10 SUMMARY

Introduction

The Dutch government has been pursuing climate policy since 1989, the year the country's first National Environment Policy Plan was published. That policy is intimately linked with the country's energy policy, which is geared partly to reducing dependence on fossil fuels and improving energy efficiency. Over the years, numerous policies have been implemented to incentivize society-wide efforts to reduce greenhouse gas emissions. In order to assess the results of Dutch climate policy, the parliamentary standing committees on Infrastructure and Environment (I&E) and Economic Affairs, Agriculture and Innovation (EA&I) have requested an integral review of the costs and effects of the climate policies implemented to date.

Over the years numerous review studies have been carried out to evaluate the extent to which climate and energy policies in various sectors of the economy have contributed to achieving national policy targets. These studies were conducted prior to introduction of the policies in question (ex-ante reviews) as well as afterwards (ex-post reviews).

The aim of the present study is to review the costs and benefits of the policy instruments employed to flesh out the Netherlands' climate and energy policy on the basis of published ex-ante and ex-post reviews. This will give Parliament a better understanding of the pros and cons of a range of potential policy instruments, thus furnishing a basis for assessing future use of specific types of policy as well as helping improve the quality of the reviews themselves.

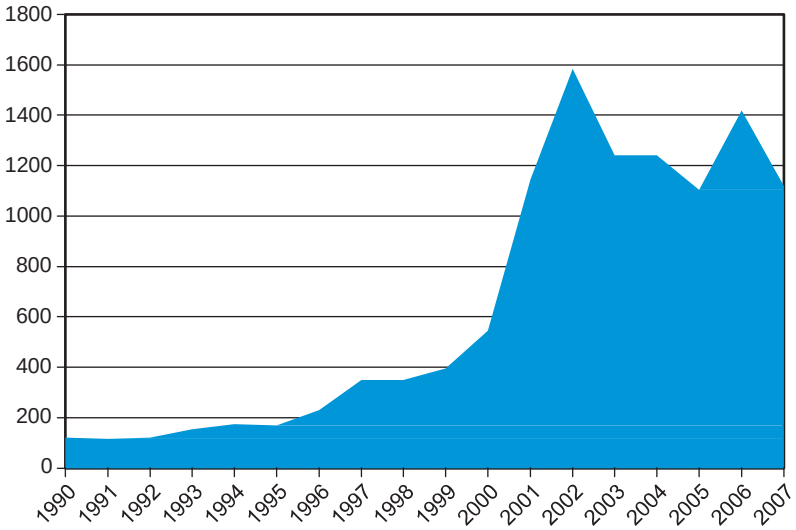
Dutch climate policy since 1989

The first National Environment Policy Plan marked a modest start in the country's climate policy by citing «climate change» as one of the themes to be addressed. During the first decade, climate policy remained a modest undertaking in terms of both concrete policies and earmarking of government funds. As a EU member state, the Netherlands has committed itself to implementing dedicated climate policy and more specifically to honouring its obligations under the Kyoto Protocol. The strategy envisaged for meeting the latter obligations was set out in the government's Climate Policy Implementation Plan, published in two parts in 1999 and 2000. When the Kyoto Protocol came into effect in 2005[29] climate policy was given a major impulse.

In the run-up to the concrete Kyoto obligations for the period 2008–2012 there was a marked increase in the range of specific policies and related government expenditures on climate policy. Around 2003 these expenditures stabilised at between € 1 and 1.5 billion a year (Figure 7).

[29] Making the target to which the Netherlands had signed up – an average reduction in greenhouse gas emissions of 6% per year (relative to 1990) over the period 2008–2012 – binding.

Figure 7 Annual government expenditure on Dutch climate and energy policy, 1990–2007 (million euro)



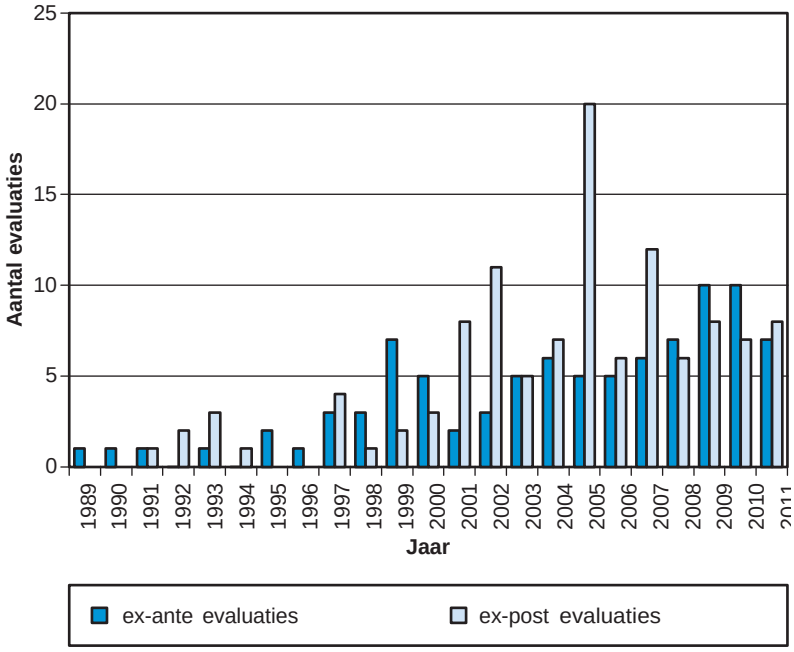
Source: Compendium voor de Leefomgeving (CBS, PBL, WUR)

History of climate policy review

In 2002 and 2005 there were two key occasions on which it was assessed whether policy progress and concrete emissions reduction were on scheme relative to Kyoto obligations. The results were laid down in two Climate Policy Reviews, published in the same years.

To improve insight into the efficacy and cost effectiveness of policies on the second of these occasions, in the 2002 Review it was announced that there was to be greater uniformity in the monitoring and assessment of individual policy measures. To this end a Handbook for the Monitoring and Assessment of Climate Policies (VROM, 2004) was drawn up. At the same time it was agreed that in 2005 there were to be ex-post reviews of all the main policies, to be published within eighteen months, enabling reasonably current conclusions to be drawn. The impact of the 2002 Climate Policy Review is clearly reflected in the number of reviews subsequently carried out, with the number of ex-post reviews peaking in 2005 (Figure 8).

Figure 8 Number of review studies published annually



Source: CE Delft, IVM

As Table 34 shows, around two-thirds of the policies implemented were evaluated in one way or another. What can also be seen is a clear decline in the number of sectoral reviews after 2005.

Table 34 Synopsis of policies reviewed

				Of which sectoral reviews	
	Policies	**Ex-ante review**	**Ex-post review**	**Pre-2005**	**Post- 2005**
Agriculture	4	2	4	1	
Built environment	20	13	13	1	
Transport	18	12	10	1	1
Industry	16	14	12	1	1
Power generation	18	10	9		
«Other» greenhouse gases	10	9	9	1	
Overseas emission cuts	2	2	2	-	-
Total picture	**88**	**62**	**59**	**5**	**2**
Total coverage		**71%**	**67%**		

Instruments employed in climate policy

In this report, climate policy is broken down into policies in seven sectors:

- Agriculture.
- Built environment.
- Transport.
- Industry.
- Power generation.
- «Other» greenhouse gases.
- Overseas emission cuts.

Numerous instruments have been employed in Dutch climate policy. In this study, three «families» of instruments are distinguished:

1. Instruments of a primarily **regulatory** nature.

2. Instruments characterised primarily in seeking to provide a **financial incentive.**
3. Instruments geared primarily to **communication and voluntary agreements.**

In most sectors, instruments from all three families have been used.

Monitoring and evaluation of policy effectiveness

In the run-up to the 2005 Climate Policy Review the ministries concerned devoted considerable efforts to improving the monitoring of policy effectiveness, yielding a large number of useful ex-post reviews of overall Dutch climate policy. These provide a good picture of the costs, effects and some of the side-effects of climate policy over the period 1999–2004.

The Handbook for the Monitoring and Assessment of Climate Policies (VROM, 2004) helped achieve methodological uniformity in the monitoring and evaluation of individual policy measures. The ease with which reviews could be compared improved and eventually greater insight was obtained into the impact and cost effectiveness of Dutch climate policy. On top of this, every year since 2003 a review has been carried out of climate policy in a particular sector (e.g. built environment, transport, industry, «Non-CO_2 Abatement Programme»), with an ex-post assessment of its efficacy and cost effectiveness. These efforts are clearly reflected in the quality and usefulness of reviews of individual instruments and sectoral policies. The impact of these reviews on the quality of policy formulation has not been firmly established in the present study. Our impression, however, is that reviews of this kind have contributed to greater insight among policy-makers, major focus on optimising the climate policies eventually opted for and improved learning curves.

The picture of the period post-2005 is more fragmented, with focus on systematic policy evaluation appearing to have waned. The initiative for sectoral reviews has been shifted from the responsible ministries to the Court of Audit, which since 2005 has published reviews on the transport, industry and power generation sectors. The initiative for reviews of individual policies lies with the ministries and implementation agencies (NL Agency, for example). In addition, in a growing number of the reviews commissioned by ministries and implementation agencies the standard methodology laid down in the Handbook has been abandoned. Some of the reviews report on costs and effects with reference to random samples only, without generalising the results to the country as a whole (as with the ex-post review of the tightening of the Energy Performance Standard in 2010, for example). Other reviews are purely qualitative in nature (as with the ex-post review of the voluntary agreements on energy efficiency in the built environment in 2009). Finally, there are yet other reviews that report only on policy costs, without including technology costs (as with the ex-post review of emissions trading in 2007).

Based on the available reviews, then, it has proved difficult to establish the contribution of government policy to greenhouse gas emissions reduction and the associated costs to society. What can be concluded is that in reviews of individual policies there is often no allowance for synergy with other policies. As a result, in reviews of individual policies their effectiveness is frequently estimated to be greater than in sectoral reviews in which consideration *is* given to such synergy.

The picture up to 2005

The picture to emerge from the cited reviews and summarised in the 2005 Climate Policy Review is as follows:

– The policy track adopted has had an impact. Thanks to domestic climate policy, in 2003 emissions were around 11.4 Mt CO_2-equivalent (5 per cent) lower than would have been the case in the absence of such policy (average savings: 2.3 Mt per annum).
– As a result of its early start with JI (Joint Implementation) and CDM (Clean Development Mechanism) the Netherlands has contributed to the creation of an international market for emission cuts. As a first mover in that market, the country was able to benefit from favourable conditions in (framework) contracts.
– Between 1999 and 2003 policies had a cost effectiveness, from a national perspective, of € 44–100 per tonne of avoided CO_2-eq.[30]. If the avoided costs due to the synergy effects of domestic climate policy on local air pollution and acidification are included, the cost effectiveness improves by € 11 per tonne CO_2-eq.

Looking back, domestic climate policy up to 2005 proved to be more expensive than had been anticipated during implementation. The main reason for this is that renewable energy proved dearer than expected (about € 300 per tonne avoided CO_2). Energy efficiency measures were generally far more cost-effective than renewables.

The picture post-2005

Based on the available reviews and data from Netherlands Statistics (CBS), it can be cautiously estimated that between 2006 and 2011 the overall policy impact on carbon emissions reduction is probably 33 Mt CO_2, with a lower bound of 18.4 Mt CO_2 and an upper bound of 39.9 Mt CO_2. To this should be added the savings on emissions of «other» greenhouse gases, which probably amounted to around 20 Mt CO_2-eq. At the end of the period 2006–2011 emissions were 12.4 Mt lower than would have been the case in the absence of policy measures (average savings: 2.1 Mt per annum).

Based on the reviews examined, the conclusions to be drawn regarding policy costs and cost effectiveness post-2005 are less clear and, above all, less quantitative. In addition, there was a fundamental change in the situation post-2005 because of the introduction of the EU Emissions Trading Scheme (EU ETS). As a result, renewably sourced electricity no longer had any direct influence on CO_2 emissions, for the «emissions space» created by generating more renewable power now allows other ETS parties to emit more CO_2, which means net emissions remain the same.

On the one hand, there are factors that have contributed to a decline in the overall cost of climate policy:

– There has been a major, one-off reduction of nitrous oxide emissions as a result of the opt-in of these emissions in the EU ETS. This emissions reduction came at relatively low cost.
– Renewable energy, the single biggest cost item, has in all probability become cheaper. This is due on the one hand to the learning curve resulting from worldwide upscaling of production together with the specific Dutch context. On the other hand, fossil-based electricity has become more expensive, leading to a decrease in the price differential of renewable energy (and the subsidy level per green kilowatt-hour).

[30] Here a correction has been made for subsidy leakage via green electricity imports. Without such a correction the cost effectiveness would have been € 33–83 per tonne of avoided CO_2-eq.

– In all likelihood, the policy costs of renewables incentivization have also declined. In drawing up incentive programmes, explicit lessons have been learnt from the review studies and used to «tweak» incentives over the following period, as witnessed successively by the Regulatory Energy Tax (REB), the ministerial regulation «Environmental Quality of Power Generation» (MEP), the incentive scheme for renewable energy production (SDE) and its follow-up, the SDE+. This has improved policy cost-effectiveness.

On the other hand, several other factors have pushed up costs:

+ Numerous low-cost measures to improve energy efficiency and reduce non-CO_2 emissions had already been implemented during the period through to 2005. These concerned both domestic emission reductions and acquisition of overseas emission cuts via JI and CDM[31]. This means it is the relatively expensive measures that are now left.
+ Since 2007 policies have been rolled out to increase the market share of biofuels. Use of these fuels in the transport sector comes at significant additional cost, though: the mandatory blending of biofuels in transport fuels is a relatively high-cost strategy compared with the types of policy adopted in the foregoing period. This certainly holds compared with incentives for more fuel-efficient vehicles, given the generally short payback time of such action. The high costs lie not so much in the choice of policy instrument (mandatory blending) as in the technology being incentivized: biofuels. When indirect land use is factored in, the lifecycle emission cuts embodied in biofuels become dubious, to say the least.
+ Although the energy efficiency route comes at relatively low cost (cheaper than renewables, for example), relatively little use has been made of it.

Given these various observations, it is hard to compare the cost effectiveness of overall climate policy with that in the period through to 2005. Apart from the one-off success with the «other» greenhouse gases, the obvious conclusion is that the main effects are down to renewables, at lower cost to society than in the period up to 2005. Across the board, this means a considerable improvement in the cost effectiveness of each Euro subsidy for renewables. On the other hand, though, the intensified policy efforts vis-à-vis relatively high-cost biofuels have led to an increase in the volume of renewables and thus to higher total costs to society.

In all probability, overall climate policy could have been more cost-effective if more energy had been saved – or the same result achieved, but at lower cost. It has emerged time and time again from ex-post reviews that policies geared to improving energy efficiency in industry have been relatively unfruitful. In the built environment, although efficiency standards for new buildings have led to improvements, in the existing building stock relatively little has been achieved. Likewise in the transport sector, where efficiency gains have been only modest, up to 2010 at least. This has probably changed for the better in the meantime, thanks to the introduction of an EU standard for the CO_2 emissions of cars and vans, as well as a series of domestic fiscal incentives to improve the emissions performance of the national vehicle fleet. In the energy-intensive industry, finally, policies became increasingly «hands-off» between 2000 and 2007. This largely voluntary approach yielded few if any gains. The energy savings achieved (0.5% a year on average) were less than those that would have been secured anyway (the autonomous trend; 0.8–1% a year).

[31] A correction for the major leakage of Dutch subsidy funds to overseas renewable energy facilities was already made in the cost effectiveness results for 2005.

With regard to the overall cost to society of climate policy post-2005, no solid conclusions can be drawn, however.

Analysis of climate policy instruments

The umbrella term «climate policy» refers to a broad spectrum of individual policy instruments, and the overall picture to emerge from the various reviews is that it is the synergy between these various instruments that has been one of the key factors in securing the emission cuts achieved.

It is extremely difficult to isolate the impacts of individual instruments from the broader context of overall climate policy and autonomous improvements in energy efficiency. In many cases, policy-makers also consciously allowed for the synergy between measures when drawing up the various policies. One example is the synergy between the energy performance standards for new buildings (EPC), the subsidy for energy efficiency measures in homes (EPR) and the regulatory energy tax (REB). Without this subsidy and a higher energy tax, the payback time for the tighter energy performance standards for new buildings would have been far longer. As another example, the gains accruing from the Energy Investment Deduction Scheme (EIA) were due partly to the voluntary agreements already in place (especially the 1st Long-Term Agreement on Energy Efficiency, MJA-1), which meant businesses readily found their way to the subsidy scheme. Vice versa, MJA-1 would not have been as effective in the absence of the financial support under the EIA scheme.

Besides this kind of synergy, the contribution of various instruments to the climate target can also overlap, as in the case of the EU ETS and the energy efficiency policy for industry. Here, too, explicit allowance should be made for mutual interaction during the policy formulation phase.

Together, this makes it hard to establish with any precision which policy instrument is responsible for what share of the emission cuts achieved. It is therefore essential for policy-makers to explicitly state ex ante the theory behind their particular policy – not just for the purposes of a sound review but also, and in particular, to be better able to learn lessons about the (intended) mechanisms of climate policy. In this context we would stress the importance of sectoral reviews as a means of avoiding the mistake of policy effects being ascribed to several different policies simultaneously, and the overall policy impact then being totted up as the sum total of all those policies.

Below, we discuss our conclusions on the respective «families» of policy instruments.

Regulatory instruments

In all the various sectors, regulatory instruments have proved effective in cutting greenhouse gas emissions. The energy performance standards for new buildings (EPC) have led to a substantial reduction in the emissions of new homes. The new standard for car and van CO_2 emissions, for its part, will probably lead to a significant decline in road traffic emissions.

The conclusion to be drawn from the various examples is that standards are effective when they are:

– technology-neutral;
– directed towards specific targets;
– generic in nature;

– properly enforced.

Timely announcement of progressive tightening of standards is also important, as was the case with the «Clean and Efficient» programme (energy performance coefficient (EPC) 0.6 in 2013, 0.4 in 2015 and zero in 2020, when all new homes are to be energy-neutral). This allows the building industry to prepare for future policy changes and means the increasingly tight efficiency standards can be met using a variety of savings packages. A progressively more stringent EPC has thus become an accepted element of everyday construction practice. This «dynamic» standard also has a demonstrable long-term impact on innovation: in addition to proven technologies (high-efficiency boilers, heat pumps) increasing use will have to be made of new technologies (solar boilers, photovoltaics, shower water heat recuperation) in order to meet the ever-tighter EPC standard.

Standards are never 100% effective, owing among other things to behavioural effects. The reduction in the energy consumption of homes built under a tightened EPC regime, for example, is not as great as calculations predicted, probably because occupants now heat more rooms and/or set their thermostat higher because their home is «more efficient». Particularly with these energy performance standards, the intended savings are partly cancelled out by increased use of lighting and heating.

By and large, standards function well in a situation in which they are geared to a well-defined and homogeneous target group. For this reason, regulatory instruments like those included in the Environmental Protection Act (mandatory implementation of measures with a payback of less than 5 years) appear to have been less successfully applied, despite the considerable scope for cost-effective measures here. To enforce such standards across a heterogeneous group of industries requires substantial human resources and thorough expertise on specific savings options at municipal offices, the government level at which this legislation is enforced. Enforcement is thus an issue that should be explicitly addressed in policy reviews.

In theory, standards lead to higher costs than comparable taxes and subsidies, as they do not yield the most efficient distribution of emission cuts across the target group. These additional costs of standards compared with economic instruments rise with increasing heterogeneity of the group being targeted. Whether this is also the case *in practice* cannot be ascertained on the basis of the reviews available, however.

Economic instruments: charges

Charges like the regulatory energy tax (REB) and fuel duty have proved effective in reducing carbon emissions.

In various sectoral reviews a substantial part of policy-induced emissions reduction is ascribed to the REB and fuel duty. The increase in fuel duty in 1990 led to savings of 1 Mt CO_2 per annum, while by 2002 the REB was saving 1.6 Mt CO_2 per annum in the built environment. This picture is confirmed in foreign reviews of CO_2 emissions and energy taxes.

This is still a somewhat surprising conclusion, though, because the public at large is under the impression that the price sensitivity of energy consumption, fuel consumption and car use is virtually zero.

The first main explanation for the difference between the results of ex-post reviews and this widely held view is that these kinds of charges impinge on a very substantial fraction of overall energy use. For the economy as a whole they consequently provide an enormous incentive to reduce fuel use and thus CO_2 emissions, despite the limited savings incentive for individual consumers. There are scarcely any other types of policy tool with such a wide sphere of influence. Standards, subsidies, voluntary agreement and communicative policies always exert leverage on a far smaller fraction of overall energy use.

Secondly, there prove to be a far wider range of behavioural options available, particularly over the longer term, leading to a considerably greater elasticity of energy consumption and vehicle use than in the short term[32].

Little is known about the cost effectiveness of taxes and charges and this parameter is often estimated using the «rule of half» as half the price incentive to be paid in the margin (the last unit of energy consumed). It is the final user who bears the cost, with revenue accruing to the Treasury; the cost effectiveness at the national level depends on the technology or technologies involved. Taxes and charges can also be extremely cost-effective as a means of securing climate targets, although ex-post affirmation of this is a very difficult task. To be effective, a uniform charge rate needs to be applied to all groups of energy consumers. At the moment the Energy Tax, in particular, is degressive: the more energy is used, the less the tax rate per kWh of power or m^3 of gas. For the most energy-intensive industries this might be justified with reference to international competitiveness, but this holds far less for the very sizeable group of mid-range energy consumers.

Emissions trading creates a similar price incentive for consumers and businesses and works similarly to charges. The difference, though, is that in this case an emissions cap is first defined, with the price then being dictated by market forces. In the first EU ETS trading period (2005–2007), as a result of over-allocation no real price incentive emerged. Because of the slump in the economy and, again, over-allocation, in the second trading period (2007–2012) although the CO_2 price was high at first it then fell substantially and the impact on energy savings and CO_2 reduction has remained limited. Despite this modest pricing level, over the past few years emissions trading has nonetheless had an impact, especially with regard to non-CO_2 emissions (opt-in for nitrous oxide emissions from nitric acid production). In the few years of comparatively high pricing there was also some impact on emissions from industry and power generation; the cost effectiveness of the ETS was promising. How costs are distributed depends very much on how emission credits are allocated.

Economic instruments: subsidies

Subsidies are generally effective in stimulating technologies that are at the stage of innovation and initial market introduction.

In the Netherlands substantial subsidy funds have been devoted to incentivizing renewable energy, in particular. It is above all the new technologies that provide leverage for securing greenhouse gas emission reduction targets and, with time, bringing down the price of CO_2 abatement technologies through learning effects.

[32] Consumers holding that at present they have no alternative but to pay more energy tax can, in the slightly longer term, consider insulating their home better or bringing foward a decision to fit solar panels or LED lighting, since the payback time of these kinds of measures is getting shorter all the time. Also, the indirect effects on energy-intensive sectors knock on in the entire economy.

In practice, the effectiveness of climate and energy subsidies is ultimately determined by the actions of free riders: parties that would have adopted the measures in question even in the absence of the subsidy. This is particularly relevant for energy-saving technologies (with a short pay-back and so for some parties cost-efficient without a subsidy) and, to a far lesser extent, for renewable energy technologies coming at substantial extra cost (long pay-back and scarcely cost-efficient unless subsidized).

Over the years, policy-makers have focused considerable efforts on improving the effectiveness of energy subsidies. This was due in the first place to a major interdepartmental study (IBO) carried out in 2001 to assess precisely this issue and later, in 2007, to a review of the Energy Investment Deduction Scheme, EIA (SEO, 2007). As a result, inefficient technologies were stripped from the list eligible for the scheme in question.

The free-rider effect of schemes like the EIA and a similar scheme then in force for non-profit organisations (EINP) was as high as 50%, and even 70% for certain specific schemes further back in time. However, these percentages may well be lower if a correction is made for the role some schemes play in focusing attention on certain measures (the «attention effect»).

Also, the percentage of free riders can vary considerably depending on the technology concerned. In the case of the EIA it ranged from 30% to 70%, with an average of about 50% (as calculated ex-post in 2007). This makes it almost inevitable that subsidy-driven incentivization leads to «over-encouragement», with subsidy funds being distributed to parties that would have adopted the same or similar measures in the absence of subsidies. With too low a subsidy level, on the other hand, the policy would not have been as effective.

For subsidy recipients there may be a rebound effect, for as the net cost of energy consumption falls more energy may ultimately be consumed, leading on balance to higher emissions.

In designing future energy subsidies, therefore, allowance should be made for between 70 and 30 per cent of free riders.

Free-rider effects also affect the cost effectiveness of subsidies. Subsidies often lead to negative costs (i.e. revenues) per unit emission reduction for final users and positive costs for the Treasury.

Communicative instruments

In the overall climate policy package employed to date, communicative instruments have been given only a relatively modest role. Information and education are above all effective when there are cheaper routes to emissions reduction of which the parties in question are unaware. The programme to encourage a «Greener Driving Style» is an example of a communicative instrument that had a relatively robust impact (0.4–0.8 Mt CO_2 per annum). Ignorance is one of the main reasons a whole range of cost-effective behavioural measure are not adopted (proper tyre pressure, efficient driving style, efficient house-warming, process optimisation in industry, etc., etc.).

In the Netherlands, however, there has been major emphasis on voluntary agreements as a means to reverse the trend of rising energy consumption and associated emissions.

The reviews examined for the present study provide little or no evidence that Dutch voluntary agreements have had any real effect, leading to only negligible cuts in carbon emissions. One exception was the 1st Long-Term Agreement on Energy Efficiency (MJA1). At the time, there were still plenty of low-cost measures that could be implemented and there was also a clear «stick» to induce businesses to implement them. Under subsequent agreements these conditions no longer held to the same extent. And as international comparisons show, Dutch policing of such voluntary agreements – in relation to lower energy tax rates, among other things – is more laissez faire than in countries such as the United Kingdom or Denmark, where these kinds of agreements are formal and binding, with a penalty for non-compliance with the agreed terms in the form of the right to a lower tax rate being revoked.

Comparison of ex-ante and ex-post

On the basis of the present study it has proved impossible to carry out a systematic comparison of the costs and effects estimated ex ante and achieved ex post.

What can be concluded, though, is that in the short term (growing) focus on renewable energy has led to higher costs for consumers and tax-payers than had been anticipated. In the longer term, though, it is unclear whether these high costs will contribute to a reduction in the cost of the technologies in question.

The key role assigned to the implementation of relatively expensive renewables across EU member states is anchored in the EU's Renewable Energy Directive (RED), which seeks to achieve fair distribution among member states of efforts and contributions towards market scale-up of renewables. In this way a guarantee is provided that renewable energy can acquire a substantial market share in Europe's energy supply. This kind of scale-up is essential if costs are to be reduced further, making renewables competitive with conventional technologies as time progresses.

What is surprising is that in the reviews of the EIA, REB and MEP no attention was paid to the decline in the cost of CO_2 abatement technologies achieved over the years and the extent to which this was due to government policy.

That domestic climate policy has proved more expensive than originally anticipated is due above all to renewables emerging as dearer than first thought. Another factor is the disappointing rate at which even the most cost-effective energy efficiency measures have been adopted in various sectors, with implementation rates lagging substantially behind policy targets or intended policy results. For the energy-intensive industry – with major scope for low-cost savings – the policy pursued during the period 2000–2007 can be characterized as increasingly «hands-off».

Spin-off of climate policy

Climate policy has a number of important side-effects, or spin-off. In ex-ante reviews the following are cited:

– reduction of air pollutant emissions;

– changes in patterns of employment and economic growth (in the case of CDM, including sustainable development in the recipient nation);
– reduced dependence on fossil fuel imports;
– a wide range of other effects (comfort, improved travel times, foregone tax revenues).

In several cases this kind of spin-off was also quantified in the ex-ante studies. Whether it indeed materialized is impossible to assess, though, because the ex-post reviews published since 2005 have ignored the issue entirely, except for the impact on air pollutant emissions in the period through to 2004.

In climate policy reviews there has been little focus on the impact on innovation and cost reduction of green technologies, despite the fact that such innovation is crucial for the transition to a low-carbon economy – the ultimate goal of climate policy.

Recommendations

A long-term review programme to improve monitoring and evaluation

1. It is recommended to conduct a comprehensive ex-post review of Dutch climate and energy policy since 2005.
This recommendation stems from the impossibility of estimating the effectiveness or costs of Dutch climate policy in the years post-2005 on the basis of available ex-post review studies. With the «Kyoto era» coming to an end in 2012, it would seem a good moment to carry out a comprehensive assessment of policy to date, all the more so because the country faces a major challenge in securing the emission cuts agreed for 2020.

A review of the kind envisaged demands a clear-cut programme, similarly to the reviews conducted between 2002 and 2005. Then, the first step taken was to establish a methodology for such ex-post reviews, with responsible ministries subsequently evaluating all major policies in accordance with those methods. In that process, sectoral reviews have a key role to play, in order to avoid the trap of reviews of individual policies verring into over-estimation. There will also need to be guarantees as to the long-term availability of climate cost data in the environmental cost statistics compiled by CBS and PBL. Only with such statistics at hand can the cost and effectiveness of overall climate policy be properly reviewed.

2. The ex-post review of Dutch climate and energy policy as well as sectoral and other such reviews should be carried out according to a single, consistent methodology.
On the basis of available ex-post reviews it is not currently feasible to produce a *sufficiently reliable* analysis of costs and effects: the review methods applied are too divergent, there are too many «blanks» because of missing or unsatisfactory reviews of the climate policies implemented, and numerous crucial sectoral reviews are lacking.

Many ex-post reviews provide absolutely no estimate of costs under the respective headings of policy, technology and behaviour. Even government costs, which are relatively straightforward to establish, failed to be reported in a number of cases, definitively precluding any estimate of cost effectiveness. A consistent methodology, alongside explicitly stated policy theory (how does policy X contribute to securing the climate target?), also

facilitates detailed comparison of ex-ante and ex-post reviews, making for far better learning curves.

3. It is recommended that in all ex-post reviews of Dutch climate and energy policy there is due focus on spin-off.
Because CO_2 emissions are intimately linked with energy consumption, as well as for other reasons, climate policy has countless side-effects.

In future ex-ante and ex-post reviews it is recommended to focus specifically on such spin-off, if possible in quantitative terms. In particular, it is recommended to review impacts on innovation and cost reduction of green technologies, because these are indispensable elements of further emission cuts. This requires that policy-makers adopt an explicit policy theory: how does policy X contribute to the envisaged innovation and technology cost reduction and what fraction of the cost decrease is autonomous (i.e. uninfluenced by Dutch climate policy).

Further elaboration of climate and energy policy

4. The cost effectiveness of climate and energy policy can be improved by focusing more on energy efficiency.
European climate and energy targets and the accompanying policy instruments relieve the Dutch government of some of the work of pursuing a climate policy. The EU ETS, for example, provides an effective emissions cap (despite it not constituting an effective incentive for energy efficiency under current prices).

The policy scope available to the Netherlands can in all likelihood be utilised more cost-effectively if energy efficiency improvements are more robustly incentivized. Cutting energy consumption is not only generally cheaper than roll-out renewables; with energy demand reduced, less renewables will also be required to meet the European target (14%) or the Dutch government target (16%). In ETS sectors, too, improved energy efficiency increases overall policy cost effectiveness, despite the fact that it does not lead directly to emission cuts. There is substantial potential here: in the existing housing stock around 4 Mt CO_2 per annum and in the utility building sector around 3 Mt per annum. More stringent enforcement of the terms of the Environmental Protection Act can yield a further reduction of 3 Mt (with this overlapping partly with the potential in the utility building sector). A further greening of the Netherlands' tax system can also provide incentives for greater energy efficiency. Thus, broadening the scope of the Energy Tax (increasing tax rates for small and medium-sized consumers) can yield a further few mega tonnes of emission cuts per annum, with higher energy bills being compensated via cuts in other taxes like corporate tax or more favourable terms in the Energy Investment Deduction Scheme, for example.

If energy consumption is reduced, less renewable power needs to be generated. Given that renewables are among the more expensive measures, improved energy efficiency reduces the costs of climate policy in two ways.

5. To achieve more rapid cuts in carbon emissions it is essential that more use be made of regulatory instruments and taxes on energy consumption and/or emissions. Voluntary agreements have been shown to have only a modest effect.

To achieve substantially more robust emission cuts in the cited sectors, it is recommended to adopt a less «hands off» strategy. This means that greater focus on regulatory instruments (including provisions for adequate enforcement) and on taxes and charges, and less on subsidies and communicative instruments like voluntary agreements. Dutch practice in recent years has not yielded any real proof of the presumed added value of such agreements, while the various policy reviews have provided a wealth of evidence that regulatory instruments and taxes have made major contributions. In other words, voluntary agreements should, at most, be used only as a *complement* to more effective instruments, not as an *alternative.*

According to most forecasts, in the transport sector there needs to be a volume shrinkage if emissions are to be reduced (efficiency standards and biofuels can at best only limit emissions growth). Effective instruments to this end include introduction of pricing for infrastructure use, an air ticket charge and revised tax arrangements for commuters.

11 MANAGEMENT SUMMARY

The Dutch government has been pursuing climate policy since 1989. From 1999 onwards that policy has been intensified with a view to securing the Kyoto target for the period 2008–2012. The Dutch parliament has requested a review of the costs and effects of the measures adopted under the country's climate and energy policy, based on existing review studies, and to this end commissioned the present study. Because of the differences in availability and quality of the reviews up to 2005 and thereafter, separate conclusions have been drawn for the respective periods.

Costs and effects in the policy period up to 2005

The last comprehensive reviews of the costs and impact of Dutch climate and energy policy date back to 2005. For the period then studied, 1999 to 2003, there is consequently a clear picture:

– Between 1999 and 2003 climate and energy policy led to an emissions reduction of 11.4 Mt CO_2-eq. (average savings: 2.3 Mt per annum). Of this, 1.5 Mt stemmed from cuts in «other» greenhouse gases, 8.1 Mt from improved energy efficiency and 1.7 Mt from use of renewable energy.
– Between 1999 and 2003 policies had a cost effectiveness, from a national perspective, of € 44–100 per tonne of avoided CO_2.
– Cost effectiveness varied considerably from sector to sector, with measures in agriculture, transport, «other» greenhouse gases and industry relatively low-cost between 1999 and 2003, and measures in the built environment and renewable energy comparatively expensive.

Costs and effects in the post-2005 policy period

The impact and costs of climate and energy policy in the post-2005 period are rather less clear as well as less quantitative, for several reasons:

– The only sectoral studies carried out were on transport (for the period up to 2007) and industry (for the period up to 2008, but only for energy efficiency and not for renewables). For other sectors, several ex-post reviews of individual policies have been published, but most of these overestimate the effectiveness because no allowance is generally made for interactions among policies.
– To a growing extent, the reviews opt not to use the standard review methods that in the 2005 studies enabled robust comparison of results. This makes it necessary to fall back on statistical data, which are only available up to 2007, however.
– Ex-post reviews of several key instruments are lacking. Incentivization of renewables, for example, which is one of the most expensive forms of climate policy, has only been reviewed ex-post for the period up to 2006.

Based on the available reviews and data from Netherlands Statistics (CBS), it can be cautiously estimated that at the end of the period 2006–2011 emissions were 12.4 Mt lower than they would have been in the absence of policy measures (average savings: 2.1 Mt per annum).

Conclusions about policy costs post-2005 are harder to draw. A number of factors have contributed to a decline in the overall cost of climate policy:

– There has been a major, one-off reduction of nitrous oxide emissions at relatively low cost.
– Renewable energy, the single biggest cost item, has in all probability become cheaper. As a result, and thanks to more effectively designed

policies, the policy costs of renewables incentivization have also probably decreased.

On the other hand, several other factors have pushed up the costs:
+ Compared with pre-2005, numerous low-cost energy efficiency measures have already been implemented.
+ Since 2007, policies have been rolled out to increase the market share of biofuels, which are relatively expensive.
+ Relatively little use has been made of the energy efficiency route.

In all probability, climate policy as a whole could have been more cost-effective if more energy had been saved, since the less energy is consumed, the less need there is for renewables, which are relatively expensive.

Recommendations

To improve insight into the costs and effectiveness of climate and energy policy, it is recommended to set up a comprehensive review programme. Similarly to that implemented from 2003 to 2005, this should have two main elements:
– Establishing an unambiguous methodology for calculating costs and effects.
– Performing ex-post reviews of all the main policies and individual sectoral policies, along with a comprehensive overall review.

To improve overall cost effectiveness, it is recommended to boost incentivization of energy efficiency. In the built environment there is still major potential in this area, which can be exploited by adopting a less hands-off approach geared more to regulation and pricing rather than subsidies and voluntary agreements. For other sectors, including transport, improved efficiency will not suffice as a route to achieving the emission cuts required. Here, consideration can be given to policies to reduce transport demand, through infrastructure pricing, for example. Finally, a review may in order for policies that have proved to be comparatively ineffective, or whose effectiveness is impossible to assess. This is the case for most voluntary agreements, for example.