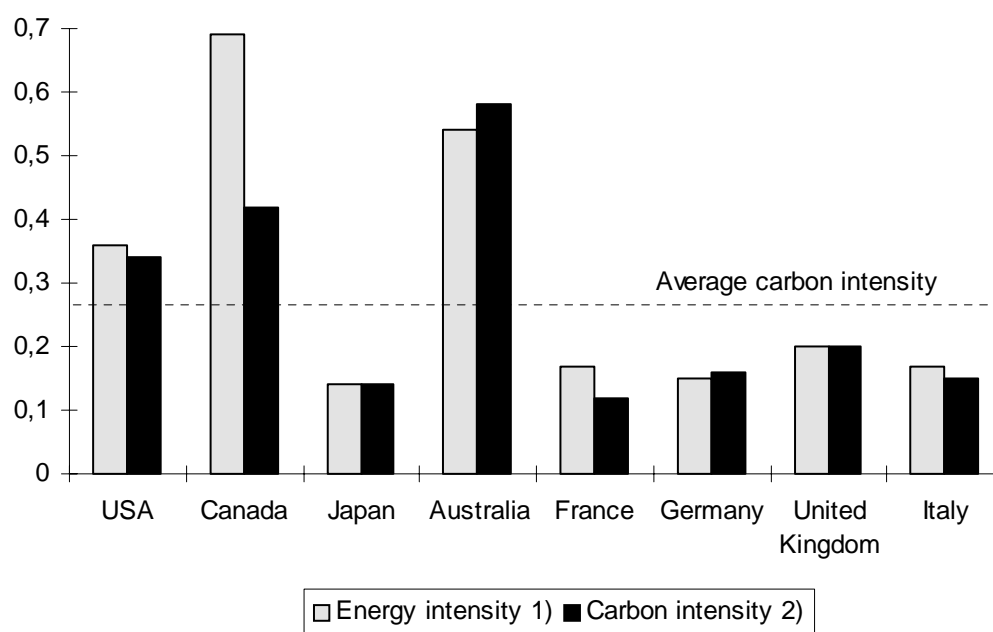
However, this rather reassuring view that environmental policies have negligible effects on international trade and competitiveness is only provisional: first, as mentioned earlier, heavy and export industries are generally totally or partially exempted from carbon taxes. Furthermore, this view is based on fairly limited data and reflects a situation where these policies have perhaps not yet crossed a certain intensity threshold. This could change, for instance, if drastic measures are taken against the greenhouse effect. In the specific case of taxes, one may wonder how competitiveness would be affected if carbon

taxes were introduced at the sort of levels required to attain the objectives of the Convention on Climate Change, and more specifically, those of the Kyoto Protocol.

A number of economic models (such as the OECD GREEN model) have evaluated the impact in terms of effects on growth and "leakage" (i.e. the increase of CO<sub>2</sub> emissions in countries not applying any tax) of different carbon tax scenarios. The type of impact varies considerably according to the various hypotheses, particularly with regard to the use of tax revenue [see OECD (1995)]. However, these models do not really offer any way of evaluating impact in terms of competitiveness.

A study by Baron and ECON (1997) tries to determine the potential impact of a carbon tax using a statistical survey of industrial structures, of energy (and carbon) intensity and of the structure of international trade of OECD countries or groups of countries. They have found first of all that there are clear differences in terms of energy intensity and carbon intensity between different OECD regions; in particular, the higher the energy intensity, the higher the carbon intensity tends to be, with the highest values being observed in Australia, Canada and the United States (Figure 7).

**Figure 7. Energy and carbon intensities<sup>3</sup> in total industry  
Selected OECD countries**



1) Kilogram oil equivalents per US\$ value added

2) Kilogram of carbon per US\$ value added

3) Carbon intensities are from direct use of fossil fuels (incl. feedstock) in industry, but not process emissions i.e. from use of coke in aluminium production. Carbon intensity includes derived carbon emissions in electricity generation.

Source: IEA/OECD, 1992 data.

The greater the carbon intensity of an industrial sector, the more pronounced the impact of a carbon tax will be on competitiveness. There are other structural factors which need to be taken into account, however, such as the place of industries on the world market and the structure of trade in different countries or regions. In the OECD area, the proportion of energy intensive industries amounts to 20 to 25 per cent of GDP. It has also been observed that the proportion of exports by energy intensive industries of OECD countries varies considerably according to the regions or countries: while only 15 per cent of the exports of energy intensive industries of OECD/Europe countries go to countries other than

Annex 1, the proportion is greater than 30 per cent for North America and almost 70 per cent for OECD/Pacific countries; the discrepancy is similar for imports. Table 4 gives an idea of the trade structure of energy intensive products (iron and steel, non-ferrous metals, pulp and paper, chemical products); it may be seen that these products account for only a relatively modest proportion of total trade (between 3.2 and 7.5 per cent of exports and between 1 and 3.7 per cent of imports).

**Table 4. Trade in energy-intensive products for major OECD regions (1994)**

Region	OECD Europe	OECD North America	OECD Pacific
1. Exports of energy-intensive products* to non-Annex I over total exports	3.2%	4.9%	7.5%
2. Imports of energy-intensive products* from non-Annex I over total imports	1.0%	1.8%	3.7%
3. Share of exports (imports) of energy intensive products* to (from) Annex I	80.7% (88.9%)	66.6% (79.1%)	33.3% (67.2%)
4. Net exports of energy intensive products* to <u>non-Annex I</u> (Billion)	US\$ 39.8	US\$ 16.0	US\$ 21.3
5. Net exports of energy intensive products* to other regions (Billion)	US\$ 53.0	US\$ 2.7	US\$ 8.0
6. Contribution of trade to GDP (Imports + Exports) / 2 * GDP	27.3 %	13.4 %	9.8 %

\* "Energy intensive products" are: iron and steel, non-ferrous metals, paper and pulp, and chemical products.

Source: Baron et ECON (1997)

Baron and ECON have calculated the cost increases from a tax of 100 dollars/tonne of carbon on energy intensive industries. The results indicate a cost increase varying between 1.2 and 5.2 per cent according to countries, with further variations according to sectors (Table 5).



**Table 5. Selected OECD countries cost increases<sup>1)</sup> from a tax of 100 USD/ton carbon as percent of production value.**

	Total energy-intensive industries	Iron and steel	Non-Ferrous metals	Chemical	Pulp and paper
USA	2.8 (2.5)	2.3	3.1	2.8 (2.2)	3.2
Canada	4.1 (3,3)	6.2	3.7	4.1 (2,3)	5.0
Japan	1.2 (1,0)	2.0	0.7	1.0 (0,6)	0.6
Australia	5.2 (5,0)	5.8	11.4	1.7 (1,4)	2.6
France	1.4 (1,1)	2.4	1.4	1.3 (0,8)	0.6
Germany	1.6 (1,4)	2.6	1.2	1.4 (1,1)	1.0
United Kingdom	1.6 (1,3)	3.6	1.9	1.2 (0,8)	1.2
Italy	1.4 (1,2)	2.0	1.1	1.3 (0,9)	0.7
Belgium	2.3 (2,1)	7.3	0.8	1.6 (1,2)	0.6

- 1) The figures also include carbon emissions through electricity generation and from process emissions in aluminium production. Numbers in parentheses indicate cost increases when the tax is applied only to fossil fuels used for energy purposes, i.e. not-sequestered in the final product.

*Source:* OECD/IEA data, sectoral energy data: Energy Information Agency (1994), ECON calculations, see Appendix II.

It appears that cost increases are generally low (under 2 per cent), except for Australia and Canada, which are more carbon intensive. In fact, the weaker the energy (and carbon) intensity is, the weaker the impact of a carbon tax will be on competitiveness; its impact would therefore probably be limited in the European Union and in Japan. On the other hand, more marked effects might be expected in other countries, such as Australia and Canada in the OECD area, as well as in developing and transition countries. It should be noted that this is a *static* form of analysis, which does not take account of the tax implications for the economy as a whole and its effects on prices in general.

#### **6.4 Policy aspects**

In any event, the threat or fear of loss of competitiveness remains one of the main obstacles to the introduction of environmental taxes, particularly on carbon and energy. Few countries at present apply carbon taxes, and those that do tend to take other measures to protect sectors exposed to international competition.

*Exemptions or reduced rates* are the first type of protective measure. For instance, Sweden initially gave industry a 75 per cent rebate on the carbon tax (and total exemption in the case of the energy tax); the rebate was then reduced to 50 per cent in July 1997. In Denmark, a 50 per cent rebate on the CO<sub>2</sub> tax was granted to industry for the period 1993-1995. Other such examples could be mentioned. A certain "precautionary principle" therefore has to be applied, especially in the most innovating and the most advanced countries, from the point of view of green tax reforms, although the risk then arises of reducing the incentive effect of the tax.

Another approach is to apply the tax *conditionally*. In Switzerland, for instance, the CO<sub>2</sub> bill provides for a "subsidiary tax" on carbon if industry fails to attain emission abatement objectives (down 10 per cent by 2010, compared with the 1990 level).

One can simply exclude the main industries from the application of the tax: in the Netherlands the new regulatory tax on energy applies exclusively to households and small businesses.

Lastly, certain forms of *recycling* of the tax can mitigate its effect on payers. In Denmark, for example, CO<sub>2</sub> and SO<sub>2</sub> taxes are fully redistributed to industry in the form of subsidies for energy saving investments and lower employers' social security contributions.

The impact of ecotaxes depends not only on a number of economic factors, but also on *how* the taxes are implemented. Thus the potential impact on competitiveness can be attenuated and even avoided altogether if taxes are announced in advance, implemented in consultation with the parties concerned, and gradually increased, according to a planned schedule and possibly subject to negotiation, until they reach the desired rates. While the carbon tax has sometimes been compared with an oil price "shock", and while the desired effect in both cases is an increase in the price of fossil fuels, the two cases should be seen as entirely different (see Box 5).

#### **Box 5. Comparison of ecotax and oil price shock**

<b>Oil price shock</b>	<b>Ecotax</b>
Sudden	Announced
Unilateral	Negotiated
Once-only price increase	Gradual tax increase
Sharp price increase	Moderate rate
No specific modalities	Flexible arrangements according to circumstances
No compensation	Tax shifts and other redistributive measures (if necessary)
Global	National (with the possibility of international harmonization)

Lastly, the impact on competitiveness of an ecotax (especially on energy) will also depend on the following factors:

- From a general point of view, the tax is only a form of transfer between economic agents: there may be winners and losers, but overall the transfer is neutral.
- An economically efficient tax should reduce and ideally minimize the total cost of combating pollution ("static efficiency" of taxes). Ecotaxes should therefore produce a competitive advantage, at least in the longer term, even if there may be some short-term adjustment costs.

In any case, any environmental policy is bound to affect costs to some degree, for instance through pollution standards, technical standards or regulations. There is no need to single out ecotaxes in particular.

*Can countries act independently?* A consumption tax affecting imports and not exports (in the event of border adjustments) does not give rise to any real problem of competitiveness or any risk of relocation. On the other hand, any tax affecting the productive sector can encourage relocation in energy intensive sectors. It all depends on the mobility of capital. According to the European Commission (1993), the risk of capital mobility is greater in a small open economy than in a large "relatively closed" grouping such as the European Union. That would already involve concerted action among many countries. However, a consumption tax with border tax adjustment should be a way of minimizing the risk of trade distortion. Moreover, the lower labour costs resulting from the reduction in employers' social security contributions (in the event of a "double dividend") should offer some competitive advantages, especially in labour intensive sectors.

In any event, the question of competitiveness remains central to the debate on ecotaxes and the most advanced countries in this area are proceeding very carefully. There is no doubt that on an international level any form of harmonization or concerted action would facilitate the introduction of green tax reforms. The "conditionality clause" attached to the initial proposal (now abandoned) for a European carbon/energy tax did stipulate that such a tax could only be adopted if similar measures were applied by the other trading partners. It seems reasonable to believe that there will be no large scale green tax reforms without some form of international coordination.

It is worth keeping a watch on developments. It is really up to the European Union and WTO to spell out the rules of the game. In 1997, for instance, the European Commission submitted a "Communication on environmental taxes and charges in the single market" and, also in 1997, a draft Directive on the taxation of all energy products, with minimum rates and a regular increase between 1998 and 2002.

## 7. ENVIRONMENTAL TAXES AFTER KYOTO?

The first economic instrument considered as a means of combating greenhouse gases, and particularly CO<sub>2</sub>, was taxes. Some pilot countries have in fact already introduced carbon taxes. Proposals had also been made, however, for an *international carbon tax*; one example of this was the proposal for a European carbon-energy tax, which was eventually rejected. The idea of an international tax on carbon now appears to have been abandoned and the instrument favoured by the Kyoto Protocol to the United Nations Convention on Climate Change (December 1997) is one or more systems of tradable permits. But this does not mean to say that taxes would have no role to play; quite on the contrary, for a number of reasons.

In the first place, the Kyoto Protocol itself recommends that Annex I parties "...implement and/or further elaborate policies and measures, in accordance with its national circumstances, such as ... a progressive reduction or phasing out of market imperfections, fiscal incentives, taxes and duty exemptions and subsidies in all greenhouse gas emitting sectors, that run counter to the objectives of the Convention, and apply market instruments".<sup>7</sup>

In fact, in order to fulfill its Kyoto commitments, each country is expected to introduce domestically the most efficient instruments it can for combating greenhouse gases. And taxes rank very high among such instruments. For example, a country might well choose to achieve its abatement objectives through taxes, while proceeding to trade *international* permits, either selling them or acquiring them in addition to the abatements obtained through the domestic tax system [Hourcade (1998)].

---

<sup>7</sup> Article 2 §1(a)(v).

It is by no means sure, however, that tradable permits are an effective way of combating all emissions, especially those of mobile sources (transports), which account for about a quarter of CO<sub>2</sub> emissions and are undergoing substantial, uncontrolled growth in OECD countries. Insofar as domestic tradable permit systems are introduced, it is possible to imagine that the two systems might coexist, in the form of tradable permits for fixed sources and taxes for mobile or diffuse sources.

There may also be the possibility from a taxation point of view of a follow-on solution based on *auctioned* tradable permits (in other words not allocated free of charge). The revenue obtained from permit sales could be redistributed in the form of reduced distortional taxes, such as labour taxes; in this way, a "double dividend" policy could use both ecotaxes and the sale of permits.

Systems *combining* ecotaxes and trading permits, that is, both a price approach and a quantity approach, still remain to be tested.

In any event, in a longer term perspective, it is likely that ecotaxes will play an increasing role and will become more diversified in the effort to combat greenhouse gases.

## **8. CONCLUSIONS**

Ecotaxes are a potentially effective way of protecting the environment and at the same time enhancing economic efficiency. This is increasingly shown by the experience of OECD countries. The effectiveness of ecotaxes should be judged not only from a (primarily) environmental point of view, but also from a fiscal, economic and social angle.

From an environmental point of view, the prime objective of an ecotax must clearly be to protect the environment.

From a fiscal point of view, a "green" fiscal reform should provide an opportunity to eliminate tax distortions and to modernize taxation systems.

From an economic point of view, it should be possible by internalizing costs, by eliminating subsidies and taxes which are harmful to the environment and to the economy and by introducing appropriate tax shifts, to achieve real structural adjustments of economies and thereby greater efficiency.

From a social point of view, reducing taxes on labour and employment is a desirable objective, particularly in the many countries where unemployment is rife.

Nevertheless, ecotaxes should not be seen as a panacea. Environmental policies include a whole range of instruments (such as regulations, standards, voluntary agreements, tradable permits, etc.). The right place for ecotaxes is most likely to be found in "mixed" systems combining a selection of these instruments.

Furthermore, ecotaxes are neither applicable nor even desirable universally. In some cases, involving toxic products for instance, it is preferable to ban than to tax. In other cases, ecotaxes may be difficult to apply because the situation is too complex (see the "tragic triangle").

While ecotaxes are an effective, flexible instrument for protecting the environment, they are not universally applicable and need to be considered within a general environmental, economic, social and international context.

Finally, it is likely, in the light of the Kyoto Protocol on Climate Change, that ecotaxes will play an increasingly important role as a means of combating greenhouse gas emissions.

## REFERENCES

- ADAMS, J. (1997), "Environmental Policy and Competitiveness in a Global Economy: Conceptual Issues and a Review of the Empirical Evidence", in OECD, *Globalisation and Environment: Preliminary Perspectives*, OECD, Paris.
- ANDERSEN, M.S. (1998), "Assessing the Effectiveness of Denmark's Waste Tax, *Environment*, May 1998.
- ANDERSON, R.C., LOHOF, A.Q., CARLIN, A. (1997), "The United States Experience with Economic Incentives in Pollution Control Policy", Environmental Law Institute and U.S. EPA, Washington DC.
- INTERNATIONAL ENERGY AGENCY, *Energy Prices and Taxes*, IEA, Paris.
- SWEDISH ENVIRONMENTAL PROTECTION AGENCY, *Environmental Taxes in Sweden*, Stockholm.
- BARDE, J.Ph. (1992), *Economie et politique de l'environnement*, Presses Universitaires de France, Paris.
- BARDE, J.Ph. (1997), "Economic Instruments for Environmental Protection: Experience in OECD countries" in OECD (1997), *Applying market-based instruments to environmental policies in China and OECD countries*, OECD, Paris.
- BARDE, J.Ph. and SMITH, St. (1997), "Do Economic Instruments Help the Environment?" *The OECD Observer*, No. 204, March.
- BARON, R. and ECON-Energy (1997), "Competitiveness Issues Related to Carbon/Energy Taxation", Working Paper No. 14, prepared for the Annex I Expert Group, IEA/OECD.
- BOVENBERG, L. and de MOOIJ, R. (1994), "Environmental Levies and Distortionary Taxation", *American Economic Review*, Vol. 84, No. 4, September.
- ECMT (1998), *Efficient Transport for Europe*, ECMT, Paris.
- EUROPEAN COMMISSION (1993), "Taxation, Employment and Environment: Fiscal Reform for Reducing Unemployment", DSG II document, 3 December, Brussels.
- ECON (1994), report 326/94, Oslo.
- EUROSTAT (1996a), "Road Transport and the Environment: Energy and Fiscal Aspects", *Statistics in Focus*, 1996.2.
- EUROSTAT (1996b), "Structures of the Taxation Systems in the European Union", Office for Official Publications of the European Communities.

- GIEC (1995), Working Group 3 Draft assessment report, Washington D.C., January.
- HOURCADE, J.C. (1998), "Les écotaxes et le Protocole de Kyoto" *La jaune et la rouge*, April 1998, Paris.
- IIMD (1996), The World Competitiveness Yearbook, International Institute for Management Development, Lausanne.
- JAFFE, A., PETERSON, S.R., PORTNEY, P.R., STAVINS, R.N. (1995), "Environmental Regulation and the Competitiveness of US Manufacturing: What Does the Evidence Tell Us?", *Journal of Economic Literature*, Vol. XXXIII, March.
- LARSEN, B.M. and NESBAKKEN, R. (1997), Norwegian Emissions of CO<sub>2</sub> 1987-1994. A Study of Some Effects of the CO<sub>2</sub> Tax", *Environmental and Resource Economics*, in course of publication.
- MAJOCCHI, A. (1996), "Green Fiscal Reform and Employment: a Survey", *Environmental and Resource Economics*, Vol. 8, No. 4, December.
- MICHAELIS, L. (1996), "The Environmental Implications of Energy and Transport Subsidies", in OECD (1996b).
- DANISH MINISTRY OF FINANCE (1995), *Energy Taxes on Industry in Denmark*.
- OECD (1994), *Managing the Environment: the Role of Economic Instruments*, OECD, Paris.
- OECD (1995a), *Global Warming: Economic Dimensions and Policy Responses*, OECD, Paris.
- OECD (1995b), *Climate Change, Economic Instruments and Income Distribution*, OECD, Paris.
- OECD (1996a), *Integrating Environment and Economy: Progress in the 1990s*, OECD, Paris.
- OECD (1996b), *Subsidies and Environment: Exploring the Linkages*, OECD, Paris.
- OECD (1996c), *Implementation Strategies for Environmental Taxes*, OECD, Paris.
- OECD (1997a), *Reforming Environmental Regulation in OECD Countries*, OECD, Paris.
- OECD (1997b), *Evaluating Economic Instruments for Environmental Policy*, OECD, Paris.
- OECD (1997c), *Environmental Taxes and Green Tax Reform*, OECD, Paris.
- OECD (1997d), *Economic Globalization and the Environment*, OECD, Paris.
- OECD (1998), *Improving the environment through reducing subsidies*, Parts I and II, OECD, Paris.
- PEARSON, M. and SMITH, St. (1991), "The European Carbon Tax: an Assessment of the European Commission Proposal", Institute for Fiscal Studies, London.
- PEARSON, M. (1992), "Equity Issues and Carbon Taxes", in *Climate Change: Designing a Practical Tax System*, OECD, Paris, 1992.

SCOTT, S. (1992), "Theoretical Considerations and Estimates of the Effects on Households", in J. FitzGerald and D. McCoy (eds), *The Economic Effects of Carbon Taxes*, Policy Research Series, Paper No. 14, The Economic and Social Research Institute, Dublin.

SHAH, A. and LARSEN, B. (1992), "Carbon Taxes, the Greenhouse Effect, and Developing Countries", Background paper No. 6, prepared for the *Report on development in the world*, 1992, World Bank, Washington D.C.

SMITH, St. (1998), "Distributional Incidence of Environmental Taxes on Energy and Carbon: a Review of Policy Issues", presented at the colloquy of the Ministry of the Environment and Regional Planning, "Green Tax Reform and Economic Instruments for International Cooperation: the Post-Kyoto Context", Toulouse, 13 May 1998.