

## Chapter 5

# **Environmental Policy and Environment-oriented Technology Policy in the Netherlands**

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### **5.1 Introduction**

This chapter presents an overview of the Dutch environmental policy (EP) and environment-oriented technology policy (ETP). The main aim is to give insights into some of the recent modifications and innovations in both EP and ETP systems, and to trace some of these changes back to the historical roots of EP and ETP in the Netherlands. The paper starts with an overview of environmental policy in the Netherlands, and a description of the standard EP system. This is followed by an introduction to recent developments in Dutch environmental policy. These involve the system of environmental planning, the focussing on target groups, the use of negotiated agreements, and stimulating the introduction of environmental management systems in companies. The next section focuses on environment-oriented technology policy. An overview of the development of ETP is provided by evaluating the main policy documents. Following this, the standard ETP system, the technology subsidy scheme, is reviewed. The main institutions and instruments are described in section 5.2 and the implementation of technology policy at the national and regional levels is explained. A number of new developments are then presented. The paper concludes with a review of the inter-policy co-ordination between EP and ETP in the Netherlands.

## 5.2 Environmental Policy

### 5.2.1 The Standard EP system in the Netherlands<sup>1</sup>

#### 5.2.1.1 *History: direct regulation through licensing schemes*

As early as 1810, when the Netherlands were under Napoleonic rule, a licensing system was introduced aimed at controlling the hazards, damage and nuisance caused by industry (De Koning, 1994: 13). The first environmental law was the 1875 Factory Act. Its successor, the 1896 Nuisance Act, which governed hazards and nuisance caused by installations at specific locations, remained the most important environmental law for a long period.

Environmental awareness grew in the late 1960s and early 1970s. Major landmarks were Rachel Carson's book 'Silent Spring' (1962), and 'Limits to Growth', the first report for the Club of Rome (Meadows, 1972). These made people aware of the deplorable state of the ecology and the finite availability of natural resources. In response to this, all over the world, environmental laws were put in place. In the Netherlands, as in many other countries, emphasis was put on prevention - to avert further decay. Activities and products harmful to the environment were either prohibited or made subject to licensing schemes. Reparation of existing damage was left to ad-hoc measures and the recuperative capacity of nature.

In 1962, 'environment' as a policy issue made its first appearance. In that year, the Minister of Social Affairs and Public Health set up a Public Health Inspectorate to be responsible for environmental protection. However, it was not until 1971 that environmental protection was established as a formal policy field when the Directorate General for Environmental Protection (DGEP) was created, as part of the newly established Ministry of Public Health and Environment. The DGEP was initially allocated only very limited resources. As the workload increased and environmental problems gained in urgency, the political will grew, notably in Parliament, to provide the DGEP with further resources and powers. The allocation of financial and human resources showed a marked increase in the period from 1972 to 1982. In 1982, the DGEP was transferred to the new Ministry for Housing, Spatial Planning, and the Environment (VROM).

Along with these institutional developments, a set of environmental laws was put in place. The dominant perspective was problem oriented. Individual environmental problems were consequently dealt with by integrating them into existing laws, often the Nuisance Act, or by enacting special laws, the so-called 'sector laws'. The latter include acts on: Surface Water Pollution (1969), Air Pollution (1970), Hazardous Waste (1976), Waste Materials

<sup>1</sup> This section is mainly based on Bressers and Plettenburg (1997).

(1977), Noise Nuisance (1979), and Soil Clean Up (1982). In drafting the system of environmental laws little attention was paid to uniformity and internal coherence. This deficiency has led to sharp criticisms from various sections of society. Citizens have claimed that the public participation and appeal procedures were biased against them. Industry, for its part, claimed that the licensing procedures were far too time-consuming; companies needed a multitude of environmental permits, issued by various authorities who often imposed different and conflicting conditions (De Koning, 1994: 168-169).

To solve these problems, the 1979 Act on the General Provisions for Environmental Protection (in Dutch: Wabm) was introduced. This framework law subjected the various sector laws to uniform rules for the application and granting of licenses while also providing for uniform participation and appeal procedures. Nevertheless, it was still felt that environmental legislation lacked coherence, and pressure was exerted to further expand the scope of the new General Provisions Act at the expense of the sector laws. This culminated in 1993 with the incorporation of the General Provisions Act into a new Environmental Management Act (EMA, in Dutch: Wm). The name was deliberately changed to reflect that the new act was designed to create an all-embracing framework law. The EMA also opened up the possibility of granting integrated environment licences covering all environmental aspects. As a consequence, the five licensing systems stemming from the five environmental acts - the Nuisance Act, the Air Pollution Act, the Noise Nuisance Act, the Waste Materials Act, and the Hazardous Waste Act - were transferred to the Environmental Management Act as of March 1<sup>st</sup> 1993. This has made environmental legislation much more transparent and easier to enforce. A separate licence is however still required under the Surface Water Pollution Act, within the competence of the Ministry of Transport, Public Works and Water Management, since this ministry was unwilling to transfer this task.

#### 5.2.1.2 *Institutions and key actors*

*Policy institutions.* To obtain a clear understanding of the policy institutions in the Netherlands, a subdivision has to be made using the vertical and horizontal distributions of power between the policy institutions. Horizontal distribution involves powers being divided between different authorities on the same level, such as Ministries. Vertical distribution relates to the division of powers between authorities at various government levels.

In the Netherlands, the administrative structure comprises three layers of government, namely: (1) municipalities and water boards, (2) provinces, and (3) the national government. These do not operate in isolation, but are complementary to each other. Initially, environmental regulations were

exclusively made at the local level, and municipalities are still the most important government body for issuing and monitoring environmental licences. In the environmental laws of the 1970s, the provinces were given responsibility for their implementation. They also became the legal authority - i.e. for issuing licences, monitoring and enforcement of the law - for large, technically complicated, and highly polluting companies, a situation that has been confirmed by the Environmental Management Act. The national government concentrates primarily on national legislation and regulations as well as on the planning of national environmental policy, including the setting of targets and norms.

This, however, does not mean that the national government has sole responsibility for determining an environmental policy which municipalities and provinces are obliged to implement. The provinces, and most municipalities, conduct their own environmental policy planning. Moreover, the municipalities and provinces enjoy autonomous status when it comes to environmental policy. The law states that plans made at the various government levels are not governed by a hierarchical order. Vertical co-ordination should be achieved by means of mutual consultation, agreements, and the exchange of information. Where this fails, both the national government and the provinces have instruments at their disposal to enforce vertical fine-tuning.

The Dutch environmental policy planning system differs from systems in other countries, although some are similar to the Dutch example, by two characteristics. Firstly, it can be considered as an attempt to apply the ideas of the 'strategic choice approach' as it is known in the scientific planning literature. This means that the main goal is not to stipulate future actions, but to improve the coherence, the perspective on the future, the quality of motivation, and the openness for external participation in future decision-making (Coenen, 1992). The second characteristic, more or less in contradiction to this general orientation, is that the national, as well as many of the provincial and local, plans contain precise and quantitative targets, for instance on the decrease of emissions.

#### *5.2.1.3 Policy integration: inter-policy co-operation as an objective*

It has been argued in the Netherlands that the best environmental policy would be to put an end to all environment-unfriendly policies (Drees, 1992). This is a pointed reference to, among other things, the policy aimed at stimulating intensive agriculture and livestock farming, which involves the construction of large infrastructural works to increase the mobility of people and goods, land-use revision, and a lowering of the ground water level to facilitate agricultural mechanisation at the expense of nature.

A further factor is that many environment-related tasks have been entrusted to other Ministries. The Ministry of Economic Affairs, for instance, is responsible for energy-saving. The tasks of the Ministry of Agriculture include nature conservation, fisheries, and - together with the Ministry of Environment - manure disposal and pesticide use. The Ministry of Transport, Public Works, and Water Management is responsible for water quality management and also for curtailing the growth in car use. All the National Environmental Policy Plans were therefore drafted under the responsibility of all four Ministries involved. The coming about of the first National Environmental Policy Plan (NEPP) in 1989 can, incidentally, be seen as a successful attempt by the Ministry of Environment to take advantage of the wave of sympathy and attention for environmental issues in the late 1980s in order to secure the commitment of the other relevant Ministries to environmental objectives. This process was certainly not free of tensions. Shortly afterwards the government (Lubbers II, 1986-1989) resigned when the Ministers of Transport, Public Works and Water Management, and Environment, lost the support of the conservative Liberal Party after seeking to abolish tax relief for commuting traffic in an effort to slow down the growth in automobile use. In the framework of the NEPP, municipalities and provinces have been entrusted with all sorts of tasks designed to make the environment an integral concern in other policy fields. Their environmental policy plans must explain how this aim is given concrete form. This approach has also resulted in the creation of 'bridgeheads' at other Ministries, in the form of individual officials or complete departments which stand up for environmental issues within their own policy fields.

### **5.2.2 Transition to the new EP system**

This 1980s are still seen as the major watershed in Dutch environmental policy. The transition to the present EP system is often attributed to Pieter Winsemius, Minister of Environment in the first Lubbers' administration (1982-1986). The shift can be characterised by three elements. Firstly, the new policy was based on the idea that environmental protection and the striving for sustainable development were not only the responsibility of government, but that each sector in society should take responsibility for solving the problems it creates. Secondly, as a consequence, the burden on the state, with its lack of problem-solving capacity, is reduced. Thirdly, it was expected that polluters who participated in solving their own problems would do so more diligently and also more efficiently than under a command-and-control approach. This approach fits quite closely with the broader strategies of deregulation and political modernisation pursued by the Lubbers' administration (Mol et al., 1998: 60).

The buzzword for the new EP system is ‘internalisation’, which means that everyone, every sector of society, assumes responsibility for the environment and gears its behaviour towards it; while the role of government is to set overall targets, to facilitate and to stimulate (see VROM, 1989a). It is a gradual process, characterised by subsequent stages; “*the wipe, the carrot, and the sermon*”, as Winsemius puts it (interview in Schrama and Van Lierop, 1999). Le Blansch (1996) stresses that internalisation, as intended in the Dutch environmental policy, is foremost a matter of standards and values, or civilisation in a sociological sense, and not the internalisation of external costs in an economic sense.

In the remainder of this section the most relevant aspects of the new EP system, from the perspective of industry, will be discussed: the changes in policy style, the national environmental policy plans, the target group approach and the ensuing negotiated agreements, the use of economic policy instruments, and the stimulation of corporate environmental management.

#### 5.2.2.1 *Policy style*

Dutch environmental policy has gone through a radical change in policy style. Initially there was a wide discrepancy between the policy style of the policymakers and that of the policy implementers. The policymakers, civil servants and administrators at the Ministry of Environment, had adopted a distant, and often rather negative, attitude towards the regulated sectors such as industry. The addressees generally had little influence over the environmental policy, which tended to favour direct regulation. The enforcement of these regulations, however, was left to other agencies (Bressers, 1993; Bressers, Huitema and Kuks, 1994). The policy implementers, such as the licensing agencies, were understaffed. In addition, they often lacked motivation, and received too little support from the responsible administrators. As a result, they tended to respond to complaints rather than pursue active and systematic execution of the legal regulations. Systematic control and enforcement was virtually non-existent.<sup>2</sup>

The difficulties in providing concrete evidence of environmental infringements was a further reason for refraining from legal action and, instead, to opt for ‘talk, talk, and more talk’. In other words, although the legislation was formally strict, in practice it was at best used as an informal bargaining counter in negotiations.

In the first half of the 1980s, Winsemius, the Minister of Environment, initiated vigorous efforts to persuade the environment policymakers and regulated sectors to abandon their entrenched positions (Winsemius, 1986: 61-67). He encouraged policymakers to see the policy addressees as ‘target

<sup>2</sup> Policy formulation based on consensus was already applied in the 1970s (e.g. Mol et al., 1998: 46).

groups' with which they could communicate. As this process gained momentum, special 'target-group managers' were appointed at the ministry. Their task was not only to act as ambassadors of the environmental policy vis-à-vis the target groups, but also to 'educate' their own organisation so as to have a better understanding of the target groups' positions. Contacts between environmental policymakers and the representatives of the target groups became much more regular. It was due to these initiatives that, at the end of the 1980s, the authoritarian style of Dutch environmental policymakers was supplemented with a new approach designed to encourage self-regulation. At the same time, the allocation of additional funds reinforced the policy implementation powers of environmental authorities at provincial and municipal levels, while growing public attention to environmental problems had also resulted in stronger administrative support for implementing the environmental laws. As a consequence, some friction has emerged between the implementers' regulation-oriented policy style, and the policymakers' emphasis on the companies' goodwill.

This problem has been recognised over the past few years, and scope has been created within the law to attach more weight to the companies' own environment plans in the licensing process. Further, frameworks have been created so that temporary 'toleration' of infringements is now subject to clearer rules. However, there is still a long way to go before the problem of opposing policy styles is resolved.

#### *5.2.2.2 National Environmental Policy Plans*

The headlines of the Dutch environmental policy are laid down in National Environmental Policy Plans (NEPPs). There is a certain pattern in these policy documents. The core of the present EP system was drafted in the first NEPP (VROM, 1989a) and elaborated in the Annex to NEPP 1 (VROM, 1990) and NEPP 2 (VROM, 1993). Subsequently, the emphasis changed, from policy formulation and acquiring support, to policy implementation and environmental management. This was expressed by Minister De Boer when she took office in 1994, and was reflected in NEPP 3 (VROM, 1998a) and NEPP 4 (VROM, 2001). Another development was environmental integration, the introduction of environmental concerns into other policy fields. Whereas NEPP 1 was drafted by the Ministry of Environment alone, NEPP 3 was published under the joint responsibility of the Ministries of Housing; Spatial Planning and Environment (VROM); Economic Affairs (EZ); Agriculture, Nature Management and Fisheries (LNV); Transport, Public Works and Water Management (V&W); Finance; and Foreign Affairs.

Briefly, the NEPPs are framed as follows (De Moel et al., 1999):

- explicit perception of the environmental problems (scales, material chains);
- policy approach (four-year planning cycle, two-track policy aimed at sources as well as effects, environmental themes instead of environmental sectors, target group approach, and an additional regional approach;
- distribution of responsibilities (central: policy targets and framework; decentralised: implementation).

Since the revision of Dutch environmental policy in the first NEPP of 1989, instruments have either appeared or gained dramatically in importance. These are aimed at stimulating sectors of society to accept responsibility for sustainability and environmental quality. This is done, for instance, through target group consultations and negotiated agreements, extended liability for environmental damage, tradable emission rights, research and information obligations, regulations requiring companies to employ staff with adequate expertise, and the creation of institutional facilities (environmental impact assessments, company environment departments, and internal company environmental management systems). Many of these instruments also operate indirectly through intermediary organisations, and sometimes even lead to the creation of such intermediary organisations. This approach has become much more widespread, not only in the Netherlands but - since the fifth Environment Action Programme of the European Union - also at the European level (Bressers and Plettenburg, 1997).

#### 5.2.2.3 *Target groups*<sup>3</sup>

In the 1989 NEPP 1, the so-called 'target group approach' was introduced. Eight social sectors, responsible for considerable environmental impacts, were labelled as target groups. The government started talks with their representatives in order to establish joint policies for the control and reduction of their impacts. The selected target groups are:

- agriculture,
- transport and mobility,
- industry,
- energy production,
- oil refinery,
- construction,
- waste processing,
- consumers and retailers,
- drinking and wastewater (added in NEPP 2).

<sup>3</sup> This section is mainly based on Bressers and Plettenburg (1997).



In an attempt to encourage the internalisation of environmental responsibility by individual actors a consultative structure around government and industrial organisations, representing the target groups, has been created. One of the main aims of the consultation process is to define the tasks for a specific sector within the framework of the overall national environmental objectives. Experience from the first years has shown that target groups consisting of large numbers of small units (such as households, farmers, car drivers, retailers, and other small firms) are the most difficult to reach by means of a target-group policy (NEPP 2).

#### 5.2.2.4 *Negotiated agreements*

Negotiated agreements - also called voluntary agreements or covenants - are the most common kind of policy instrument in the Dutch policy approach that draws on consensus and self-regulation. Negotiated agreements are formal agreements between government and representatives of societal sectors - usually branches of industry - in which the latter make certain commitments, often as an alternative to direct regulation. Most negotiated agreements concern issues that are assumed to be the main environmental problems related to the sector concerned. Several classifications can be made, such as waste reduction (collection of used batteries, reduction of packaging materials), reduction of emissions of specific substances or classes of substances (VOCs, CFCs), and integrated negotiated agreements concerning all the environmental effects of particular sectors or branches. In addition to the target-group covenants, there are also energy conservation agreements between the Ministry of Economic Affairs and the industrial sectors.

The application of negotiated agreements is mainly based on trust between the parties. They have no foundation in public law. It is generally assumed that they constitute contracts under private law, but this may not always be the case (Algemene Rekenkamer, 1995), and it is not certain whether compliance can be enforced through the courts (Mol, 1998: 73). We are not aware of any relevant jurisdiction.

The negotiated agreements, as part of the target-group approach for industry, are framed in a six-step scheme, with a four-year cycle:

1. Firstly, emission reduction targets were formulated for industry as a whole.
2. Next, fifteen priority branches of industry, involving 12,000 companies responsible for over 90% of industry-based environmental pollution, have been selected by the Ministry of Environment.
3. Negotiations were then started with each of the fifteen branches. The Ministry of Environment and the trade associations established the so-

called 'Integral Environmental Targets', mainly in terms of emission reductions, at the branch level. Targets were set for 1995, 2000, and 2010 relative to a base year that varied depending on available emission data. The outcomes were recorded in negotiated agreements that were officially signed by all parties. Large companies and representatives of the regulators (provinces, municipalities, and waterboards) were also involved. Part of the deal was that the branch would not be affected by new legislative measures, but that the environmental permits of participating companies would be adjusted to reflect the content of the agreement.

4. The Government facilitated extensive information campaigns aimed at individual firms, which were carried out by an independent agency (FO Industrie), with a considerable stake for the trade associations.
5. For the implementation of the negotiated agreements, a distinction has been made between homogenous and heterogeneous branches (according to firm size and production processes). For the former cases, an 'Environmental Handbook' or 'Manual' was developed, which served as a uniform directive for each participating company. In the latter case, each participating company was expected to develop an individual 'Corporate Environmental Plan' which would be submitted for approval to the main regulator (either the municipality or the province). Corporate environmental plans would be renewed every four years, and based on assessments of the state-of-the-art of the technologies in the respective branches. New technologies which are accepted as applicable to a certain sector are labelled as 'specific measures' and should be incorporated when corporate environmental plans are renewed. In the case of the metalworking and electrical engineering industries, however, companies develop corporate environmental plans based on general directives (technological state-of-the-art for different processes) as laid down in a guidebook.
6. The final step involves implementation within the practice of corporate environmental management, and the adjustment of the firm's environmental licences. With respect to monitoring and control, participating companies have to submit annual progress reports, according to a framework that is laid down in the negotiated agreements. The issue of reporting is backed up by a law on environmental reports which came into force in 1999 and affects the 300 largest and most polluting companies.

The process was subject to considerable delays. Only three negotiated agreements were in place on schedule (i.e. by the end of 1993). These concerned the chemical industry, the basic metals industry, and the printing industry. However, these were also the most important ones since these

industries were responsible for 60% of the total industrial environmental deterioration. In two instances, the negotiations were still ongoing (as of August 1996), and in six cases the parties involved agreed not to have a covenant. Table 5.1 gives an overview of the branch agreements currently in operation.

*Table 5.1: Overview of Target Group negotiated agreements for industry*

<b>Industry</b>	<b>Companies<sup>*</sup></b>	<b>Type</b>	<b>First agreement</b>
Primary metals industry	39 (38)	Heterogeneous	1993
Chemical industry	148	Heterogeneous	1993
Printing industry	3400	Homogenous	1993
Dairy industry	34	Heterogeneous	1994
Electroplating industry	±18.000	Hybrid	1995
Textiles processing, carpet and floor coverings industry	80 (49)	Heterogeneous	1995
Paper (products) industry	28	Heterogeneous	1996
Concrete and cement industry	440	Homogenous	1998
Rubber and plastics processing industry	>1.200	Homogenous	2000
Meat industry	332 (185)	Homogenous	2000

\* Number of companies in the branch; between brackets number of companies as signatories to the negotiated agreement. Source: FO Industrie ([www.fo-industrie.nl](http://www.fo-industrie.nl)), last update October 2001.

All the requirements for individual firms are extensively described, as well as the sanctions to be applied to negligent firms, in the event of total refusal or sluggish behaviour. Although certain firms have refused to endorse the covenants, there is no evidence that they perform significantly less than other firms. In general, sluggish firms are treated very considerately with gentle reminders and neatly-formulated requests.

In general, all parties are very satisfied with this approach. There is, however, a tendency to downplay certain problems:

- the Corporate Environmental Plans are rather superficial and show no profound vision on corporate environmental management;
- the guiding principle of ‘best available technology’ is very difficult to apply in specific cases;
- the target group approach by individual branches of industry disregards product chain interdependencies;
- monitoring and control by environmental regulators is very demanding, the agencies concerned often lack adequate expertise and manpower;
- monitoring by environmental regulators is usually not very precise, since they are very careful not to disrupt the good atmosphere;
- many companies have difficulties in complying with the requirement for annual progress reports, as this has turned out to be a demanding task;
- the consultations are confined to two kinds of actors, government and industry; while third parties, such as environmental groups, are not

involved (environmental permits are based on negotiated agreements and corporate environmental plans, and third parties have the right to challenge them in court, but in practice the chances of success for this kind of procedure are very low and this option is rarely pursued - Biecart, 1995).

Government and industry are clearly very pleased with the results thus far. There is no doubt that things have changed and the relations between government and industry have improved. There is no doubt either that industry is active with the implementation of environmental management and the public advertising of their achievements in this field. The environmental movement, however, has strong doubts as to whether companies, in particular large ones, are doing any more than what they would have done under the old regulatory regime.

#### 5.2.2.5 *Economic instruments*

Economic instruments are not widely applied in the Dutch environmental policy. The discussion on this topic started in the first NEPP of 1989. There have been many debates, with very few outcomes. In 1995, the OECD reviewed the Dutch environmental policy very positively, but it judged that emphasis should be put less on consensus building and covenants, and more on economic instruments (Opschoor, 1995). When the Kok administration took office in 1994, it presented the 'greening of the tax system' as one of its priorities. A commission headed by Van der Vaart was charged with the task of investigating possibilities and barriers. At the start of its second term, in 1998, the Kok administration announced additional measures aimed at a gradual shift from taxing of labour to taxing of environmental deterioration. An important role was here assigned to the new system for income tax, taking force in 2001. This section will now dwell somewhat more on the topics of green taxes and levies, and stimulating fiscal measures. Other economic instruments – not discussed in further detail here - are the tradable quota in the field of agriculture (for manure and milk production) and fisheries. Although these measures are, at least to an extent, implementations of EU policies, they do have considerable effects on the behaviour of the target groups.

*Green taxes.* The difference between taxes and levies is that the revenues from the former are part of the general means, while the revenues of the latter are earmarked for purposes related to the activities on which they are imposed. In practice, however, the distinction is somewhat blurred. In official government documents (e.g. VROM, 1999) the following 'green taxes' are distinguished:

- excise duty on mineral oils (the regular tax on lubricants);

- excise duty on the sale of motor vehicles and the annual duty on the use of motor vehicles;
- environmental taxes.

Total expected revenues for 1999 were NLG 26 billion (€11.8 billion), about 14% of the total tax income. The definition of ‘green tax’ is admittedly very broad and includes regular taxes and duties related to automobile usage. There are five ‘real’ environmental taxes with revenues of about NLG 5 billion (€2.3 billion) in 1999. These are<sup>4</sup>:

- fuel: an environmental tax on fossil fuels in addition to the regular excise duty; the tax is levied primarily on the manufacturers and importers of fuel;
- groundwater: tax on the extraction of fresh water, introduced in 1995, with rates at about €0.18/m<sup>3</sup> when used for drinking water, and €0.09/m<sup>3</sup> when used for agricultural and industrial purposes;
- waste disposal: general levy on the delivery of waste on top of the price of waste processing; specific types of waste disposal are free of charge, such as organic household waste, and asbestos;
- regulatory energy tax: levied on the use of natural gas, electricity, and mineral oils used for heating by households and small companies (see below for more detail);
- uranium: tax levied on energy companies to counterbalance the taxes on fossil fuels.

*Energy taxes.* Attempts to introduce an energy or carbon tax have failed several times, mostly due to strong resistance by industry, certain parties in parliament, and the Ministry of Economic Affairs. When, in 1994, the Kok administration took over, a new opening was created and consensus was reached on a restricted and small energy tax for households and small companies, which was finally introduced in 1996. In order to prove that the measure is aimed at the reduction of energy consumption and not at increasing taxes, the revenues are returned by way of reductions in the rates of other taxes. Extension of this measure to larger companies is dependent on developments within the European Union, in order to avoid competitive disadvantages for Dutch industry.

*Environmental levies.* There are several levies charged for environmentally burdensome activities. The most important ones are: the sewage rights, waste levies, and the wastewater levy for discharges into surface waters. Total revenues for 1999 were expected to be about NLG 6.8 billion (€3.1 billion). The levy on wastewater is discussed in more detail below.

<sup>4</sup> Source: website Ministry of Finance ([www.minfin.nl](http://www.minfin.nl)).

*Wastewater levy.* Notwithstanding the limited application of economic instruments in environmental policy, the Netherlands are well known for the early implementation of a wastewater levy. This levy, introduced in 1970, has proved to be successful both in generating funds for the setting up and maintenance of wastewater treatment plants, and in curbing wastewater production by industry. Whereas industrial production increased steadily from 1970 to 1980, organic wastewater pollution by industry decreased dramatically in the same period (Bressers 1983; 1988). The introduction and development of pollution charges was found to correlate strongly with the reduction in wastewater pollution<sup>5</sup> (Bressers, 1988: 507). The high level of charges, providing a significant incentive for companies, has explained the relative success of the wastewater levy in the Netherlands compared to other countries. As a comparison, annual per capita revenues from water effluent charges in the mid-1980s were about €37 in the Netherlands as against €4.3 in France and €2.2 in Germany (Opschoor and Vos, 1989).

*Fiscal measures.* The Ministry of Finance has a pretty long list of fiscal measures, but most of them have had limited impacts. The most important ones are: a tax deduction for investments in energy efficiency (EIA), a tax deduction for environmental investments (MIA), a tax depreciation measure for investments in environmental technology (VAMIL), and a measure on 'green investments'. The latter two green tax measures are well known success stories of the last decade. Both are linked to deputy-minister of Finance, Willem Vermeend, and will be discussed briefly below.

*VAMIL measure.* As a Member of Parliament, Willem Vermeend initiated a tax depreciation measure for investments in environmental technology, the so-called 'VAMIL measure', which was introduced in 1993. The basic idea is that companies have the maximum leeway in the depreciation of specific equipment (the present list includes about 480 items), and this can yield considerable tax advantages. There are also less generous tax measures for regular energy and environmental investments.

*Fiscal measure on 'green investments'.* In 1995 Vermeend introduced another of his ideas, a fiscal measure on 'green investments'. The measure involves an exemption from an individual's income tax of interest and dividends earned from approved green investment funds. The measure is aimed at generating money at favourable interest rates for sustainable projects in the fields of energy, nature, and agriculture. The measure is considered to be a great success. Within a few years all major banks had introduced their own 'green investment fund'. On its introduction, there was

<sup>5</sup> The extent and change in pollution charges varies from region to region in the Netherlands, Bressers found a significant relationship between decrease in wastewater pollution and increase in pollution charge by differentiating between industries and regions.

a run on these funds and banks were faced with a temporary shortage of eligible green projects. In 1996 and 1997, the Government expanded the criteria for eligible projects. The number of issued certificates for green projects has risen from 160 in the first year to 539 in 2001. The total value of these projects was €336 million in the first year and €914 million in 2001 (Novem, 2002).

#### *5.2.2.6 Self-regulation through stimulation of environmental management in companies*

As explained earlier, the first NEPP introduced the concept of self-regulation as a cornerstone of environmental policy. It was concluded that directives from government actors would not be sufficient to realise the changes necessary for adopting a path towards sustainable development. Furthermore, the environmental problems of industries were acknowledged to be too complex and too dynamic to be solved by static regulations such as environmental standards. Therefore, a new policy approach was developed with a basic premise that companies themselves are able to clean up the environmental problems they create, and secondly that companies can be made aware of the environmental problems which they cause. In a policy document (VROM, 1989b), therefore, a strategy was set out in which industry would be induced to set up environmental management systems (EMS) within companies. These systems would provide the tools for companies to gain insights into their environmental impacts, and provide tools to control and decrease that environmental impact. The government expected, according to the policy document, that companies with large environmental impacts (estimated number about 10,000) would have a functioning environmental management system in place by 1995. Smaller companies were expected to install relevant parts of an environmental management system by the same time. Related to this, it was also expected that government organisations, such as municipalities and provinces, would implement environment management systems. Given the ambitiousness of these goals, a specific stimulation policy was implemented. The main strategy was to have intermediaries that could convince companies of the importance of environmental management (De Bruijn and Lulofs, 1995). It should be noted, however, that, independent of these government initiatives, employers' organisations and branch associations were already active in developing tools for environmental management for their members (De Bruijn and Lulofs, 1996). The government strategy consisted of a programme of activities with four clusters, and a total budget of around €23 million (De Bruijn and Lulofs, 1996: 48-49).

Research has shown that branch associations have played an important role in informing and supporting companies concerning the importance of

environmental management systems (De Bruijn and Lulofs, 1995). For most branches, handbooks on the implementation of EMS in companies have been developed. In 1996, more than one-third of all Dutch companies had a functioning EMS, while another 37% had implemented several elements of an EMS as defined by the government policy document. The percentage of larger companies with implemented EMSs is considerably higher than that for SMEs.

With the introduction of certification schemes such as BS 7750, and later ISO 14001, several Dutch companies applied for certification for their EMS. In 1998, more than 200 companies had an EMS certified according to ISO 14001, and this figure is expected to double annually. EMAS, however, is much less popular with Dutch industry, with only around ten companies certified in 1998. Some of the reasons given are that EMAS is not a worldwide certification scheme that the required certified annual environmental report does not have any added value, and moreover that companies would be reluctant to publish it for competitive reasons (Van Oorschot, 1998).

### **5.2.3 Evaluation of Dutch environmental policy**

A positive feature of Dutch environmental policy is the general framework laid down in the National Environmental Policy Plans. The general picture of a worrisome environmental state has generated a basis for environmental policies in various government departments, in business, and in the public at large. Moreover, the goals in the policy plans have made clear that there is more to do than 'business as usual'. Direct regulation, although effective in curbing obvious pollution, has not been effective in realising more prevention-oriented behaviour in business and society. The wastewater levy has been one of the most successful examples of Dutch environmental policy, but has not led to an extensive use of economic instruments in, for example, energy policy, mainly due to their alleged negative impact on competitiveness. Environmental management systems have now become widespread in Dutch companies, but this does not necessarily imply a significant reduction in environmental impacts. Negotiated agreements have become increasingly popular in Dutch environmental policy making, but the results of these policies are difficult to assess. While being positive about the co-operative mode of governance, in which various actors take responsibility for ensuring the environmental changes deemed necessary take place, it is unclear, and somewhat unlikely, that they result in the kind of change necessary for sustainable development. Table 5.2 summarises some of the results of negotiated agreements. Furthermore, we give an assessment of the potential of the new approach for delivering the kind of changes that are needed to achieve sustainable development. The success of a negotiated



agreement correlates positively with the degree of organisation of the target group. This indicates that in the case of heterogeneous and unorganised target groups it is much more difficult to make progress through the negotiations. The negotiated agreements allow target groups to time the development and implementation of measures, but it is not clear whether this will result in changes that are more radical in the longer term.

*Table 5.2: Results of negotiated agreements and their possible contribution to sustainable development (source: Hofman and Schrama, 1999)*

<b>Dimension</b>	<b>Results</b>	<b>Possible contribution to sustainable development</b>
Degree of freedom of choice	Target groups can time their own implementation of measures to some extent, however 'alara' ('as low as reasonably achievable') is the bottom line for individual companies.	It is not clear who will take the initiative to develop new technologies, the anticipated market is still the main factor for inducing innovation. Some of the choices for new technologies and especially products do not bring sustainable development closer.
Co-operative nature	Intensive negotiations between target groups and government: regular meetings improve acceptance and the basis for environmental policymaking.	Consultation takes place between existing companies with significant interests in the current modes of production and this may impede more radical innovations.
Level of ambition	Long-term targets (2010) are ambitious; short-term targets (1995) reflected state-of-the-art technology and tended towards 'business as usual'.	Depends on the realisation of necessary innovations. Current targets are mainly emission ones, and less focussed on input/resource use, whereas the latter is a condition for progress towards sustainable development.
Time horizon	Extension of the time horizon, especially for the mid (2000) and long-term goals (2010) provides direction and some certainty for industry.	Depends on the effectiveness of the links with technology policy; a lengthy period is needed to develop new technologies and product-consumption linkages.
Instrumentation	The mix of instruments works to some extent: most target groups are on schedule to meet most targets. The difficulty is how to switch to strict enforcement when targets are not within reach.	The mix of instruments needs to exert enough pressure and scope to drive and facilitate industries along a path towards sustainable development. Co-ordination between the various policies in different policy areas is needed.
Addressees of policy	Associations and active companies are being reached, but it is harder to reach sluggish/defensive companies. The success of the network approach depends on the degree of organisation of the target group.	Many of the goals of sustainable development require collaboration between various actors. Relations with consumptive and other industrial sectors is limited, while much progress might come from changes in these linkages or technological developments outside the branch.

In addition, the consensual nature of negotiated agreements, and the network of actors currently involved in the agreements, promotes innovations of an incremental nature rather than radical innovations, because newcomers, or new technologies which might be developed outside the branch, are not part of the agreement. More research is needed on whether the consensual and target group approach is conducive to innovation of a more radical kind. The diffusion of state-of-the-art technology, as propagated in negotiated agreements, will only be successful if it is complemented by direct

regulation, which implies that when direct regulation fails, negotiated agreements are also likely to fail. The successful development of 'new' technologies will depend on whether negotiated agreements are complemented by programmes which specifically inform the target group about, and focus on, the technological paths and technologies which need to be developed in order to solve technological bottlenecks.

For the sake of sustainable development the linkages between production and consumption, and within product chains, are crucial and need to be reconsidered. However this is well beyond the scope of the current negotiated agreements and, in this sense, a new generation of negotiated agreements which capture these dimensions would perhaps have greater potential to facilitate progress by industry towards sustainable development.

As mentioned, the target group policy for industry had reached the implementation phase under NEPP 3 (1998). The four-year cycle has been institutionalised and was no longer subject of political debate. In general, the sense of urgency had subsided and the impression had grown that the big environmental problems had been solved. The 2001 NEPP 4 (VROM, 2001) was aimed at reformulating Dutch environment policy. It indicated seven most urgent environmental problems and indicated the paths to solve them in the period till 2030. The seven problems were:

- loss of biodiversity,
- climate change,
- over-exploitation of natural resources,
- threats to health,
- threats to external safety,
- damage to the quality of the living environment,
- possible unmanageable risks.

Since NEPP 1 (1989) the role of industry as the main target group of environment policy has gradually diminished. NEPP 4 distinguishes between problems related to the economic system and more complex ones. For the former, short-term thinking, fragmentation and institutional shortcomings - including government - and the fact that environmental costs are hardly included in the prices of products and services, are major obstacles for reaching sustainability. The more complex environmental problems require technological, economical, social-cultural, and institutional transformations that can only be achieved in the long run. These are called 'transitions', and NEPP 4 indicates the following transitions as the major challenges of the Dutch environment policy in the coming decades:

- transition to a sustainable energy system (emission, energy, and mobility),

- transition to sustainable use of bio-diversity and natural resources,
- transition to sustainable agriculture (environment, nature, and agriculture).

Although the role of industry has changed, it still will have an important stake in the solutions for these environmental problems.

### **5.3 Environment-oriented technology policy in the Netherlands**

Based on the lessons learnt from the NEPP 1 and NEPP 2 policies, the Dutch government concluded that environmental policy should enter a new phase, that of ‘environmental management’. In the previous periods, the main focus was on cleaning up pollution and a reactive attitude towards environmental problems was adopted. Nowadays, the main objectives are to ensure an absolute decoupling of economic growth from environmental pressure, and the sustainable use of resources (VROM, 1998a: 35). Technology is expected to play an important role in reaching this objective. According to the NEPP 3, “*science and technology will play a vital role in bringing sustainable development closer and in providing insight into the technological and social breakthroughs sought*” (VROM, 1998a: 41). As a result, the NEPP not only provides the agenda for environmental policy, it also sets the stage for environment-oriented technology policy in the Netherlands.

Another pillar of environment-oriented technology policy stems from the Dutch technology policy within the responsibility of the Ministry of Economic Affairs. In line with the NEPP perspective, which is also the responsibility of this ministry, it is argued that the challenge for economic policy is to ensure that the Netherlands can follow a sustainable path while achieving high economic growth. The stimulation of technology development and the provision of information and advice are important pillars of this technology policy. Furthermore, from 1994 on when the first Kok administration took office, the importance of innovation-oriented clusters has been emphasised and specific initiatives taken to stimulate the formation of clusters. Some of these initiatives will be explored more fully in the next section in describing the roots of Dutch environment-oriented technology policy and explaining its current focus.

### 5.3.1 A short history of ETP in the Netherlands

Technology policy became a separate policy field in the 1970s, when a comprehensive ‘innovation policy document’ was published (Tweede Kamer, 1979). One of the drivers of technology policy is the importance of competitiveness to the Dutch economy. Technology policy can play a role in improving the international competitiveness of Dutch industry, and government support for industry is partly legitimised using the ‘level playing field’ argument, referring to state support given to foreign competitors (Van Dijk and Van Hulst, 1988). Until the 1980s, technology policy was developed separately from environmental policy, without any focus on environment-oriented technology. At that time, the Ministry of Environment started a programme to stimulate clean technology in order to stop the spread of pollutants, but the focus of the actual projects was mainly on end-of-pipe technologies. This was also reflected in the environmental law and permits, which set short-term standards to reduce emissions. As is shown in Table 5.4, environmental problems were mostly dealt with by companies installing standardised end-of-pipe technologies. However, the increasing public attention to environmental problems, the worrisome conclusion of ‘Concern for tomorrow’, a report on the state of the environmental in the Netherlands by the national institute for public health and the environment (RIVM, 1988), and other factors, led to changes in both environmental and technology policies.

*Table 5.3:* Development of environment-oriented technology policy in the Netherlands from the 1970s onwards.

Period/characteristic	1970s to mid-1980s	Mid-1980s to mid-1990s	1990s
<i>Focus of environment-oriented technology policy</i>	Emission-oriented	Process-optimising	Prevention-oriented
<i>Orientation of companies</i>	Treatment of emissions	Reduction of emissions	Reduction of raw material usage
<i>Nature of technology</i>	End-of-pipe technology	Process-integrated measures	New processes and product chains
<i>Focus of environment-oriented projects</i>	Standardised for individual companies	Customised for individual companies	Co-operation between companies on industrial estates and in production chains

According to the ‘Concern for tomorrow’ report, emissions of several polluting substances needed to be reduced by between 70% and 90% in order not to overstress the capacity of the environment. The practice of adopting end-of-pipe measures were costly and did not lead to improved environmental performance. According to RIVM, a sustainable alternative needed to include: ongoing prevention, re-use, energy saving, and the development of the technology necessary to achieve this (RIVM, 1988; see

also Cramer, 1996: 132). The first National Environmental Policy Plan reflected this shift in environmental policy and adopted the recommendations of the RIVM report. The main lines of the Dutch environmental technology policy were developed in a policy document on 'Technology and Environment', jointly drafted by the Ministries of Economic Affairs and Environment (EZ and VROM, 1991). This document reflects a change in policy that had previously been mainly concerned with remedial measures that tended to induce the use of end-of-pipe technology. The document further developed a policy path in which the dominant focus would be on preventing pollution at the source by implementing process-integrated and clean technology. This also implies a shift from a one-sided focus on the supply side of technology towards an orientation on the mutual adjustment of demand and supply of environment-oriented technology. Several programmes were developed, and others were adapted, in order to ensure the effective stimulation of technologies to solve long-term environmental problems, and to increase the users' appreciation of both the environmental and economic potential of new environment-oriented technologies.

A further shift towards emphasising the importance and scope of environment-oriented technology took place when the role of technology as a link between ecology and economy was advanced. The strategy document 'Knowledge in Action', a joint production by the Ministries of Economic Affairs, Education and Science, and Agriculture (EZ, OCW, and LNV, 1995), implemented the Dutch government's new policy initiatives to increase the knowledge-intensity in the Dutch economy, in order to enable it to move onto a higher and more-sustained growth path. By doing this, it was argued, the link between economy and ecology could also be strengthened, not just by tackling environmental problems, but also by making greater use of technological opportunities to create a sustainable economy. The document stresses the importance of environment-oriented technology as one of the spearheads of technology policy. Some specific actions were set out to advance these ambitious goals. One was the setting up of a new programme, 'Economy, Ecology, and Technology' (EET), with a focus on the development of technological breakthroughs that would provide a leap in efficiency and an improvement in competitiveness in the longer term.

In the 'Environment and Economy' policy document, which gave a perspective on sustainable economic development, some more-specific options and action paths were described (VROM, 1997). Various activities were explored which could result in so-called 'win-win situations', where both the environment and the economy would benefit. In current governmental policies, therefore, the main philosophy is that the strengthening and renewal of the economic structure can coincide with

improved environmental and energy efficiency. The document reflects not only co-ordination of EP and ETP, but also steps towards their integration. In several actions, it is stressed that aspects of both regulation and technology have to be dealt with. An example is that of product improvement involving policy measures on ecolabels, product standards, and the stimulation of product-oriented environmental management; combined with technology programmes focussed on environment-oriented product design and chain management. A further example is the development of sustainable industrial estates where both regulatory actions and technological initiatives are required. To sum up, several initiatives have been set in motion where the Ministries of Environment and Economic Affairs jointly develop action paths towards a more sustainable economy.

### **5.3.2 Institutions and instruments for ETP**

#### *5.3.2.1 Generic and specific subsidies for environment-oriented technology*

The Ministries of Environment and Economic Affairs are the most important actors with regard to environment-oriented technology policy. At the national level, the Ministry of Economic Affairs is primarily responsible for technology policy. Part of this policy is the establishment of a number of generic programmes under which subsidies and credits are applied for the development and application of new technologies. Several specific programmes are focused on the promotion of the development and application of energy-relevant technology. In addition, the Ministry of Environment has put in place several programmes on environment-oriented technology policy, as part of its environmental policy. Various other departments are involved in stimulating environment-oriented technology policy, in most cases in co-operation with either the Ministry of Economic Affairs or the Ministry of Environment. Although environment-oriented technology policy contains a mix of instruments, such as various financial incentives, information, and advice, applied by various agencies the national and regional governments, the dominant instrument is the subsidy scheme. The number of stimulating programmes focussing on environment and energy is very high; in 1998 about 150 were in operation (VROM, 1998b). Of these, about one-third was focused on energy savings, efficiency and renewable energy. The other two-thirds were focused on environmental improvements to products, processes and product chains. Approximately two-thirds of the programmes are implemented at the national level. Projects at the regional level mostly focus on providing information and advice to relevant organisations. Table 5.4 presents a selection of the main financial schemes employed to stimulate environmental innovations in Dutch companies.

*STD programme.* The largest technology programme to date with a focus on the environment was the ‘Sustainable Technological Development programme’ (STD, Dutch acronym: DTO), performed in the period 1993 to 1997, with an annual budget of around €45 million funded by five Ministries (Economic Affairs; Agriculture; Education and Science; Traffic and Water Management; and Environment). A large number of companies, research institutes and NGO's have contributed to the programme and the performance of the projects. The programme was based on a specific and extensive philosophy and method aimed at achieving long-term sustainable technological development. Some characteristic elements from the philosophy and method are (Weaver et al., 2000):

- Government should influence innovation processes indirectly by encouraging and facilitating the context wherein the processes take place in stead of ‘picking and backing prospective technological winners’.
- Integration of environmental policy and environment-oriented technology policy.
- Innovators should attend and integrate technological, cultural and structural aspects.
- Social networks are key elements both in the stabilisation of present technologies and in the creation of new breakthrough technologies, so ‘engage the stakeholders’.
- Long-term solutions determine the short-term steps to be taken. Therefore a time horizon of fifty years was taken. Technological improvements to be achieved, in terms of eco-efficiency, are estimated at a factor twenty. This factor is computed as the product of the present environmental pressure which is twice as high as it should be, the expected doubling of the population, and the envisaged increase of individual prosperity by a factor of five. The required short-term steps are established by way of ‘backcasting’, that is taking the desired situation fifty years from now as point of departure.

To the STD programme five sub-programmes were defined, according to the ‘key need areas’ (Weaver et al., 2000: 78): water, building and spatial planning, transport and mobility, materials and chemistry, and nutrition. The sub-programmes were distinct entities within the programme with an assigned staff and a steering group. The task was to assess the needs for improvement of eco-efficiency on the long term for the specific field. In addition a number of projects on selected issues should be initiated with the aim of setting innovation processes in motion and engaging the relevant social parties.

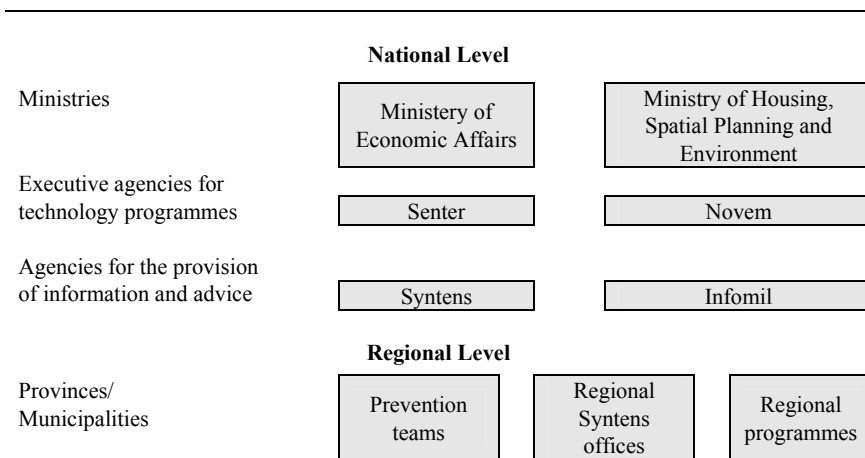
The STD programme has been terminated ultimo 1997. Follow-up activities have been unfolded in a large variety. At the overall programme

level, in September 1998 a new programme, 'DTO-KOV' has been established at a smaller scale, aimed at knowledge transfer and education.

*Legal aspects.* In terms of subsidies, the 1997 General Act on administrative law applies (AWB). This act provides a framework for the procedures of granting subsidies and carrying out the concerned regulations. Specific articles provide rules for the legal basis of subsidies. Legal regulations specifically prescribe the activities that are eligible for a subsidy, and procedures in terms of the obligations of the granting organisation and of the recipient. For specific programmes, rules and directives are laid out in specific documents which are published in the government's official journals (Staatscourant and Staatsblad). Two dedicated organisations, Novem (Netherlands Agency for Energy and the Environment), and Senter (Agency of the Ministry of Economic Affairs), are charged with the administrative and procedural tasks for these programmes.

### 5.3.2.2 *Provision of advice and information through support for intermediaries*

Apart from the programmes primarily focussed on stimulating the development of environment-oriented technology, the government also induces diffusion of innovations by establishing and funding intermediary organisations that inform companies about innovative options and companies involved in innovation networks. Figure 5.1 provides an overview of organisations in the Netherlands that are involved in the stimulation of development and diffusion of environment-oriented technology.



*Figure 5.1:* Organisations involved in the stimulation of development and diffusion of environment-oriented technology in the Netherlands





Table 5.4: Overview of financial schemes to stimulate environmental innovations in companies

<b>Financial scheme Sponsor Budget 2002</b>	<b>Objectives</b>	<b>Specific characteristics</b>
Economy, Ecology, and Technology (EET) EZ & OCW €22.7 million	Stimulating research into new technologies that may bridge the gap between ecology and economy.	Specific focus on technological breakthroughs and co-operation between users and developers of technologies. Significant results from the project are expected over 5 to 20 years. Subsidies up to €4.5 million per project are possible (25% - 60% of total project costs).
Subsidies for energy programmes (BSE) EZ €113 million	Support for projects aimed at: energy efficiency, use of renewable energy, and application of energy technologies with reduced environmental impact.	Framework measure consisting of several programmes focused on specific industries, or on the promotion and development of energy technologies based on renewable sources.
Fiscal depreciation of environmental investments (VAMIL) Finance & VROM €63,5 million	Stimulating investments in new machinery or equipment with less environmental impact than the existing ones.	Tax measure enabling companies to choose the moment of depreciation of investments in environment-beneign equipment (contained in a list of approved items).
Technology co-operation (BTS) EZ € 23.6 million	Stimulating co-operation in R&D projects by SMEs (up to 25.000 employees).	Criteria are a high level of innovativeness and good economic perspectives. Project needs to involve at least two partners.
Programme Environment and Technology VROM a.o. €2.6 million	Solving technological bottlenecks in industrial branches in order to realise the reduction targets in negotiated agreements.	Specific environmental problems are formulated within the programme, relatively high subsidy percentages, project information is public.
Innovation-oriented research programmes (IOP) EZ €18 million	Stimulation of co-operation between research and industry aimed at bridging the gap between fundamental research and need for applicable new technology. Environment-oriented technology is one of the foci.	Framework measure consisting of several subsidy programmes for universities and non-profit research institutes.
Technical development projects (TOP) EZ €25 million	Promotion of the development of products with reduced environmental impact. (successor to MPO)	Only applicable to SMEs: a project should result in a significant reduction in environmental impact relative to existing products. Credit is granted up to 40% of project costs and if the product fails to realise turnover within five years of its introduction the credit is written-off.

Sources: Arentsen & Hofman, 1996; Hofman, 1997; VROM, 1998b; Schrama, 2002; www.senter.nl.

EZ = Ministry of Economic Affairs; VROM = Ministry of Environment; OCW = Ministry of Education and Science; LNV = Ministry of Agriculture.

Further information is provided in the following section. Several organisations are involved in providing information and advice at the national level. An information centre, Infomil (the Dutch abbreviation for information point on environmental licensing), has been set up to inform government agencies, such as local environment agencies, companies, and citizens about current environmental standards, anticipated standards, and the current state of the art with regard to technology. Furthermore, the Ministry of Economic Affairs has set up a network of innovation centres, Syntens, regional offices in all provinces. Syntens mediates between companies and sources of knowledge, such as research institutes and universities. Syntens is regionally organised through fifteen establishments in the various provinces in the Netherlands. Syntens' activities are funded by the Ministry of Economic Affairs and other government agencies. Its major objective is to stimulate innovation of products, production processes, and management in Dutch companies through performing the following tasks:

- provide advice to companies;
- link company demand to the supply of knowledge;
- guide innovation processes that companies carry out in co-operation with other organisations;
- provide information to entrepreneurs and policymakers;
- stimulate specific regional activities focussed on innovation in companies;
- develop methods and tools in order to advise companies on innovations;
- identify and unlock new knowledge fields for companies.

### **5.3.3 Implementation of ETP**

#### *5.3.3.1 Implementation at the national level*

Two organisations are mainly responsible for the execution of technology programmes at the national level. Senter is the administrative agency responsible for most programmes established by the Ministry of Economic Affairs, and has around 100 subsidy programmes, mainly focused on energy, and a annual budget of around €250 million. Novem executes environmental programmes established by the Ministry of Environment and is also involved in several energy programmes under the Ministry of Economic Affairs. Very large programmes, such as EET, have their own executive agencies, made up of professionals seconded from both Novem and Senter.

Both Novem and Senter act as spiders in the web of the various subsidy programmes for environment-oriented technology. The professionals in these organisations have to ensure the correct application of the procedures for the different schemes. Schemes often involve an application period of around three months, and then an advisory committee, or 'a board of wise persons', prioritise the different proposals using criteria set in the

programme objectives. Alongside their work in guiding this process, and administrating incoming, ongoing and finalised projects, Novem and Senter also play an important networking role in the whole process of starting up technology projects. They act as intermediaries and offer advice to organisations that are considering setting up specific projects, and to companies which have specific questions regarding solutions for environmental problems, or technological demands. With their knowledge of most organisations involved in technology development, and because specific officers are specialised in certain technologies, they are often well placed to bring relevant parties into contact with each other.

### 5.3.3.2 *Implementation at the regional level*

In order to reach small and medium sized companies, technology policy also pays attention to the regional level. Therefore, both for technology and environmental technology, several activities are carried out at the regional level in the Netherlands.

We can crudely divide these activities into three main categories:

- specific tasks performed at the provincial level in the areas of cleaner production and pollution prevention;
- the establishment of agencies to facilitate the introduction of innovations in SMEs: the previous innovation centres, now called Syntens, and an innovation network for entrepreneurs;
- subsidy schemes for innovation, technology, and the environment at the regional level; with a specific focus on the structure and problems of the regional industrial and agricultural sectors.

The Dutch provinces carry out various activities related to the innovative behaviour of companies. The development in the 1980s of pollution prevention as a tool for improving environmental performance in companies has led to the setting up of pollution prevention teams in most provinces in the Netherlands. These teams initiate and stimulate various pollution prevention projects throughout the Netherlands (De Bruijn and Hofman, 1998). Various subsidy schemes are in operation in the provinces, with the majority of subsidies targeted at the economically less developed areas. Most of these subsidies focus on economic and technological development but, in every province, at least one scheme has a specific focus on the environment, innovation, or the prevention of pollution. The Departments of Economic Affairs and of Environmental Affairs, together with the consultation group of the provinces (IPO), engage in promoting projects for cleaner production. Initiatives towards cleaner production are supported both at the national and regional levels. Further, organisations such as Syntens, which operate regionally, play a role in these activities.

### 5.3.4 New developments in environment-oriented technology policy

*Linkages between environmental policy and technology policy: branch covenants and related technology programmes.* Negotiated agreements for industrial branches are among the recent innovations in Dutch environmental policy. Related to these covenants, through a specific technology programme, technologies are stimulated which have the potential to solve some of the bottlenecks for reaching the targets of specific branches. In exchange for the willingness of branches to commit to specific targets set down in the agreements, the government is prepared to support branches in the development of environment-oriented technologies. The technology programme provides an indication to the branch and to related technology developers the problems that need to be solved in the medium and long term.

*A focus on technological breakthroughs through long-term commitments and with co-operation as a crucial factor: the EET and DTO programmes.* In several programmes and policies, the EP and ETP time horizons increasingly include the longer term. In this longer term, efficiency gains by factors of 4 to 10 are aimed for. Therefore, in a programme such as EET (Economy, Ecology, and Technology, see also Table 5.4) the focus is on technological breakthroughs and long-term projects with the co-operation and commitment of different parties as critical conditions. This co-operation should encompass parties involved in fundamental research, such as universities; partners involved in strategic research, such as research institutes; partners involved in applied research, such as engineering firms; and finally companies which are marketing or using the technology. The time horizon of the DTO programme (Sustainable Technology Development) is even longer, from 20 to 50 years. This programme establishes scenarios in which efficiency improvements by factors of 10 to 20 are starting points. This programme tries to outline possible future lines of development, it does not develop the actual technology.

*Cluster policy.* This involves the stimulation of co-operation and network-forming between companies and knowledge institutes, and between various companies. Various policy instruments play a role in the stimulation of technological co-operation and the formation of innovative clusters. Lately, government policy in this area has intensified, with technology programmes where co-operation between companies and research institutes is a condition, and programmes which focus on the development of sustainable industrial estates. Furthermore, innovation centres (Syntens), institutes for SMEs, and regional development corporations play an active role in strategic cluster formation in specific regions. Three major roles of the government can be distinguished:

- creating the right conditions: improving market mechanisms and innovative potential through deregulation, generic technology programmes, and good infrastructure;
- operating as an intermediary between supply and demand: providing strategic information, facilitating platforms for parties to meet each other, initiating specific projects focussed on technological co-operation;
- acting as a demanding buyer: infrastructure projects, regulation, and tender procedures. This is based on the historical insight that economic and technological renewal often occurs through a customer with far-reaching demands.

*Benchmarking as a policy tool to stimulate cleaner production and the development and application of new technologies.* Benchmarking has recently been introduced by the government as a policy instrument to induce companies to produce more efficiently. A benchmarking study can provide information on the status of the national emissions per unit of production in a certain industrial sector or company, as compared to other countries. An example is to be found in an agreement between the Dutch government and industry to reduce CO<sub>2</sub> emissions. According to the ‘Environment and Economy’ policy document, Dutch industry is ambitious and wants to belong to the best in the world in terms of energy efficiency. The national government very much welcomes this from the perspective of environmental protection and the perspective of international competition through cost-savings. The general idea is that benchmarking could be an extra impulse for energy saving, by assessing energy performances abroad and comparing them with Dutch industry. The energy-intensive industries will work on a protocol for benchmarking with the national government. An independent institute will analyse how much energy Dutch companies use per product unit and compare this performance with other countries. If the Dutch companies are not leading in terms of energy efficiency, then additional measures have to be taken to catch up within a reasonable time limit. As a reward for fulfilling the promises made in negotiated agreements with the government, companies will not be confronted with any additional measures aimed at energy savings and CO<sub>2</sub> reduction.

### **5.3.5 Evaluation of environment-oriented technology policy in the Netherlands**

Dutch environment-oriented technology policy contributes to bridging the gap between demand for, and supply of, environmental technology. The main instrument has been to subsidise promising environment-oriented technologies. However, the focus of this instrument has changed over time. Its focus is now prevention-oriented rather than the previous emission-

oriented one. Closing the cycles of water and material uses in processes are now prevailing concepts; concepts that have been extended from process to products, and from individual companies to product chains and groups of companies. The rationale and motivation for this stems from two basic concepts: in the first place it is accepted that sustainability, and solving Dutch environmental problems, needs these kinds of changes; and secondly there is now a widespread belief that these changes enhance competitiveness in the long run, and create new market opportunities. In short, it is expected that this will create win-win situations.

Apart from financial support for the development of environment-oriented technology policy, several other policy instruments are utilised. Most of them focus on the provision of information and advice to organisations potentially, or effectively, involved in the development of environment-oriented technology. Examples include the specific centres such as Syntens and Infomil which, at the regional level, inform organisations about innovative possibilities, anticipated regulations, or about bodies involved in the development of environment-oriented technology. At the national level, Novem and Senter have similar functions.

#### *5.3.5.1 Strengths and weaknesses of the Dutch ETP*

An important question is whether Dutch environment-oriented technology policy can be considered as successful and effective. It is difficult to give a straightforward answer to this question. Various evaluations have taken place, although more are required, which have looked at the effects and effectiveness of different technology programmes (Arentsen, Bosveld, and Bressers, 1992; Arentsen and Hofman, 1996; Berenschot, 1995; RIZA, 1995; TNO, 1996; Van Seggelen, 1993; Willems and van den Wildenberg, 1993). All these evaluations come to a similar conclusion: it is difficult to precisely quantify the effects of a technology programme. An apparent deficiency in most technology programmes is the lack of an adequate monitoring system, especially with respect to the follow-up to sponsored projects. What can be said is that the effects vary among the different beneficiaries and also that different aspects need to be taken into account. Considering the beneficiaries for example, large multinational companies are investing significantly in new technologies, and their behaviour in this respect is little influenced by the availability of subsidies. For SMEs, however, subsidy schemes are often crucial for the feasibility of projects, but such companies are often scared off by the administrative burden of applying for subsidies (Van Seggelen, 1993; Arentsen and Hofman, 1996). For research institutes, the funding of projects through technology programmes can amount to a very substantial part of the total investment in the development of technology. Especially for the more fundamental and risky projects, support from government plays a very

important role. An aspect which needs to be taken into account, apart from the apparent environmental impact of the technology (through the specific development and application of the technology, and through the possible diffusion of this technology), is the way in which subsidies can influence the behaviour of the target group. The following aspects can be considered as relevant (Arentsen, Bosveld, Bressers, 1992; Arentsen and Hofman, 1996):

- making the development of environment-oriented technology possible by providing the necessary financial means;
- making parties aware of the possibilities in the development of ET;
- improving the cost-benefit ratio of the development of ET;
- improving the attitude of companies towards environmental problems and environmental regulation;
- improving the climate for negotiations between government and industry, and decreasing resistance to the application of other policy instruments;
- improving the contacts between the various organisations involved in a specific policy and technology field.

In practice, different technology programmes and ETP stimuli will derive strengths from several of the aforementioned aspects. A clear weakness of the ETP is the difficulty in relating the effects to the costs of the programmes. In other words, are the effects sometimes not insignificant compared to the overall costs involved in setting up and maintaining these programmes? Some of the other apparent weaknesses of the ETP concern the co-ordination between the various government agencies and among different technology programmes. Although Novem and Senter are the main organisations involved in the implementation of the different programmes, and this is a strong point of the Dutch ETP, the large number of programmes sometimes confuses the individual company looking for possible support. Coupled with the bureaucratic nature of some of the schemes, this explains the success of consultancy agencies that specialise in the application and execution of subsidy schemes.

A more serious weakness is that the co-ordination among programmes and government agencies is limited. One result is that technology which is developed in the more fundamentally-oriented technology programmes, but which is not yet ready to enter the market, does not necessarily progress to programmes that focus on making technologies ready to enter the market. Promising projects are not automatically guided by different programmes, and this leads to unnecessary inflicted costs if such projects do not succeed in surviving without financial assistance. Another problem is the fact that often the barriers to the development of an environment-oriented technology are not so much financial but of another nature. An example is the development of more efficient wind turbines, a programme which is heavily



subsidised by the Dutch government, where the difficulty in entering the market is due to problems in obtaining permits to erect wind turbines. Similar regulatory constraints can occur when companies develop technologies to process waste product streams into useful material, but are not allowed to transport these waste products because this requires specific permits which are not granted.

## **5.4 Co-ordination of environmental policy and environment-oriented technology policy**

This section outlines some of the efforts made to co-ordinate and integrate EP and ETP. The most important feature of EP/ETP co-ordination is the four-year national environmental policy plans which are the responsibility of several Dutch ministries, under the overall responsibility of the Department of Environment. However, the integration of environmental concerns in policy fields other than the environment is still in an infant stage. As an illustration, recent research has shown that many of the intended effects of environmental policy instruments, such as to reduce household consumption and car mobility, have been offset by the unintentional side effects of other public policies (Ligteringen, 1999). This emphasises that efforts have to be made to explain the effects of policies, and to co-ordinate the use of different policies and policy instruments. Some examples of where steps have been taken towards co-ordination and integration are outlined below.

### **5.4.1 Integration of economic and environmental policy: the environment and economics policy document**

EP/ETP co-ordination has become more prominent over the last decade, especially since EP and ETP are increasingly viewed as not only being potentially detrimental to economic growth but also as offering new perspectives and opportunities for more sustained growth and increased competitiveness. A further factor that is helping co-ordination between EP and ETP, and in particular between the Ministries of Environment and of Economic Affairs, is the climate change challenge. The Ministry of Environment is primarily involved in setting goals for CO<sub>2</sub> reduction, and the Ministry of Economic Affairs is responsible for energy policy, which makes co-ordination imperative. However, the most striking example of co-ordination has been the joint effort by the Ministries of Environment, of Economic Affairs, of Transport, and of Agriculture, to provide a perspective on the types of changes and renewals where economic growth, competitiveness, increased efficiency, and reduced environmental impact can go hand-in-hand. This has been laid down in the 'Environment and

Economy' policy document (VROM et al., 1997). Apart from having civil servants from the four departments working together to create different perspectives, this has also led to a series of specific policy initiatives. One overall principle that has been agreed upon is that taxes will have to shift from placing a burden on labour to laying the burden on environmentally unfriendly activities. The document also provides inputs for important infrastructure decisions that will have to be taken in the coming years.

Two comments that are more critical with regard to this document should be noted. Although it is a significant step and development towards removing the barriers between different departments and policy fields, it is clear that when it comes to actual decision-making that long-term environmental values are still secondary to the shorter-term economic concerns. Several decision-making processes on large infrastructure projects provide evidence of this. Secondly, although the perspective adopted in the policy document is very attractive, namely that both the economy and the environment can win, in real life this is often not the case. Further, there is a danger that strategies for economic expansion are being legitimised using the argument that they are also positive for the environment whereas, in practice, the environmental aspects of the expansion are not given adequate consideration.

#### **5.4.2 Combinations of environmental and technology policy instruments: focus on specific target groups**

An example of a co-ordinated effort to integrate EP and ETP is the negotiated agreements in industry and related technology programmes. Figure 5.2 provides an overview of the linkages between negotiated agreements, technology programmes, and direct regulation (the licensing scheme). Covenants have clear targets for specific themes and substances that are based on the overall targets in the National Environmental Policy Plan. Studies are carried out to assess the potential of specific branches to meet these targets. This calculation is based on the implementation and diffusion of the best technical means available throughout the branch. If this does not allow the targets to be reached, this indicates that certain technological bottlenecks exist that prevent the targets being met. Different programmes are then developed to stimulate the development of technologies that have the potential to remove these bottlenecks. Initially, a specific technology programme is set up to develop technologies that can overcome bottlenecks (Programme Environment and Technology, see also Table 5.4). Secondly, task forces are set up to inform industries of the scope for technological improvement, and a specific technology programme is established to stimulate initial applications of newly developed technologies

(Programme ‘Referentieprojecten Milieutechnologie’ by the Ministry of Economic Affairs).

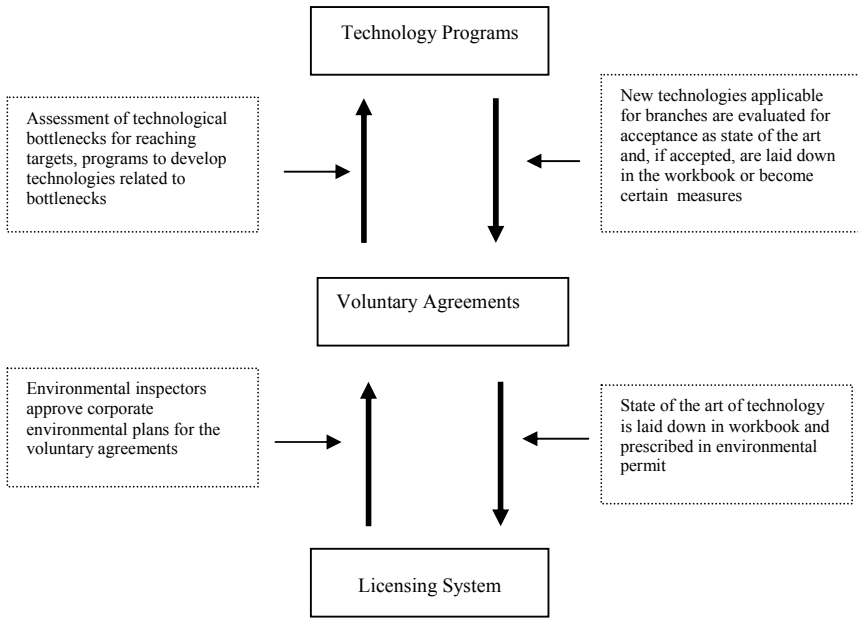


Figure 5.2: EP and ETP interlinkages in the voluntary agreements for branches of industry

Thirdly, for new technologies that are shown to offer a significant improvement in environmental efficiency, or to reduce environmental impact, a specific tax scheme has been developed. Such technologies are placed on an approved list, and companies then using them can write off their investment costs in the year that suits them best, thus offering them the potential of considerable tax savings.

Apart from the actual stimulation of technologies, the programmes also create a medium- and long-term perspective on the required technological changes and environmental problems that need to be solved. The downside is, however, that direct regulation and the setting of specific standards still play important roles in pollution control policies and can constrain innovative activities by companies.

### **5.4.3 Stimulating responsiveness and innovativeness of companies through environmental policy measures**

A crucial element of a successful technology policy is that the companies who are expected to apply the technologies have the capability and willingness to innovate and implement organisational and technological changes, and modifications to their products, processes, and management. Several policies have been developed in the Netherlands which have the potential to foster these innovative capacities. The stimulation of the introduction of environmental management systems into companies, and of the use of the concept of pollution prevention in companies, has increased the sensitivity of companies to technological opportunities which have both environmental and economical benefits. In this sense, it can be argued that such EP policies lay the foundations for a more successful ETP.

### **5.4.4 Organisations at the interface between environmental policy and technology policy**

Apart from the relatively direct stimulation of technologies, policies are also in place to inform companies of the options available for technological and organisational improvements, for example by providing examples of companies that have successfully introduced organisational and technological changes. Therefore, specific organisations play an important role in distributing these kinds of messages to companies. Materials such as books with success stories of companies have been developed (examples of active environmental approaches in Dutch business) (EZ and VROM, 1995). Specific organisations, such as Infomil and Syntens, at the interface between environmental policy and environment-oriented technology policy have been set up and stimulated. Dutch EP also makes use of the networks in which companies operate. EMS stimulation has made use of intermediaries such as branch organisations. Since messages conveyed by government agencies are often viewed suspiciously, companies are much more likely to accept a message and take appropriate actions if it is received from an organisation with which they feel much more at ease, and which they expect to represent their interests.

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