10 Economic Policy Instruments
Taxes and Fees

10.1 The Economy of Environmental Protection

10.1.1 To Pay the Costs of Environmental Services

Environmental policy is about protecting the environment by reducing or removing environmentally adverse behaviour on the side of business, people at large and public activities alike. The need for environmental policy means, that this aim is not coming about all by itself. Environmental policy is, therefore, essentially about finding ways and means to influence behaviour of all kind of human actors in more environmentally friendly direction.

This book focuses on industry and thereby business. We have in the previous chapters seen key elements of regulatory policy instruments applied by policy makers to make industry minimize, or at least reduce, adverse environmental impact from their activities. Many of these instruments have a strong element of self-control and self-management. Where they are authoritative, i.e. determined by the environmental authorities, like an environmental licence according to the IPPC directive, there is a considerable element of consensus-making involved in establishing these licences.

When we now turn to the economic policy instruments, which make up an important – and increasing – part of the arsenal of environmental policy instruments, the basic assumption is that there are no "free luncheons". Resource use and waste emissions are services which cost something and those costs need to be paid. If the prices are right they would – according to the views of market economy – take care of all environmental protection needed. But it is not that simple, as we will see.

Economic instruments are general in their nature. For any unit performing the targeted activity or using the targeted commodity and once decided upon, there are no negotiations on their application. Economic instruments work by economic incentives. This is a particularly strong incentive in any business context. By changing behaviour, that is, by replacing one kind of material or process with environmentally less harmful materials or processes, the company can reduce the fee or avoid paying all together. Economic instruments therefore influence the behaviour of the business, that is, change the way the busi-

In this Chapter

ness is run to avoid the fee. Ideally, the policy intentions have been achieved, when no fee is paid. Then the policy has been successful.

For economic instruments the key property and peculiarity is, that complying fully with the policy brings the "free lunch-eons" about at last. It might even be topped up by outright economics gains, at least in the long term. Reality is, however, also in this area, often quite a bit away from the ideal. Before expanding on that, we will take a somewhat closer look at the economic instruments and their application.

10.1.2 Why Economic Instruments?

Economic instruments are applied to change behaviour by economic incentives. But why do these incentives need to be imposed? Why do not companies and individuals see and go for these benefits on their own?

There are several reasons.

First a good deal of the natural environment, such as the air, is "common good", i.e. it has no owner. There is then a risk of exploitation. The state comes in to play the role of the owner to protect this common good. It may do this by charging a fee for its use.

In other cases there is no possibility of charging for the use of a service, for example street lighting. But it costs something to provide it. In order to cover the costs again the public has to collect a tax.

Thirdly, and more importantly, environmental consequences of human activities are diffuse, wide-ranging, piece-meal and often dangerous only in the long term. A few examples may illustrate this:

- Particles from car exhaust in the city affect health seriously; people exposed to particles on the street will bear the consequences, far away from the car owners.
- Nutrients and pesticides leaking from agricultural land cause pollution of rivers and coastal waters; reduced water quality, reduced biodiversity etc will be felt far away from the polluter.
- Pollution of air by SO_x and NO_x cause degradation of buildings, monuments and corrosion of various installations due to acidification; owners of these monuments or equipments are far away from those emitting the acidifying gases.
- Release of CO_2 from power generation etc., create the enhanced green house effect; those suffering from the consequential climate change are often far away from the polluters.

Some of these impacts are regulated by regulatory policy instruments. Emission values, imposed by the environmental licences for an activity and by specific product standards, set upper limits on the hazardous content. In other cases an original economic approach is replaced by a regulatory one. Regulation of cars is illustrative in this respect. Authorities started to phase out leaded petrol by introducing a differentiated petrol tax. Later they demanded catalytic converters on all new cars from a certain time. This ended the use of leaded petrol, since converters did not function with lead in the petrol. Another example is provided by agriculture. Here the use of fertilizer and pesticides were regulated via a quota-system and by quality requirements or outright ban on certain products.

Still, regulatory policy instruments are not sufficient. There is a limit to in how much detail you can regulate an activity. The resources needed for detailed control would be impossible. This is especially true for diffuse sources and/or diffuse and long-term effects. Further, the direct regulation approach does not promote changes and innovation very well. It holds no or limited incentives. In these cases economic instruments are more efficient.

10.1.3 Setting the Right Price for External Effects

The damaging effects of emissions exemplified above, remain external to the cost-calculations in companies and hence are not included in the prices of the products. This is where the economic instruments may play an important role. Such instruments can "internalize" the costs of this type of environmental impact by assigning a tax to each unit of exhaust, to each kg of fertilizer and to each ton of CO_2. Such taxes will make the prices go up. Thereby they will create a dynamic (or continuous) incentive to innovate, to substitute or – at least – to try to reduce the use of the environmentally damaging products or methods to avoid paying or reduce the amount of the tax to be paid.

There are, in other words, some "social costs" of human activities, which are not automatically brought "into the equation". The economic instruments, i.e. taxation, provide a way to internalize these costs into the private calculations. In this way private and social costs are added together to make up the full costs for the environment of human activity and thereby make the prices "tell the truth" [Weizäcker, 1997] about the environmental costs of a given commodity or service.

For micro-economic theory the internalization of social costs represents a problem of principle. It has correct (fair and firm) marginal pricing as a precondition for efficiency in cost distribution and resource re-allocation via the market. But the estimation and quantification of the social costs of different kinds of environmental damage are very difficult to establish, and any calculation will be full of uncertainties and reservations. Fixing the tax-level will therefore not come up to these micro-economic requirements, which are, by the way,

also hampered by many other uncertainties and reservations in their practical application. Rather, deciding the level of the taxation will be much more of a "trial and error" exercise, depending on political support and drawing on experiences from other areas and from other countries and then correcting the tax-level as experiences are gained.

10.1.4 The Polluter Pays Principle

Quite a few environmental policy principles have been developed over the recent 30 years and most notably since 1987, when the Brundtland Commission Report Our common Future was published. For the economic instruments, the *polluter pays principle* is the oldest, the most widely recognized, taken up in legislation across the globe. It was adopted in the 1st EU Environmental Action Programme back in 1973 and included in the EU Treaty of 1992/93, Art. 174/EC. It was also included in the UNCED-Rio-Declaration from 1992. The key issue is, what should be included to fulfil this principle, i.e. when can the polluter be said to have paid (all the costs of his activity)? Like most other areas we have here witnessed a historical development, changing the notion and the understanding of the polluter pays principle as to what should be included for full cost coverage. The main distinction goes between environmental fees/charges and environmental taxes. Suggestions for moving into taxation were heard all the way from Pigou in the 1920's till Baumol and Oates in the late 1970's into the 1980's. It was not until the latter half of the 1980's that the first environmental taxes were actually introduced.

Table 10.1 User fees/charges in Denmark for discharging/delivering wastewater and solid waste to treatment and handling facilities for years 1998 and 2004, compared with the environmental taxes for the same years. *Figures in Million DKK. The OECD defines charges and fees as "compulsory requited payments to either general government or to bodies outside general government, such as for instance an environmental fund or a water management board" (OECD, 1999), and environmentally related tax as a "compulsory, unrequited payment to general government levied on tax-bases deemed to be of particular relevance. Taxes are unrequited in the sense that benefits provided by government to taxpayers are not normally in proportion to their payments" (OECD, 2001). [Sources: Danish Ministry of Finance and Danish Statistics Service].*

Tax	1998	2004
Energy- tax	22,964	31,768
CO_2/SO_2-tax	4,515	4,954
Packaging tax	864	921
CFC/Chlorinated compounds etc.	2	53
Pesticides	298	379
Raw-materials	157	161
Solid Waste-tax	889	1,005
Wastewater tax	273	197
Drinking-/Tap water tax	1,544	1,430
Miscellaneous	53	92
In Total	31,559	40,960
in EURO, million	4,236	5,498
User fees, same years:		
Waste water treatment	6,400	7,900
Solid waste handling	6,200	13,300
in Total	12,888	21,200
In EURO, million	1,730	2,845
User Fee, percentage of Taxes	40.8	51.7

10.2 Charges or User Fees

10.2.1 Charges

Charges are defined as the payment which should cover the proven expenses for handling waste or providing a resource such as water. The charges include costs for collecting sewage and treatment of wastewater in treatment plants collecting and incineration of solid waste collecting and depositing solid waste on landfill collecting and managing hazardous waste, either by incineration, or storage cleaning or depositing polluted soil from so-called brown fields

The companies responsible for these services are in many EU-countries run by, or owned by, the municipality or by the regional government, but private companies are also involved, especially in the solid waste-handling sector.

As the handling cost for the clean-up operations are not taking into account the wider implications and wider social costs of the economic activity, they will never be able to achieve the full "internalization" of these social costs. Still, within their scope, the charges will have some internalization effect as these costs will influence the behaviour of companies and consumers in the direction of avoiding or minimizing the amount to be paid. If charges were not required there would be a social redistribution via the state for the benefit of those, creating the pollution. The costs would then have to be paid by the ordinary taxpayer.

Data on charges are not available in Eurostat, (the EUs Statics Bureau), or EEA, the European Environmental Agency, on the charges collected in the EU-countries on only the taxes. But they are available nationally. As an example the fees and charg-

es paid by Danish users in 1998 and 2004 are shown in Table 10.1 together with the environmental taxes paid these same years. It is clear from the table, that the relative increase in the charges is higher than the relative increase in the taxes. The main increase comes from charges for solid waste handling, which has actually doubled within these 6 years with the biggest "jump" from 1998-2000. The reasons seems to be cost increase at the handling utilities, including expansion of the handling capacity, a rise in the amount received and a slight increase in the proportion of private companies, active in the solid waste sector.

10.2.2 Setting a Price for Water Services

For the publicly owned utilities the charges may cover the actual costs of running the operations, but may not exceed that level. Then they would turn into profit making, i.e. act as a hidden and non-decided taxation. The charges must, put differently, not move beyond making the services "expense-neutral".

The responsibility for defining the charges is normally that of the municipality or region. The city council or regional council in these cases appoints and constitutes the board of such companies, which decides the charges.

The charges may be fairly easy to calculate from the cost of operations. But it is less clear how to divide charges between a basic and a volume-dependent part of the charge. The cost for wastewater treatment is by far dominated by the basic cost for running the treatment plant, which is volume independent. Still, if the charge is volume-dependent, that is, dominated by costs per cubic meter, it will work as an incentive to decrease water use. This was dramatically illustrated when charges for water were introduced in Central and Eastern Europe. Water use decreased from more than 400 l/capita and day to less than 100 l/capita and day in a few years. A further complication is that normally the costs for water and wastewater management are combined into a single charge. The user pays for the volume of water used, regardless of how it is used and polluted. In addition many water companies do more than simply take care of water. They e.g. ferment their sludge to produce biogas, which is sold, and they may use residual heat in wastewater e.g. by a heat pump to feed into the district heating. It is not clear in which way the costs and gains from these activities enter into the definition of the charges.

In general only small industries use municipal water and municipal treatment plants. The larger industries most often have their own water supply and thus are independent of the municipal policy for setting charges. The cost for their water use is instead decided by the costs connected with fulfilling the conditions for water withdrawal and concentrations of pollutant in the effluents as decided in their licences. But in case the country or the region has put a tax on water use, this tax will have to be paid also by companies with their own water supply, as the objective of the tax is reduced use of the water resource as such. This is yet another demonstration of the difference between the fee and the tax.

10.3 Environmental Taxes

10.3.1 Introducing Environmental Taxes

Environmental taxes have become increasingly popular with most governments in recent years. It all started in the late 1980's with an OECD declaration by the member countries' Environmental Ministers in June 1985. This was a pledge for the use of the polluter pays principle and initiated an extensive survey of the use of economic instruments among the member states. The study [Opschoor & Vos, 1989] found a number of charges but in reality no environmental taxes. The Japanese SO_2 tax was the only exception. In addition taxes on petrol in the Netherlands and Scandinavia were identified.

In Denmark, the petrol tax was introduced as far back as in 1927, but at a low level. Petrol taxes were, however, subsequently raised considerably. In conjunction with the first and the second "oil crises" in 1974 and 1979 respectively an increase of petrol tax was introduced to halt a rise in, or to reduce, the petrol consumption. At the same time a shift from oil-based to coal-based power generation was initiated. Both measures were made to reduce the Danish dependency on oil and the damaging influence on the balance of payment. These taxes were, therefore, not originally founded on environmental concerns, but were increasingly seen that way, as the concern for the environment came firmly on the agenda with the 1987 Brundtland Report and the Rio summit in 1992.

OECD has compiled information on the level and importance of the "environmentally related taxes" for its 30 member states. Table 10.2 A-C provides an overview of the taxes for selected countries, related to GDP, to total tax revenue and per capita.

10.3.2 Pollution Fees and Product Taxes

Environmentally related taxes or fees are of several kinds. They include:

- Emission charges or fees, e.g. on emitted SO_X.
- Non-compliance fees when exceeding permitted emissions.
- Product taxes on products causing an environmental impact, such as fertilizers.
- Product charges on petrol.
- Taxes for land-filling of waste.

A. Env. tax revenue per GDP (%)	1995	1999	2003	2004
Czech Republic	3.36	3.03	2.83	2.62
Denmark	4.36	5.19	4.96	5.10
Finland	2.93	3.49	3.29	3.12
Germany	2.41	2.29	2.64	2.53
Norway	3.54	3.26	2.98	3.03
Poland	1.52	1.94	1.94	na
Slovak Republic	2.41	1.99	0.14	na
Sweden	2.92	2.88	2.95	2.88
United Kindom	2.93	3.21	2.68	2.65
United States	1.12	1.03	0.88	na
OECD average	1.94	1.89	1.73	na

B. Env. tax revenue per total tax (%)	1995	1999	2003	2004
Czech Republic	8.38	7.79	7.52	na
Denmark	8.83	10.08	10.27	na
Finland	6.52	7.42	7.37	na
Germany	6.30	6.07	7.44	na
Norway	8.52	8.07	6.86	na
Poland	3.83	5.54	5.67	na
Slovak Republic	na	5.79	na	na
Sweden	6.14	5.50	5.84	na
United Kingdom	8.33	8.88	7.57	na
United States	4.07	3.56	3.46	na
OECD average	7.07	7.42	7.07	na

C. Env. tax revenue per capita (USD/cap)	1995	1999	2003	2004
Czech Republic	169	162	251	274
Denmark	1501	1687	1945	2288
Finland	741	862	1024	1114
Germany	724	588	781	845
Norway	1189	1155	1440	1660
Poland	49	77	106	na
Slovak Republic	82	74	na	na
Sweden	794	817	993	1112
United Kingdom	568	800	814	950
United States	310	342	332	na
OECD average	597	619	725	505

The most direct form of environmental taxes is when a cost is charged on emissions. The fee for emission of sulphur dioxide provides an example. The taxation is done to stimulate the reduction of emissions. Charges for SO_x emissions should be compared to the cost of abatement. In this case it is rather cheap to remove the SO_x from the flue gases and, at least in several countries, the taxes are more expensive. This means that the taxation have been a rather efficient economic instrument to improve environmental protection. It is much less easy to abate NO_x and the reduction of NO_x in flue gases from industry or car exhausts decreases more slowly.

An IPPC licence usually gives the right to a company to emit a defined amount of each substance from its activity. If these amounts are exceeded the consequences is in the first place a non-compliance fee. It is an economic instrument with the purpose of reducing the likelihood of exceeding the allowed amount. The non-compliance fee is often progressive, that is, the first few kg or m^3 are less costly and the additional kg or m^3 cost more.

Taxes may also be put on products, which will cause environmental impact. Most typical is the charge on petrol, but there are several other taxes. Artificial fertilisers have a tax in Sweden, related to their nitrogen content. In this case it has been clearly shown that the use of fertilisers is dependent on the level of this tax. When it increases the amount of fertilisers decreases, which is exactly what the tax is meant to achieve.

10.3.3 Taxes on Waste

One of the environmental taxes, which have increased very considerably the last few years is a tax for landfilling. The base is the year 1999 EU Landfill Directive, which aims at reducing the waste ending up in landfill sites. For this reason a landfill tax has been introduced. The present tax on landfilling waste in Sweden is 435 SEK (50 Euro) and in England it is 24 GBP (36 Euro) per tonne. The level of the tax after its introduction in 2000 has increased yearly.

Table 10.2 Revenues from environmentally related taxes. *The table gives data from countries in the Baltic Sea region and, for comparison, data for the USA, UK, and average for the 30 OECD countries. The tax-bases covered include energy products, transport equipment and transport services, as well as measured or estimated emissions to air and water, ozone depleting substances, certain non-point sources of water pollution, waste management and noise, in addition to the management of water, land, soil, forests, biodiversity, wildlife and fish stocks. A: Revenues in % of GDP. B: Revenues in % of total tax revenue. C: Revenues per capita in US Dollars. The averages for 2003 and 2004 are calculated only across the countries for which 2003 and 2004 figures are available. [Source: EUROSTAT. http://www2.oecd.org/ecoinst/queries/]*

Specifically the Commission's policy is that the amount of biodegradable municipal waste (including household rubbish) in landfill should be reduced by 35% by 2020 compared to that of 1995. A main reason is to remove methane (a greenhouse gas) emissions from landfills. Composting and subsequent use for soil improvement is the preferred way. Composting is used all through Europe especially in the old EU-15 countries. The tax on landfill has again proved to be a very efficient instrument to promote a long series of projects to reduce landfilling. Most of these projects have been initiated and run by local authorities. An important option is solid waste incineration, which is increasing in Europe.

The taxes on landfilling have also stimulated the establishment of a market for recycled materials, such as paper, glass and scrap metal. This has, in a very considerable way, changed waste management in the European Union and in other parts of the world. Other kinds of waste may also be reused. For example volumes from building sites may be sent to road constructions. Waste taxation is thus one of a number of regulatory and economic instruments, which have been introduced to stop the galloping amounts of waste in Europe, and change our "wasteisation" society into a society of good resource management.

10.3.4 Energy Taxation

Energy taxes are by far the oldest types of environmental taxes. Energy taxation has been a main instrument for a number of purposes, the most important being:

- To reduce oil dependency.
- To reduce emission caused by power production.
- To reduce car traffic.
- To increase fiscal revenues.

We will comment on each of these issues below to see to what extent they influence energy taxation.

Energy taxation is implemented for petrol and in general for fossil fuels for cars, for oil used for heating purposes, for gas and coal used for the same purposes, as well as for electricity. Energy taxation has not been introduced for international traffic, neither by boat nor by air. This is becoming an increasingly serious drawback in efforts to reduce carbon dioxide emissions. An added problem is that international ferry traffic does not have to pay fees for using high sulphur oil and is thus becoming a main contributor to aid rain. Some Baltic Sea ferry companies use low-sulphur oil anyhow to improve their goodwill, and due to customers requests.

Taxes are decided on nationally. They thus vary considerably, but all member states in the European Union have energy taxes. There have been efforts to harmonise energy taxes, and even more so, that there are carbon dioxide taxes, in the European Union. Below we will see that there are rules for minimum taxation of fossil fuels in Europe.

Figure 10.1 The car and the environment. *Car traffic is a burden on the environment in several ways. Climate change due to the use of fossil fuels, air pollution, and the extensive infrastructure are the dominating categories. Car traffic also is heavily taxed and in fact contribute with about 85 % of all environmental taxes. (Photo: Credit © European Community, 2007)*

Energy taxes are fairly high. As an example the Swedish price on 1 litre of petrol in March 2007 had a total cost of 1.3 euros per litre, of which about 2/3 is tax. This level is normal for western European countries. In 2006 the Swedish petrol taxation totalled 41 billion SEK (4.4 billion Euro). Petrol taxation has since increased.

10.3.5 Taxes on Fuels

A most important tax revenue provider is the fuel used for transportation, personal as well as commercial. We will see below that about 2/3 of all environmental tax revenue is coming from fuel taxation.

The EU-directive 2003/96/EC of 27 October 2003 sets minimum rates of taxation for motor fuel, motor fuel for industrial or commercial use, heating fuel and electricity (Table 10.3). The levels of taxation applied by the Member States must not be lower than the minimum rates set in the Directive. Under certain conditions, i.e. linked to product quality, quantity of energy used for heating purposes and e.g. for local public transport, waste collection and ambulances, the member states may have differentiated rates. Further, certain exemptions and reductions are allowed in limited and very special cases. Otherwise the member states should comply with the minimum price system, which has two stages, one to be implemented by 1st of January 2004, while the second stage (applicable to motor fuels only) takes effect from 2010.

These taxes will apply to and affect private households and private transportation, including the costs for commuting. The same is true about waste and water taxes, which are applied in

a number of member states, but with widely different amounts among its members.

Fuel for commercial use, i.e. non-car-related use, is making up about 6-8% of the household taxation. That is true also for the fuel used for producing heat and electricity.

10.3.6 Car-related Taxes make up the Most

A number of economic instruments have been introduced for car traffic. These have been motivated in at least three different ways:

- Cars should pay their costs for investments in infrastructure.
- Cars traffic should be moved over to public transport.
- Cars traffic should pay for their environmental impacts.

The economic instruments include energy tax on petrol, registration tax (accis), and road tax.

Petrol taxes started already in the 1970's in many western European countries, motivated by the search for means to ease the energy-dependency after the so-called oil price crisis. When this after a few years had lost much of its impetus, the petrol taxes had at the same time become an important income for the state. It was then convenient to be able to "rename" it "environmental". Still, the effect in terms of reducing or keeping the use of petrol stable was there and a directional effect along the ideas behind the environmental taxation therefore realized.

The registration tax on new cars is also counted as an environmental tax. This tax varies very much across the countries with Denmark having by far the highest level of that tax in all EU, making up 40% of all environmental taxes in Denmark. This is the only reason why Denmark has the highest share of environmental taxes to the GDP. Denmark would otherwise be close to the average level of environmental taxes.

More importantly, the registration tax should not be included in the environmental taxes at all, as it has very little to do with protecting the environment and even in some respect serves the opposite – it increases the pollution from cars. A high registration tax makes cars more expensive and hence makes people keep them longer, which make technological innovations, i.e. more energy-efficient motors and lighter materials, spread less quickly. Registration tax has no effect on how much you use your car. It is a "one-off" payment, made when you buy the car. It may, on the contrary, again, prompt you to use your expensive investment even more to justify it.

Till now, the dependence of the environmental taxation on car-related taxes becomes clear in Figure 10.2. It shows that 90% of the tax is related to cars. It is based on material from 1995, but the OECD underlines, that the overall picture is still valid. Petrol and registration taxes make up about 70% of all environmental taxes collected within the OECD countries, while another 20% relates to cars as "recurrent taxes". Some

Table 10.3 Minimum taxes for fuels/electricity in the EU. *The table gives minimum levels for motor fuel, motor fuel for industrial or commercial use, heating fuel and electricity according to EU Directive 2003/96/EC.*

Minimum levels of taxation for	Kind of fuel	Current minimum excise rates	Minimum excise rates from 1.1.2004	Minimum excise rates from 1.1.2010
Motor fuels	Petrol (/1,000 l)	337	421	421
	Unleaded petrol (/1,000 l)	287	359	359
	Diesel (/1,000 l)	245	302	330
	Kerosene (/1,000 l)	245	302	330
	LPG (/1,000 l)	100	125	125
	Natural gas	100 (/1,000 kg)	2.6 (/gigajoule)	2.6 (/gigajoule)
Fuels for industrial or commercial use	Diesel (/1,000 l)	18	21	
	Kerosene (/1,000 l)	18	21	
	LPG (/1,000 kg)	36	41	
	Natural gas	36 (/1,000 kg)	0.3 (/gigajoule)	
Heating fuels and electricity	Diesel (/1,000 l)	18	21	21
	Heavy fuel oil (/1,000 kg)	13	15	15
	Kerosene (/1,000 l)	0	0	0
	LPG (/1,000 kg)	0	0	0
	Natural gas /gigajoule)	-	0,15	0,3

Box 10.1 Environmental Taxes and Charges in Europe

Environmental taxes and charges are the most widely used market-based instrument for environmental policy in Europe, despite current interest in trading schemes. They are generally seen as the most cost-effective instruments for environmental improvements. Below is a overview extracted from a 2005 EEA report on the application of environmental taxes, charges and deposit-refund schemes across Europe. It is not complete, e.g. some car-related taxes are not included.

CO_2 taxes

While attempts to introduce a CO_2/energy tax at the EU level have failed, CO_2 taxes have been widely adopted in the Member States. The first CO_2 tax was levied in Finland in 1990, and there are now CO_2 taxes in Denmark, Finland, Germany, the Netherlands, Norway, Poland, Slovenia, Sweden and the UK. Estonia introduced a charge on CO_2 emissions in 2000. These taxes are often an additional tax levied on some energy carriers, not always differentiated according to their carbon content, and with many exemptions.

Air pollution

A levy on NO_x is in place in France, Italy and Sweden, and SO_2 levies are in place in Denmark, France, Norway, Sweden and Switzerland. More comprehensive, multi-pollutant systems of air pollution charging are in place in some of the new EU Member States (such as the Czech Republic, Estonia, Latvia, Lithuania and Poland) and candidate countries (Bulgaria and Romania) as well as in the eastern European countries (such as Russia where more than 200 different air pollutants and around 200 water pollutants are subject to a pollution charge). Switzerland has introduced a tax on volatile organic compounds (VOCs).

Agricultural inputs

There are taxes or charges on pesticides in Denmark, Norway and Sweden, and in Belgium, although not on products used in agriculture; and on fertilisers in Denmark (tax on phosphorus in animal food), the Netherlands (to be abandoned) and Sweden, and earlier (now abolished) in Austria, Norway and Finland.

Products

There are taxes or charges on a wide range of polluting products, including: batteries in Belgium, Bulgaria, Denmark, Italy, Latvia, Lithuania and Sweden, with a takeback scheme in place in Austria, Germany and Switzerland; plastic carrier bags in Denmark, Italy and Ireland; disposable beverage containers in Belgium, Denmark, Estonia, Finland, Latvia, Lithuania, Poland and Sweden and deposit-refund schemes in Austria, Germany and the Netherlands; tyres in Bulgaria, Denmark, Finland, Latvia and Sweden; chlorofluorocarbons (CFCs) and/or halons in Latvia and Denmark; disposable cameras in Belgium; lubricant oil in Denmark (now abolished), Finland, Italy, Latvia, Norway, Slovenia, Spain and Sweden; and oil products (to combat and compensate oil pollution damage) in Finland and France.

Waste

User charges are in place in most EU Member States and Balkan as well as eastern European countries and in the EFTA countries (Norway and Switzerland). There are waste taxes (landfill tax) in many EU Member States; hazardous waste taxes or charges in a number of countries, notably Belgium, Denmark, Finland, France, Germany and Poland; and differentiated user charges in many municipalities in a wide range of Member States, with the aim of making this compulsory across all municipalities in Ireland and Italy.

Water

User charges for water are in place for all EU Member States and Balkan and eastern European countries, though with different levels of cost recovery implicit in the price. There are water abstraction tax/charges in Denmark, the Netherlands and the majority of the new EU Member States and applicant countries; wastewater tax/charge – effluent charges in several EU-15 Member States including Denmark, France, Germany and the Netherlands, and in several new EU Member States and Balkan as well as eastern European countries.

Fisheries

While not strictly speaking an environmental charge, there are economic instruments that apply to fisheries. The EU pays access charges on behalf of its long-distance fleet for access to the fisheries resources of some third countries. In some cases, these countries also levy additional charges directly on the boat owners. These may be flat rates or linked to catch levels. The levying of charges on recreational fishing is common throughout the EU.

Others

Aggregates taxes, covering sand, gravel and/or crushed rock, are in place in Belgium (Flanders), Bulgaria, Denmark, Russia, Sweden, Ukraine and the UK. In addition, there already are, or are seriously proposed, taxes/charges on: air transport (noise charge), chlorinated solvents, disposable tableware, light bulbs, PVC, phthalates, junk mail; vehicle scrapping charges (already in place in Norway, Slovenia and Sweden), electronic and electric waste (already in place in several EU countries), nuclear waste management, and air polluting emissions from incinerators.

Source: http://reports.eea.europa.eu/technical_report_2005_8/en/EEA_technical_report_8_2005.pdf

of this last 20% will be environmentally oriented, but the major part will be related to road maintenance and construction etc. The same figures are not available for the EU-15. It would probably show less dependency on the car for taxation, but the difference would be marginal.

10.3.7 Making Passenger Car Taxation Environmentally Based

The EU-commission has in the summer of 2005 presented a draft directive on a gradual shift of registration tax for a CO_2-based taxation system for passenger cars, with the least CO_2-emitting car models receiving the biggest tax rebate. The reason behind the proposed directive is a mix of harmonization of the EU-internal market, needed because substantial differences in registration tax across the member states hinders cross border trade, and environmental concerns, referring not least to the compliance with the EU obligations under the Kyoto Protocol. The proposed CO_2-based taxation should be tax revenue neutral. The registration tax should be abolished all together by 2016 and 50% of the revenue accounted for by CO_2-taxation as early as 2010. The proposal also includes taxation for use of passenger cars, termed "annual circulation taxes". These taxes should be related to the CO_2-emission of the cars and reach the level of minimum 50% of all annual circulation taxes by 2010.

Unlike the registration tax, a full replacement of annual circulation taxes by CO_2-related taxes is not foreseen. As transportation is increasing and in all countries responsible for a substantial increase in energy consumption and hence in CO_2 emission, and as car-related taxation makes up the most of all environmentally related costs this proposed EU-regulation is turning an important part of the car-related taxes into real environmentally related taxation. The proposal relates to the two dark columns in Figure 10.2 and affects thereby the base for about 1/3 of the total environmentally related tax revenue.

Removing the registration tax will make it easier for more people to acquire a new and more energy efficient-car in those of the EU countries, which presently have a high registration tax. It might at the same time lead to more cars being sold and thereby more kilometres driven and hence higher energy consumption at the end. This is probably part of the reason for the car industry being enthusiastic about the proposal. Still, focusing on the CO_2 emission will affect all cars and if made high enough, the tax could mean a change in both models chosen by the consumers and gradually more focus at the car industry on developing more energy-efficient cars. The reason for "labelling" the proposal an internal market and an environmentally related piece of legislation has to do with the EU Treaty, demanding all taxation legislation to be decided upon unanimously. That has in taxation issues till now proven

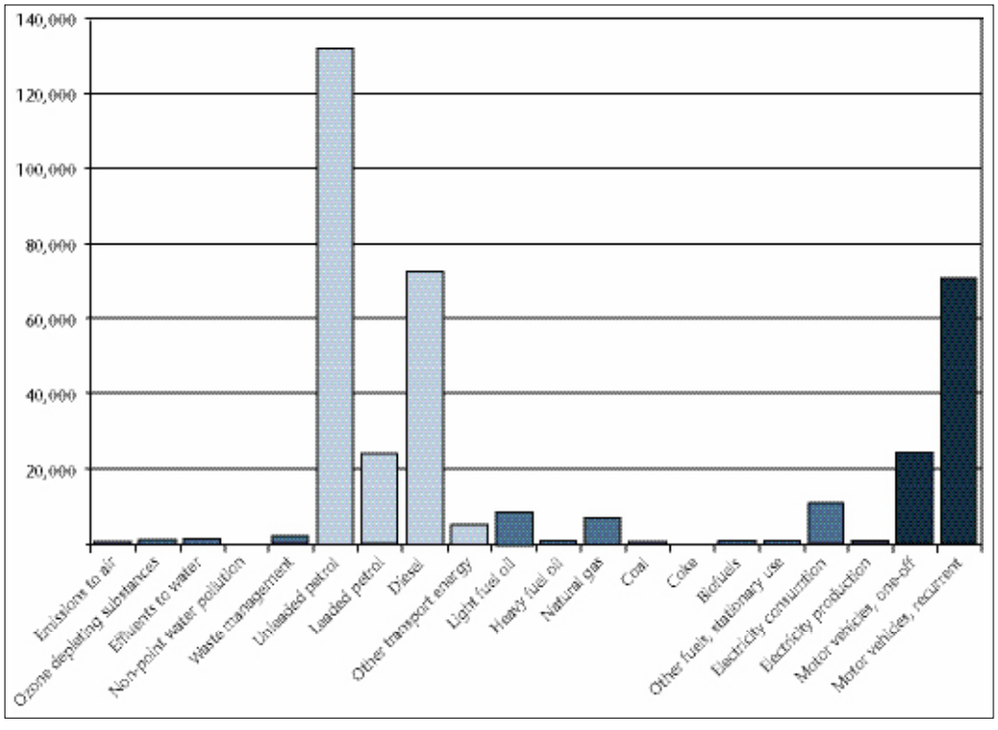

Figure 10.2. Revenues raised on different environmentally related tax bases. *The graph shows estimates for the 30 OECD member countries based on 1995 data. The data are in general still valid with the exception that taxes on the final handling of waste have increased from 0.8% in 1995 to 2.5% in 2001, and are still increasing. Data shown in million 1995 US dollars [Source: http://www2.oecd.org/ecoinst/queries/TaxInfo.htm]*

impossible. Further, the proposal does not decide the level of the taxes – only what kind of taxes are allowed and how they should be calculated or on what they should be based. The proposed directive may therefore be decided upon by the qualified majority decision-making procedure.

10.4 Subsidies

10.4.1 Subsidies as State Support

Subsidies are the opposite of charges. While charges correspond to the 'stick', subsidies constitute the 'carrot' in the carrot and stick metaphor. Subsidies by the state are widely used for a number of purposes, one of them being environmental protection.

Subsidies could be either direct or indirect. A direct subsidy is for example when a state partially finances an investment, which the state considers important. An example from the environmental field is a wastewater treatment plant. For the individual household state subsidies have been used for stimulating the change of heating equipment for individual houses. Thus in Sweden the state pays a constant subsidy (3,000 Euro) to those who change from direct electric heating or an oil-fuelled boiler to an environmentally better heating mode, such as district heating, pellet-fuelled boiler or heat pump. Most recently in spring 2007, the Swedish government introduced a subsidy of 1,000 Euro for buying a so-called "green car". A green car is a car which has been labelled environmentally better by the road authority, for having low fuel consumption or being a hybrid car or a car using ethanol or biogas as fuel.

An indirect subsidy is a reduction of costs for a certain activity. For example tax reduction may be offered to a company which invests in a region of the country, which is in need of working places.

Subsidies are sometimes of key importance for a company which needs to invest to change technology, which may be required to obtain a permit or licence for an activity. It appears that the Danish government used subsidies more than any other European government to improve environmental management. In late 1998 there were a total of 36 subsidies schemes in effect in Denmark.

In Central and Eastern Europe it appears that indirect subsidies, such as tax reduction, are more commonly used, for stimulating investments asked for by the authorities.

10.4.2 The European Union Subsidies Programmes

The European Union has established several huge funds for promoting development in the so-called less developed areas of the Union, or stimulating certain activities rather than others.

The largest-scale subsidy program is in the area of agriculture. Thus subsidies constitute an important part of the income for any European farmer, and decide much over what he/she does. If a farmer has animals or not, or grows certain crops rather than others, is decided by the European Union Common Agricultural Policy, CAP. Only recently, with the more fundamental reshuffling of the CAP, the support for producing certain (amount of) agricultural products (e.g. meat, milk and eggs) was changed to support for being a good farmer, keeping your land in good agricultural and environmental conditions, so-called "cross compliance". Like any other significant change, this will take effect over 10 years. The EU legislation was decided upon in 2003 and till 2013 the amount of money available for the CAP as a whole will be largely maintained. The interesting issues are in the actual priorities and how they will change during that period towards more environmental protection and with a perspective of achieving sustainable agricultural production in the EU. But the instruments are here: changing subsidies and not restructured taxation.

The European Union structural funds have been an important part of financing investments in several areas, and have contributed to industrial development in these areas. The structural funds have also been very important for infrastructure development, the building of roads, railroads and bridges. Of course such investments need to abide by the environmental legislation of the Union, but otherwise they are not particularly geared towards environmental objectives.

The European Union fund for improvements of environmental protection in its new member states is called Life. The Life programme supports investments for e.g. wastewater treatment plants, solid waste management and the building of landfills. The Life programme is an important policy element of the EU.

10.5 Role of Environmental Economic Policy

10.5.1 Tax Revenue or Environmental Protection

While energy taxation till now has had little to do with protection of the environment and has done little to implement the polluter pays principle as far as the wider social costs are concerned, fuel-taxation has, of course, had some effect as to putting some constraint on the consumption of fuel. But the fuel taxation has not been increased in accordance with the rise in the GDP. The overall trend for the OECD-countries as well as for the EU-15 is a relative decrease in the rate from 1998 and onwards, while the trend for the USA has been a decrease all the way from 1994. The USA fuel taxation rate, at some 40% of the average for all OECD-countries, is in addition by far at the lowest level of all nations.

While fossil energy is increasingly making up the main problem for the environment, the presently dominating type of environmental taxation has little or no effect on redirecting this adverse trend. Two recent EU-legislative initiatives may signal that changes are gradually underway. One is the new proposal for a directive on a passenger car taxation system with a clear CO_2 and environmentally oriented aim, which we dealt with just above. The other initiative is from 2003, where the directive, which will harmonize the minimum level for fuel prices in the member countries, was decided. That may have elements of equalization of the competitive framework with the EU, but it also has a distinct CO_2-taxation orientation and thereby an environmental perspective. This initiative on fuel prices we will include in the next chapter, where we will be taking a closer look at the UN Climate Convention and the subsequent Kyoto Protocol, based on the Convention in order to see, whether the protocol influences the CO_2 or green house gas policies in the EU and elsewhere.

10.5.2 Do the Polluters pay?

What effects do the environmental taxes have? Have they moved the burden of paying costs for environmental impact to the polluter? Do they reduce environmental impact?

It seems clear that environmental taxation never or very seldom makes the polluter pay for an environmental cost. The victim still has to take care of the cost of pollution. When acid rain decreases the productivity of a forest, it is the owner of the forest, who assumes the burden of decreased income. This cost can be calculated with some degree of precision, and the sums are very large. For example, the costs of all damage caused by acid rain in all of European Union were estimated in 1997 to be about 90 billion Euros. For sure those being victim of these losses had to carry these costs, from owners of forests to owners of individual cars destroyed by corrosion, to authorities responsible for maintenance of damaged public monuments etc.

There are a few cases, however, when the victim of an environmental impact does receive compensation. These are the court cases where damage compensation is part of the case. They all deal with very direct damages, e.g. an oil spill or a large sudden emission of a toxic substance, not at all with diffuse or long-term effects. Examples are the Seveso disaster or oil spills in the Baltic Sea. It should be added that only few of these kinds of events lead to compensation of costs. In general it is too difficult or costly to charge the polluter. To see charges filed against emitters of diffuse pollution is even further away. Damage compensation is decided on by a criminal court, and thus not part of the environmental legislation as such. Nevertheless it has an important role to play in environmental protection work, as these sums normally are far larger than the fines charged for non-compliance.

10.5.3 Taxation does Reduce Pollution of the Environment.

The main effect of environmental taxes has thus been to reduce emissions, rather than to compensate the victim for his/her costs for the damages the emissions may cause. Good environmental taxes are set in such a way that it is more profitable to avoid emissions than to pay the fees. In these cases the income from taxation decreases. This is caused by *price elasticity*. Price elasticity is how much consumption changes with the price. It is for prices with a high degree of elasticity that the tax really contributes to changed behaviour. For commodities with less price elasticity, such as energy, the tax provides more of an income for the state than an incentive for changed behaviour in the society.

Taxation and fees have reduced pollution and the material flows in our societies. The countries in Europe are slowly moving from waste to recycling societies. Important incentives in this process are taxation of resources, fees on landfill, markets on recycled material, regulation on end-of-life of products including producers' responsibility. These economic policy instruments have had an influence on the price of the products and stimulated environmentally better behaviour.

Study Questions

1. What is an external cost, and in what way is it external to the declared cost of a product or service?
2. The polluter pays principle is a main principle for developing environmental taxes and charges. Describe its history and how it has been received in policy-making.
3. Make a small list of the most common environmental charges for water, waste, etc. How are the charges set? What are the problems connected to setting charges?
4. What are the reasons for introducing environmental taxes?
5. List the most used environmental taxes and explain which are most important for the state (for state income), for companies (for company costs), and the environment (for reducing environmental load). What is the general level of environmental taxes compared to taxes as a whole?
6. Would people act rationally and purchase the least environmentally damaging products, if such products were least expensive, or would some products still signal great prestige and thereby still be selling greatly, in spite of a high price – or perhaps because of their high price?
7. Consider the alternatives to a registration tax on cars. Would it benefit the environment if user fees were set in relation to the use of cars instead of a tax on the purchase of cars?
8. Explain in what way energy is taxed and what importance it has had for energy management in society for industry, transport, and in households.
9. Give some examples on the use of subsidies in environmental policies.
10. Give a general summary on the role of economic policy instruments for environmental improvements. Mention specifically the Polluters Pays Principle, environmental pollution, and resource management.

Abbreviations

CAP	Common Agricultural Policy
CFC	Chlorofluorocarbons
EEA	European Environmental Agency
EFTA	European Free trade Association
Eurostat	EU Statistics Bureau
GBP	British Pound
GDP	Gross Domestic Product
IPPC	Integrated Pollution Prevention Control
LPG	Liquid Propylene Gas
OECD	Organisation for Economic Co-operation and Development
PPP	Polluter Pays Principle
SEK	Swedish Crowns
VOC	Volatile Organic Compounds

Internet Resources

Polluter pays principle (Encyclopedia Britannica)
http://www.britannica.com/eb/article-224615/environmental-law

OECD/EEA database on environmental policy and natural resources management instruments
http://www2.oecd.org/ecoinst/queries/

OECD/EEA information on environmentally related taxes, fees and charges
http://www2.oecd.org/ecoinst/queries/TaxInfo.htm

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http://reports.eea.europa.eu/technical_report_2005_8/en/EEA_technical_report_8_2005.pdf

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http://forestpolicy.typepad.com/ecoecon/2006/03/economism_or_pl.html

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http://ec.europa.eu/taxation_customs/taxation/excise_duties/energy_products/index_en.htm

EU Summaries of Legislation Framework for the taxation of energy products and electricity
http://europa.eu/scadplus/leg/en/lvb/l27019.htm

DG Agriculture EU's common agricultural policy (CAP)
http://ec.europa.eu/agriculture/publi/capleaflet/cap_en.htm