

Transition to a low-carbon energy economy

Advice for the Climate Policy Implementation Document

Advice 010E
23 december 1998



To the Minister of Housing, Spatial Planning
and the Environment
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VROMRaad

Minister,

Your predecessor Mrs. De Boer invited the Council for Housing, Spatial Planning and the Environment in a letter of 28 May 1998 to draw up an advice for the Climate Policy Implementation Document in which we were also asked to consider the Options Document of the ECN and the RIVM. You submitted this Options Document to the Council on 9 November 1998 when you also requested the Council to deal with the results of the fourth Conference of the Parties to the Climate Treaty in Buenos Aires. In addition, you asked the Council to organise a debate on the Options Document and the advice of the Council.

In its advice the Council proposes that climate policy be developed from an integrated, sustainable and long-term perspective. This will have to also include measures for the short and medium term. The Council makes a substantial number of recommendations in this regard, based on the following three orientations:

The approach should fully acknowledge the global and long-term nature of the enhanced greenhouse effect and its interrelatedness with the use of fossil fuels as the motor of the international economy.

It must reconcile cost-effectiveness of the measures with a fair distribution of the costs over countries and sectors.

The institutional structure and instruments must exploit to the maximum the self-directing capacity of society and must be such as to command maximum possible support.

It also evaluates, from the same outlook, the Options Document, and deals with the results of Buenos Aires.

In accordance with your request, the Council will organise a debate on climate policy. The date of 26 January 1999 has now been chosen for this. After this has been held the Council would be pleased to discuss with you its advice and the results of the debate.

Yours faithfully,

T. Quené
Chairman

W.A. Haeser
General Secretary

Enclosure: Advice 'Transition to a low-carbon energy economy'

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Summary and recommendations

The climate problem

It is very likely that mankind, through its emissions of greenhouse gases, is having a perceptible and disruptive influence on the world's climate. Even if vigorous policy is pursued to abate greenhouse emissions, the earth is likely to undergo considerable warming. The enhanced greenhouse effect represents a threat to ecosystems, food production, and to sustainable economic growth.

The industrialised countries are responsible for the lion's share of greenhouse emissions during the last 150 years. This share is now declining, but per capita emissions are still many times greater than in the third world. The industrialised countries must therefore make a relatively large contribution to dealing with the climate problem. They must do this from a position of acknowledged self-interest because they are best equipped in technical and economic terms to do so, while developing countries are for the moment absorbed in the fight against poverty and need sufficient emissions space for the desired growth in living standards.

Carbon dioxide (CO₂) lies at the heart of the problem because more than 60% of the increase in the greenhouse effect is attributable to this gas. It is also the most intractable component because it is released by the use of fossil fuels in innumerable production and consumption processes. The conclusion is inescapable that radical changes will be needed in our energy economy (transition process) in order to meet the CO₂ emissions objective for the longer term.

The Climate Treaty, the Kyoto Protocol and burden-sharing in the EU

The Climate Treaty was concluded in order to control the enhanced greenhouse effect. At Kyoto the industrialised countries undertook to reduce their mean annual greenhouse emissions by the period 2008-2012 to some 5% below their 1990 levels. There are differences between countries and economic blocs such as the European Union in the targets. The EU as a whole is required to achieve an 8% reduction, and is free to redistribute the burden between the different member states.

The Netherlands has committed itself to an unconditional reduction of 6% relative to 1990, which is equivalent to a reduction of about 50 Mtons (-20%) compared with the projected value. The 1998 Coalition Agreement stipulates conditions, however, for the Netherlands to actually achieve this reduction. These conditions are: ratification of the Climate Treaty by the US and Japan, the adoption of community-wide measures, the introduction of a substantial energy tax by the EU by 2002 at the latest, also for

large-scale users, and adequate latitude (about 50%) for the adoption of flexible instruments. These conditions must not be used by the Netherlands as grounds for evading its responsibilities and defaulting on an international agreement. The division of the burden between the member states of the EU is a political fact. The government should assume that the conditions stated in the 1998 Coalition Agreement will be met, and throw its efforts into getting a European climate policy off the ground.

Countries with reduction commitments will be able to trade emissions permits. They can also carry out projects in another country subject to a ceiling, with the emission reduction being divided by mutual agreement (Joint Implementation, JI). Finally, they can also carry out projects in developing countries (Clean Development Mechanism, CDM). It was agreed in Buenos Aires (CoP 4) that the conditions applying to these so-called flexible instrument would be determined in 2000.

Dutch climate policy

Climate policy in the Netherlands has hitherto been directed mainly towards: enhancing energy efficiency in production and space heating, promoting the introduction of renewable energy sources, reducing demand for energy by small-scale users and increasing the absorption of CO₂ in new forests. The results achieved by Dutch climate policy are trailing far behind the objectives for 2000. This is mainly the consequence of the growth in industrial production and certain forms of consumption. Energy conservation is below target. There is no sign for the moment of an absolute decoupling of CO₂ emissions from economic growth.

The results of policy on actual greenhouse emissions have often been disappointing. This leads to the conclusion that present policy will probably not be adequate to achieve the objectives, and prompts the question as to how the policy instruments can be improved.

If growth is in accordance with the GC scenario, major cuts in the CO₂-intensity (CO₂ emissions per unit GDP) of the Dutch economy will have to be made each year between 1997 and 2010. A sustained and (in historical terms) exceptional performance will be needed.

In putting together an effective policy package, all possible options will have to be looked at. To start with, a much greater efficiency in the use of energy and materials per unit of product is necessary. Secondly, the rate of introduction of renewable energy sources will have to be greatly accelerated (including the import of biomass). Thirdly, ensuring that emissions are reflected in the prices of products can change consumption patterns and thus have a beneficial structural effect. Fourthly, there can be further

switching to lower-carbon fuels. And finally, it is also necessary that where fossil fuels are being used, the CO₂ emissions should be reduced. It will therefore be necessary to work at the decarbonisation of processes in which fossil fuels are used and at CO₂ storage. Although this option may seem merely palliative, it fits in well with the transition to a hydrogen-based energy system and the widespread use of clean, energy-efficient fuel cells. Apart from interventions of this kind, other kinds of measures can be taken, such as CO₂ sequestration through afforestation, emissions reductions in other countries and reductions in other greenhouse gases.

Orientation

The Kyoto agreements constitute only the first step on the road to reducing global emissions by 50% relative to 1990, and the emissions of industrialised countries by approximately 80% by the end of the 21st century. Furthermore, Dutch climate policy for the short term is falling far short of its objectives. The Council views climate policy from an integrated, sustainable and long-term perspective. It considers the following three orientations crucial to a policy strategy for climate.

- The approach should fully acknowledge the global and long-term nature of the enhanced greenhouse effect and its interrelatedness with the use of fossil fuels as the motor of the international economy. The main focus must be on CO₂ emissions as the largest and most obstinate component of the problem. This requires a transformation in the energy system.
- It must reconcile cost-effectiveness of the measures with an equitable distribution of the costs over countries and sectors.
- The institutional structure and instruments must exploit to the maximum the self-directing capacity of society and must be such as to command maximum possible support (new instruments).

Tasks for national policy

Uncertainties regarding future technological developments and their application are still very great. A policy directed at technical innovation must therefore make a substantial contribution to reducing the costs of measures and behavioural changes. This policy must also be directed towards creating the infrastructural and institutional conditions in which the new technologies will be applied. This applies, for example, to energy supply systems in the built environment and to transport. The uncertainty argues for an open approach which leaves space for the continuous appearance of new options.

Climate policy will be costing between NLG 1 and 4 billion per year by 2010. The costs will then rise sharply as deeper emission cuts are made. Cost-effectiveness is important, but the costs come before the benefits. We need to be investing now in options with

long-term potential so that the costs of post-2010 reductions remain manageable. Structural-technical measures are important because their effects persist, while behavioural changes on their own are less certain. The Climate Policy Implementation Document must therefore look at developments over a timescale which extends well beyond 2010 and which forms the basis for technological innovation and long-term investment decisions.

The Council observes that it is difficult to gauge in advance the effectiveness of climate policy with the present instruments. The government does not have a good enough overview of the technical and economic possibilities itself to be able to steer the transition process. More regulation is not the answer. Businesses are much better able to select the most efficient abatement measures themselves. It is therefore essential that climate policy should harness this self-directing capacity to meet the Dutch and European emissions ceilings. Market-based instruments are the most appropriate for this.

International aspects

In physical terms the climate problem is not affected by the location in which emissions are reduced. The historical role which the industrialised countries have played, combined with their economic and technological possibilities justify their greater contribution to dealing with the enhanced greenhouse effect. This allows regard to be had to differences in living standards, economic structure (specialisations), the local availability of natural resources, cultural and climatic factors. Because the location where reductions are made is irrelevant from the climate viewpoint, these can be achieved where it is cheapest to do so. Countries are therefore rightly being given flexibility, particularly because fixed ceilings per country are at odds with the dynamic differences in reduction costs. The former could result in shifts in trade flows and the relocation of production to places which are sub-optimal in economic and environmental terms.

Assessment of the Options Document

The government had a report drawn up which lists the means by which the Netherlands can comply with the Kyoto Protocol. This 'Options Document' describes the options about which enough is known, which are considered sufficiently 'instrumentable', which could make an adequate contribution and which are not too expensive. The 61 options described, which between them would reduce emissions by over 70 million tons CO₂-equivalent, are ranked in order of increasing end-user costs. The Council examined whether the Options Document provides an adequate basis for the development of a climate policy strategy in the Implementation Document and also offers good prospects for the longer term.

The options Document presents systematically a wealth of information useful for climate policy. It would not however be sensible, in the Council's view, to simply choose a set of options on the basis of the ranking therein given, for the following reasons.

- The GC scenario is a reasonable choice for the Options Document. It should be realised, however, that this does not constitute a maximum estimate.
- There is uncertainty as to the costs of the various options.
- The list presented includes too few options mainly effective in the longer term.
- The options are ranked according to an inappropriate cost criterion.

The macro-economic assessment was made on the basis of the CPB's Global Competition scenario. This is the most conservative of the three scenarios from a climate policy perspective because it assumes the highest economic growth rate. The assumptions made in the GC scenario are mutually consistent. Should they prove optimistic, however, then the gap of 50 Mtons will grow, and policy will be more difficult and more costly.

The Council believes that some costs are higher than estimated (e.g. imported biomass). On the other hand, little account has been taken of falling costs in consequence of technological progress, scale-up and the learning effect. Nor has account been taken of the fall in energy prices.

The Options Document confines itself to options which can make a sufficient impact by 2010. Options which take longer to mature are passed over. They are also assessed too much in isolation, and therefore not placed sufficiently in context. It is right that cheaper options are chosen for the short term, but these must be accompanied by sufficient investment in the technical and institutional conditions for CO₂ reduction after 2010.

The Options Document ranks the options by decreasing cost-effectiveness for the end-user. This approach is not appropriate to determine whether an option is cost-effective for society as a whole, mainly because end-user costs are affected substantially by taxes. Furthermore the method adopted ignores loss-of-amenity, often associated with consumption-related measures. As a result, these end-user costs are not very useful in estimating the consumer resistance to measures.

The confidence that the government can form a satisfactory picture of the options and their costs (now and in the future) strikes the Council as being a little naïve given the complexity and dynamic of technology and the market. The Council urges that a more open approach be taken, which allows for uncertainties and new possibilities. The Options Document proposes a specific instrument for almost every option, drawn

from the existing arsenal of instruments. This results in a high administrative burden, the effectiveness of which may again disappoint.

Dutch energy policy faces a triple challenge: to devise a cost-effective strategy for reducing emissions to 6% below their level of 1990, to invest in options appropriate to the transformation which the energy system must undergo, and to develop new policy instruments. The Council makes a distinction in this regard between the sectors exposed to international competition, so unable to pass on environmental costs in prices, and the sheltered sectors, to which this does not apply. The most important task of government is to create the boundary conditions such that the sectors and companies concerned can themselves select the options. The most important of these boundary conditions is the rapid creation of market-based instruments (tradeable emissions permits or stiff emissions tax) for the sheltered sectors.

In the case of those sectors where the advent of these new instruments does not proceed rapidly enough, the government will have to retain control. The options selected should preferably either contribute to the transition in the energy system or, because of their cost-effectiveness, create the necessary space for such a transition. The Implementation Document must contain objectives for each of the three aforementioned challenges for 2002, 2006 and 2010. The objectives must be monitored carefully. This monitoring should extend to factors which affect the achievement of the objective in the future. In addition, it is necessary to know when, at the latest, implementation of each of the options needs to be started so that it can contribute to the reduction in 2008-2012.

New instruments

In order to make climate policy more effective, a fair distribution of costs both between countries and between sectors must be effected, and cost-effectiveness must be optimised. A fair distribution of costs requires that regard be had to between-sector differences in the ability to pass on costs to customers.

It is very difficult to effect a decoupling between CO₂ emissions, energy consumption and economic growth with the existing instruments. The costs of climate policy could be made unnecessarily high. The government has no hope of keeping up with the situation because it cannot have a sufficient grasp of current between-sector differences in the technical possibilities and costs of reducing greenhouse emissions. The strongly international nature of certain sectors makes it very difficult for government to intervene, even though these export-oriented, energy-intensive companies should in fact be very active in reducing emissions given their share in the total emissions of greenhouse gases, their scientific potential and their capacity for innovation.

Benchmarking will involve companies making a commitment to be amongst the world leaders in terms of their environmental performance. This approach by the exposed sectors appears at first sight to be a good one providing it focuses on carbon efficiency rather than energy efficiency. There is however a risk of imbalance between the efforts of the exposed sectors and of the sheltered sectors to get emissions within the Dutch ceiling. The Council urges that, from considerations of equity, companies which have already achieved the benchmark should be expected to continue to make a contribution: for example, that they should make investments which meet the internal rate of return customary for the sector, unless this would lead to a competitive disadvantage.

New instruments: towards regulatory taxes or tradeable emission permits

The active participation of companies, citizens and local government is indispensable, both in making strategic choices and in searching for practical solutions. This must be achieved by redistributing the responsibilities between the public authorities and society at large, with a more important role for general, market-oriented instruments. The choice is between regulatory taxes and tradeable emissions permits. These alternatives have many characteristics in common, although they also both have specific advantages and disadvantages. The Council is of the opinion that, since little progress is being made with the European energy tax, priority ought now to be given to studying the possibilities for a system of tradeable emission permits. The government has less influence on prices and price differences in the marketplace in the case of tradeable emission permits than for taxes, which would involve a recycling of the receipts. The Council realises that careful attention has to be paid to the issue of implementation.

There is a risk that if the exposed sectors are made subject to an emissions ceiling, they will sell their Dutch emissions permits and will relocate their production abroad. This is undesirable in climate terms. There must therefore be sufficient flexibility created for emissions permits to be purchased on the international market at a price which is reasonable for these sectors. The Council therefore regards an emissions ceiling for the export-oriented industry reasonable only if trading is possible at an international level, on a sufficiently large scale, through a system of tradeable emissions permits (TEP) for companies. In the first instance this emissions trading can be conducted between the Netherlands and other countries, possibly supplemented by internal emissions trading between the different sites of multinationals.

In theory a distribution of the initial emissions permits can be devised in which everyone concerned does better than for any other possible distribution. 'Grandfathering' on the basis of present emissions would seem to be a reasonable starting point in negotiating the distribution.

Care must be taken in setting up a system of tradeable emissions permits, in regard not only to the initial allocation, the legal basis and the trading conditions but also the monitoring of the results. The best approach is to start with a number of sectors at the national level, and to extend the system later to other sectors and to the international level.

Making a start: a twin-track approach

The Council proposes that a system of marketable carbon emissions permits be instituted for some of the sheltered sectors, and for households for energy and petrol consumption. The remainder not covered in the first phase will continue to be dealt with by regulation and covenants. In addition, a procedure must be introduced for the sheltered sectors which enables them to contribute relatively cost-effectively to the reductions needed for the 2010 target, either through subsidies or a system of negotiable reduction certificates or a combination of both. There is growing interest in emissions trading both in industry and in the public sector.

Until an adequate system of international emissions trading is possible, the 'multi-year agreements' will continue to be the indicated policy instrument for the exposed sectors.

Now that Kyoto has given the go-ahead to emissions trading between countries, emissions permits can be acquired which can be sold on to all those sectors for which a ceiling has been established. If sufficient emissions permits can be created in this way, the exposed sectors can also be brought within the ceiling.

Reductions abroad through flexible instruments

An often-mentioned objection to utilising low-cost options in other countries is that this might remove an essential incentive to innovate. The Council points out that in fact the utilisation of cheap options in the Netherlands and elsewhere can create the space in terms of both time and money to invest in developments consistent with a transition in our energy system. The government and industry together must ensure that sufficient of the financial elbowroom it acquires by taking advantage of 'flexible instruments' is used for this purpose. This can be done in various ways, e.g. through covenants.

There are also large differences in marginal costs within the European Union, to which little attention is however being paid. The Council recommends that the possibilities for emissions trading and Joint Implementation within Europe be studied.

Developing countries can benefit from emissions trading and CDM projects through the transfer of finance and technology, while the costs of options which are currently expensive will fall. In the next round of discussions on the Climate Treaty, reductions will only be accepted if account is taken of the differences in development levels. The transfer of emission credits is not the transfer of a right in perpetuity, but is project-related, and temporary.

The Council sees no reasons of principle why there should be a limit on the proportion of the emissions reduction which can be realised in other countries. It suspects that the 50% of the total additional emission reductions mentioned in the 1998 Coalition Agreement is a reasonable estimate of the maximum proportion that will in practice be used for flexible instruments. The scope for reduction outside the OECD will be limited by organisational and administrative problems. Furthermore in all countries, including the US, there will be at least some potential measures which will be cheaper than the estimated price which will apply on the world market for emissions rights (US\$ 50 per ton CO₂).

Recommendations

The foregoing can be distilled into the following recommendations.

- 1 In order to ensure that the anthropogenic climate change remains manageable, the global emissions of greenhouse gases need to be halved by the end of the 21st century. This is equivalent to a reduction of 80% for the developed countries. This huge challenge can only be met if there is sufficient problem-awareness and support for policy in society.
- 2 Given the long-term, global nature of the climate problem, structural steps which form part of a long-term strategy towards a low-carbon energy economy are more fundamentally important than incidental, short-term successes. The policy process must be shaped, also in the short term, by the desire to achieve a long-term transition in the energy economy.
- 3 The required reduction in CO₂ emissions requires not only greater and accelerated development and the application of options for conserving energy and materials. It will also be necessary to develop methods of using fossil fuels such as to limit CO₂ emissions. This means that the decarbonisation of fuels and the capture and storage of CO₂ will have to be examined.
- 4 The realisation of the long-term goals of climate policy will necessitate far-reaching measures relating to the amount and nature of energy use, touching society at every level. For the government to try to implement all these measures

would be a foolhardy venture. The strategy and policy instruments must exploit to the maximum the self-directing capacity of society. The actors must be given a stake in the process of transition in the energy economy.

- 5 Climate policy will make better progress if maximum flexibility is provided in the choice of locations where, and the manner in which, CO₂ emissions are reduced. As far as the environment is concerned, it does not matter where greenhouse emissions occur. A distinction must therefore be made between the obligations of countries and sectors on the one hand, and the geographical location where measures are actually taken on the other. Flexibility can provide the opportunity for costs and responsibilities to be distributed equitably (greater costs for industrialised countries) while selecting those measures which reduce CO₂ most cost-effectively.
- 6 The quest for a climate policy characterised by self-direction and flexibility leads logically to a choice of market-oriented instruments. The scarcity of CO₂ emissions allowances must be reflected in prices. This can be achieved through taxes or through a system of marketable emissions permits. Combinations are also possible. The Council recommends that the option of marketable emissions permits be further explored and developed.
- 7 The Netherlands must also help develop and itself utilise possibilities for emissions trading at the international level, and for reducing emissions internationally through Joint Implementation and Clean Development projects. Special attention should be given to the possibility of emissions trading within the EU (no restrictions in Kyoto Protocol). The implementation of a substantial proportion of the Dutch Kyoto commitment by flexible instruments should be made conditional on a sufficient part of the consequential savings being invested in the necessary long-term transformation, because the costs come before the benefits. Specific agreements will have to be made in this regard.
- 8 A lengthy process involving the adoption of new instruments must take place before we get to a self-regulating system in which the measures to be taken are determined by market forces. In order to meet the Kyoto commitment the government will therefore have to direct proceedings during the next few years, and this will actually involve it in selecting options and the appropriate policy instruments. An open approach is needed in which options are also considered which fall outside the purview of the Options Document. There are two categories of options: relatively cheap, large-scale options (e.g. reductions in non-CO₂ greenhouse gases) and options which demonstrably contribute to the desired

transition in the energy economy (including certain measures in the construction, transport, power generation and energy-intensive sectors).

- 9 The Council recommends that the possibilities be investigated for the first budget period of pursuing a course comprising three interrelated components.
- a Institute a domestic system of tradeable emission permits for the so-called sheltered sectors (this would include households, in relation to their energy and petrol consumption). The permits traded will be subject to an overall emissions ceiling for the participating sectors, starting from an initial distribution of the permits. The participating sectors should be given the opportunity - for example through a system of tradeable reduction certificates - to add to their initial emissions allocation by utilising options in the non-participating sectors (i.e. the exposed sectors, insofar as these options fall outside the energy conservation covenants and the benchmarking scheme).
 - b Energy conservation covenants will be continued for the sheltered sectors not yet participating in the trading system and the exposed sectors, supplemented by well-targeted regulation and benchmarking. In principle the Council welcomes benchmarking. There is cause for concern, however, that technological progress in companies which have achieved the benchmark may flag. Furthermore, a structural divide may spring up between the efforts undertaken by the sheltered and the exposed sectors. The Council therefore suggests that a deal be made with companies which achieve the benchmark, that they should continue their efforts, in so far as economically possible.
 - c The exposed sectors must also be brought within an international system of tradeable emissions permits as quickly as possible. Even though direct emissions trading between companies at the international level is not yet possible, if trading between governments becomes a fact the government may be able to purchase extra emissions, and thus allow the exposed sectors to be brought within a ceiling. If necessary, international agreements can be made about a ceiling for specific sectors with within-sector trading, as an alternative to this.

1 Introduction

1.1 The advice requests

On 28 May 1998 the then Minister of Housing, Spatial Planning and the Environment (VROM), Mrs. M. de Boer, asked the Council for Housing, Spatial Planning and the Environment (hereafter often referred to as 'the Council') to draw up an advice in connection with the third Conference of the Parties to the Climate Treaty, for the purposes of the Climate Policy Implementation Document. This document was foreshadowed in the Third National Environmental Policy Plan and is intended to broaden and intensify policy to combat climate change. As part of the preparations for the Implementation Document, the ECN (Netherlands Energy Research Foundation) and the RIVM (National Institute of Public Health and the Environment) have drawn up a document which summarises the options for reducing the emissions of greenhouse gases and presents data in this regard¹. Several sets of options are elaborated, corresponding to different reductions and selection criteria. The advice request is appended to this advice as Annex 2. On 9 November 1998 the present Minister of Housing, Spatial Planning and the Environment, Mr. J.P. Pronk, addressed a supplementary request to the Council: that the results of the fourth Conference of the Parties to the Climate Treaty in Buenos Aires should be taken on board in the advice. He also requested the Council to organise a debate on the advice of the Council and the Options Document. This supplementary request is appended as Annex 3.

The advice requests to embrace the following topics.

- 1 The 'Options Document' and the sets of options it contains.
- 2 The extent to which the Netherlands should make use of flexible instruments (Joint Implementation, Clean Development Mechanism, emissions trading) for reasons of cost-effectiveness, the level of international support for such instruments and the impact they will have on the national reduction policy after 2012.
- 3 Appropriate policy instruments (emphasis on regulation, taxation, levies/charges or emissions trading).
- 4 Policy for achieving the -6% target, bearing in mind the need for more ambitious commitments post-2012.
- 5 Damage limitation policy if the reduction target is not achieved, such as emissions ceilings, sanctions and contingency policy.
- 6 'Climate-only' measures, such as CO₂ storage.
- 7 The results of the fourth Conference of the Parties to the Climate Treaty in Buenos Aires.

¹ The English summary of this document 'Options for Reduction of Greenhouse Gas Emissions' is available from the ECN.

The Minister requested the Council to finalise its advice before the end of 1998.

Finally, the Minister stipulated that the advisory councils of the Ministry of Agriculture, Nature Management and Fisheries, the Ministry of Transport, Public Works and Water Management and the Ministry of Economic Affairs should also be involved in advising.

1.2 Orientation of this advice

The Council views climate policy from an integrated, sustainable and long-term perspective. It considers the following three orientations crucial to a policy strategy for climate.

- The approach should fully acknowledge the global and long-term nature of the enhanced greenhouse effect and its interrelatedness with the use of fossil fuels as the motor of the international economy. The main focus must be on CO₂ emissions as the largest and most obstinate component of the problem.
- It must reconcile cost-effectiveness of the measures with an equitable distribution of the costs over countries and sectors.
- The institutional structure and instruments must exploit to the maximum the self-directing capacity of society and must be such as to command maximum public support.

1.3 Methodology and structure of this advice

This advice was drawn up in response to the Options Document, and does not contain technical or methodological assessments of individual measures. The Council has taken at face value the data contained in the Options Document. It asked two external experts to evaluate the Options Document for this advice taking as point of departure the orientations set forth in section 1.2. The results were discussed in a workshop organised by the Council² and were made use of in this advice.

The Council requested the General Energy Council ('AER'), the Council for the Rural Area ('RLG'), the Advisory Council for Research of Nature and the Environment ('RMNO'), and the Council for Transport, Public Works and Water Management ('RVW') to contribute to this advice. The AER issued a stand-alone advice on the implementation of the Kyoto Protocol on 15 July 1998³, which the Council made use of. The RMNO has made an inventory of the research needing to be carried out to support policy. The RVW and the RLG both drew up position papers on climate policy as seen from their own approaches and viewpoints.

² VROM-Raad, bundel workshop klimaatbeleid, 6 October 1998, The Hague.

³ AER: De Kyoto-afspraken, gevolgen voor Nederland op energiegebied, The Hague, July 1998.

Chapter 2 outlines briefly the climate problem and discusses the Climate Treaty, the Kyoto Protocol and the agreements made within the European Union regarding its implementation. National policy is considered in chapter 3. Policy pursued to date is sketched out and appraised, and the principles governing future policy are expounded. Chapter 4 presents the essential elements of a strategy for climate policy. Chapter 5 looks at the Options Document and the role this should play in the policy process. Chapter 6 raises the issue of the new policy instruments considered necessary by the Council.

2 Climate as an international issue

2.1 The climate problem

The enhanced greenhouse effect is caused by elevated atmospheric concentrations of a number of gases emitted by human activity, specifically CO₂ (over 60%), CH₄, N₂O, HFCs, PFCs and SF₆⁴. There have now been large cuts made under the Montreal Treaty in the production of CFCs, halons, tri, tetra and chloroform which are ozone-depleters as well as greenhouse effect enhancers. All greenhouse gases are relatively stable compounds which are very persistent and accumulate in the atmosphere, where they act to enhance the greenhouse effect in the short and long term. Because of the almost complete mixing of these gases, it does not matter for the increase in the greenhouse effect where they are emitted or where the emissions are reduced.

Since 1850 the CO₂ concentration has risen from 280 ppmv (parts per million by volume) to its present level of about 360 ppmv. This rise is caused mainly by the use of fossil fuels and changes in land use such as deforestation. Raised levels of greenhouse gases in the atmosphere increase the amount of energy incident on the earth's surface in the form of infrared radiation. This can cause climate change, which manifests itself in spatial and temporal changes in, for example, temperature, wind, solar radiation and precipitation. This can affect, among other things, food production, ecosystems, river behaviour, marine currents and sea level. The mean temperature at the earth's surface is one of the indicators of climate change. According to the IPCC⁵ there is scientific evidence to suggest that the world's climate is probably being affected by anthropogenic activity⁶.

Even if stringent measures are taken to reduce greenhouse gas emissions, considerable further global warming is likely to occur. If there is no change in policy, this warming could be considerably greater. In order to explore these matters, the IPCC developed a number of scenarios for the autonomous trend in the climate between 1990 and 2100. In the middle scenario IS92a it is assumed that CO₂ emissions will almost triple by

⁴ The six (groups of) gases are: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

⁵ In 1995 the IPCC published its Second Assessment Report. The parties to the Climate Convention accepted this report as a scientific basis for the implementation of the Climate Treaty. The IPCC reports distinguish themselves from earlier assessments by their scientific thoroughness and the acceptance they command both in scientific circles and more widely.

⁶ "....the balance of evidence suggests that there is a discernible human influence on global climate"

2100. The atmospheric concentration of CO₂ would by then exceed 700 ppmv. This would lead to a rise in average ground-level temperature of 2°C and in sea level of approximately 50 cm⁷. This scenario assumes that emissions of other greenhouse gases will also have risen considerably.

Many scientists now take the view that a temperature rise of 0.1°C per decade is manageable for mankind and for ecosystems, although there are reservations about this⁸. Ultimately the temperature rise needs to be held to 2°C. In order to guarantee this, worldwide emissions of greenhouse gases probably need to be approximately halved by 2100 relative to 1990. The industrialised countries are responsible for the lion's share of the emissions of greenhouse gases. These countries will therefore have to make a relatively large contribution to controlling the climate problem in order to allow third world countries the emissions leeway to allow for the desired rises in living standards. In order to reduce global emissions by 50%, the industrialised countries will have to reduce their emissions by approximately 80%. The Council observes that the enhanced greenhouse effect has presented the world community with a collective challenge. This challenge will mean that further strides forward will have to be made in the cooperation between nations, and it cannot be isolated from other global problems such as international security. The cooperation which is crucial for climate policy may perhaps contribute to reconciling the present contradictions between North and South and between the energy-producing and energy-consuming countries.

The ongoing economic growth linked to the use of fossil fuels leads to the release of CO₂, which is far and away the major greenhouse gas. The other emissions comprise fugitive emissions and by-products which are relatively easy to deal with.

2.2 The Climate Treaty

In 1992 the United Nations Framework Convention on the Atmosphere (Climate Treaty) was adopted in Rio de Janeiro in an attempt to address the problem of the enhanced greenhouse effect. The goal is the timely stabilisation of the concentrations of greenhouse gases in the atmosphere at a level at which ecosystems can adapt to the change in climate, food production is not jeopardised and the world economy can develop sustainably. The Treaty has now been signed and ratified by over 160 countries⁹,

⁷ IPCC 1995 gives ranges, corresponding to the lowest and highest values for climate sensitivity: an increase in temperature of 1.5 to 3.5°C and a sea level rise of 15 to 95 cm. Even after the temperature has stabilised, sea level can continue to rise for centuries.

⁸ Sluijs, J.P. van der, and W.C. Turkenburg: NMP3 Thema klimaat: een kritische analyse van het probleemveld, de beleidsdoelstellingen en de maatregelen, VROM-Raad, achtergrondstudie 004, The Hague, 1998, p. 19.

⁹ The Netherlands ratified the Treaty on 21 December 1993.

and came into force on 31 March 1994. The appropriate stabilisation level has not yet been quantified. The Climate Treaty makes a distinction between the countries (listed in Annex I of the Treaty: the 'Annex I countries'¹⁰) which will "take the lead in mitigating climate change" and other countries. These other countries are under a general obligation to minimise emissions, but the Treaty must not "impose a disproportionate or undue burden", given that their primary task is the alleviation of poverty.

It was agreed that the first step should be for the Annex I countries to identify the policy needed to ensure that emissions, either separately or collectively, can be reduced to their 1990 level by 2000. At the First Conference of the Parties to the Climate Treaty (CoP 1), held in Berlin in 1995, it was concluded that this step will not be adequate to realise the objectives of the Treaty. It transpired further that many countries will not manage to stabilise their emissions by 2000. The parties to the Treaty decided that a protocol or other legal instrument must be adopted at the Third Conference in 1997 in Kyoto which would address post-2000 emissions.

2.3 The Kyoto Protocol

At Kyoto the industrialised countries undertook to reduce their mean annual greenhouse gas emissions (in CO₂ equivalents) by an average of 5% by the period 2008-2012. The reference year is 1990 for CO₂, CH₄ and N₂O, and 1990 or 1995 for HFCs, PFCs and SF₆¹¹. This is the first mandatory and concrete objective set for global climate policy, and is the first step along the long road which the international community will have to take towards bringing the enhanced greenhouse effect under control¹². The Protocol will take effect when 55 parties have ratified it provided that these accounted for at least 55% of the 1990 emissions of the Annex I countries. This means that the US does not have the sole power of veto, but two major parties could block the Protocol.

The Kyoto Protocol focuses on the net emissions of greenhouse gases. CO₂ can be removed from the atmosphere by trees which convert it into wood during their growth. It can be released again by deforestation. Only the net change in the carbon pool in 2008-2012 as a result of afforestation, reforestation and deforestation since 1990 will count under the Protocol.

¹⁰ For the list see: Second Chamber, 1995-1996 session, 24 785, nos. 1-2. Vervolgnota Klimaatverandering, p. 96.

¹¹ Economic growth is expected, in the "business as usual" scenario, to cause global emissions in 2012 to be 25% higher than in 1990.

¹² VROM-Raad: Advies over het derde Nationaal Milieubeleidsplan, Advies 007, The Hague, 1998.

There are disparities between countries and groups of countries with regard to the agreed reductions. The EU as a whole is required, according to CoP 3, to achieve an 8% reduction in the total emissions of the six relevant greenhouse gases. If the EU achieves this target then the individual member states will also have discharged their responsibilities. This means that they are free to redistribute the reductions amongst themselves. The protocol also permits other Annex I countries to form blocs in this way. Other countries have not yet taken on any commitments¹³.

Countries with commitments will be able to trade emissions permits. 'Joint Implementation' (JI) is also permitted, whereby one country carries out projects in another country subject to a ceiling, with the emission reduction being divided by mutual agreement. Finally, they can also carry out projects in developing countries (Clean Development Mechanism: CDM), with the emissions reductions made after 2000 being credited. It was intended that the conditions applying to each of these three types of so-called flexible instrument would be determined during the Buenos Aires Conference (CoP 4), but these decisions were postponed there until 2000.

2.4 Burden-sharing in the EU

The negotiating position of the EU at the third Conference of the Parties in Kyoto was a reduction of 15% (CO₂, CH₄ and N₂O) by 2010 relative to 1990, with a non-uniform distribution over member states, providing that other industrialised countries accepted similar commitments. The agreed basis for sharing the burden within the EU, as proposed at Kyoto, reflects differences in level of development, energy generation structure, climate and industrial structure (see table 1). The Netherlands declared its willingness to accept a reduction of 10% in 2010 relative to 1990¹⁴. The agreement actually made at Kyoto meant, for the EU, a reduction commitment of 8% for the six gases. The EU Environment Council reached a decision in Luxembourg in June 1998 on how the EU burden will be shared between member states. The initial position of the Netherlands was that it would accept a conditional reduction of 6%. In the event the Netherlands accepted an unconditional reduction of 6%¹⁵. The Dutch condition relating to the introduction of a European energy tax is not mentioned in the minutes of the Environment Council, but they do confirm the crucial importance of rapid, substantive progress with

¹³ The Kyoto Protocol does not envisage the possibility that countries will adopt emissions ceilings on a voluntary basis. During CoP 4, however, Argentina and Kazakhstan announced that they would voluntarily limit the growth in their emissions. It is not clear whether they also intend to seek admission to Annex B of the Kyoto Protocol.

¹⁴ The "Kyoto letter". Second Chamber, 1997-98 Session, 24 785 no. 4.

¹⁵ Second Chamber, 1997-98 Session, 21 501-08, no. 78. Environment Council.

effective, coordinated policies and measures at Community level. A general evaluation will be made of progress in this regard in 2002. The government considers the agreed Dutch target a disproportionate contribution to the EU total given the considerable efforts the Netherlands will need to make just to stabilise its emissions¹⁶.

Of relevance for the posture of the Netherlands within the EU is that the 1998 Coalition Agreement states that the Netherlands will emit an average 6% less greenhouse gases in 2008-2012 than in 1990. The realisation of this reduction by the Netherlands is made conditional, however. These conditions are: ratification of the Climate Treaty by the US and Japan, the adoption of community-wide measures, the introduction of a substantial energy tax by the EU by 2002 at the latest, also for large-scale users, and adequate latitude (about 50%) for the adoption of flexible instruments¹⁷.

¹⁶ Second Chamber, 1997-98 Session, 21 501-08, no. 77. Environment Council.

¹⁷ Coalition Agreement 1998, pp. 52-53. It is unclear whether this 50% relates to the reduction relative to the projected value or to the absolute reduction relative to 1990. The implicit assumption, at any rate in the Netherlands, is that it is the former.

member state	proposal of Dutch presidency	negotiated result March 1997	June 1998 share
	CO ₂ , CH ₄ , N ₂ O	CO ₂ , CH ₄ , N ₂ O	six gases
Austria	-25	-25	-13
Belgium	-15	-10	-7,5
Denmark	-25	-25	-21
Finland	-10	0	0
France	-5	0	0
Germany	-30	-25	-21
Greece	+5	+30	+25
Ireland	+5	+15	+13
Italy	-10	-7	-6,5
Luxembourg	-40	-30	-28
Netherlands	-10	-10	-6
Portugal	+25	+45	+27
Spain	+15	+17	+15
Sweden	+5	+5	+4
United Kingdom	-20	-10	-12,5
Total EU	-15	-10	-8,0

Table 1: Proposal of Dutch presidency, agreed EU negotiating position for CoP 3 and the final distribution agreed at Luxembourg, relative to 1990, from Milieu 1998/5. There are also large differences in the absolute magnitude of the reduction targets given the major divergencies in the sizes of the economies, fuel mix, sectoral structure, the measures already taken by the different member states pre-1990 and post-1990. In some countries emissions in 1997 were less than in 1990, because of economic recession or a restructuring of the energy production sector. The targets for the Mediterranean countries are relatively modest, despite the abundance of opportunities for low-cost emissions reduction. The targets are quite onerous for Italy, the Netherlands and Denmark.

3 National policy

3.1 Present climate policy

Until Kyoto, Dutch climate policy was to reduce emissions of CO₂, CH₄ and N₂O by 3%, 10% and 10% respectively by 2000 relative to 1990¹⁸. For the post-2000 period there was 'inter alia' an international initiative for a reduction of an average of 1-2% per year. Policy has until now been directed towards: enhancing energy efficiency in production and space heating, promoting the introduction of renewable energy sources, reducing demand for energy by small-scale users and increasing the absorption of CO₂ in new forests. Since 1996 a further NLG 1.5 billion has been made available for climate policy, a part of which for Joint Implementation. In addition, plans were announced in the Third National Environmental Policy Plan (NEPP3) to increase energy taxes by NLG 3.4 billion, to draw up a separate reduction plan for the other greenhouse gases and to take measures to curb car-use. In order to achieve the climate objectives announced, the Dutch government is employing a range of policy instruments, including agreements, regulation, subsidies, tax concessions, regulatory taxes, public information and demonstration projects (see box 1)¹⁹.

The Environmental Programme 1999-2002²⁰ describes the measures which have already been decided upon. These are summarised in box 2. It can be seen that these represent an escalation of policy, although making use of broadly the same instruments as in the preceding period.

3.2 Performance to date and forecast on basis of present policy

The results achieved by Dutch climate policy are trailing far behind the objectives for 2000. Although the emissions of CH₄ during 1990-1997, for example, fell more than expected (see table 2), the emissions of all greenhouse gases taken together did not fall but in fact rose by about 7%. This rise was mainly the result of growth in industrial production in general and in particular the steep growth in the energy-intensive sectors such as electricity supply, chemicals and freight transport. The growth in consumption also plays a role, and particularly the growth in car use and the 'thinning out' of households. Energy-saving behaviour was below target.

¹⁸ Second Chamber, 1995-1996 Session, 24 785, nos. 1-2. Vervolgnota Klimaatverandering.

¹⁹ Second Chamber, 1997-1998 Session, 25 887, no. 1. Nationaal Milieubeleidsplan 3.

²⁰ Second Chamber, 1998-1999 Session, 26 205, nos. 1-2. Milieuprogramma 1999-2002.

Box 1: Main elements of Dutch climate and energy conservation policy in the Third National Environmental Policy Plan

- Improve efficiency in production and stimulate combined heat and power (through agreements with industry, the CO₂ covenant with the electricity producers, and various tax incentive schemes such as accelerated depreciation for environmental investments and soon, perhaps, energy efficiency benchmarking).
- Improve efficiency of space heating (through energy consumption norms, subsidies, sustainable building, demonstration and model projects).
- Improve the energy efficiency of vehicles (through agreements and regulations at European level).
- Improve the efficiency of household appliances (through the Energy Conservation (Appliances) Act).
- Step up energy recovery from waste.
- Foster renewable energy sources (by promoting research, demonstration and pilot projects and through subsidies and tax concessions).
- Increased carbon sequestration through afforestation (both in the Netherlands and abroad through the FACE programme).
- Reduce demand amongst retail users (through the energy tax and public information).
- Curb traffic growth and improve driving behaviour (through regulations, discriminatory infrastructural facilities, tax concessions and public information).

Box 2: Climate policy already planned in the Environmental Programme 1999-2002

- A second tranche of NLG 750 million has been made available for Joint Implementation projects, a reduction plan for other greenhouse gases, CO₂ sequestration through afforestation in the Netherlands, energy conservation, transport and the promotion of new and clean fuels.
- CO₂ reduction plan providing NLG 1 billion in subsidies for, 'inter alia', utilising waste heat in industry, glass horticulture and the built environment, heat pumps, combined heat and power systems, renewable energy, and breakthrough industrial technologies.
- A special fund of NLG 400 million has been established to boost renewable energy to 2010.
- Since 1998 'green' electricity has benefited from a zero rating for the purposes of the regulatory energy tax.
- Continue information campaign on the greenhouse effect designed to build awareness and understanding of the need for energy conservation and renewable energy sources.

gas	share	main sectors	1997	objective 2000	forecast 2002
CO ₂	75%	industry and energy sector	+10.8%	-3%	+16 to 20%
CH ₄	10%	agriculture and landfills	-14%	-10%	-29 to -27%
N ₂ O	10%	industry and agriculture	+9%	-10%	+19 to 24%
six gases			+6.7%	-	

Table 2: Shares of the total Dutch greenhouse gas emissions for the three main greenhouse gases separately and the total for the six gases falling under the Kyoto Protocol, and actual emissions, objectives and forecast growth in emissions of greenhouse gases relative to 1990²¹.

Table 3 shows the impact these differences have on energy consumption. Over the period 1991-1995, for example, there was an overestimation of the improvement in energy efficiency (mean 1.0% rather than 1.7% p.a.), an underestimation of the proportion of energy-intensive activities as a result of structural changes (0.2% growth rather than 0.1% reduction), although this trend appears to have been reversed in recent years. As a result of all this, energy consumption grew by 1.2% p.a. during the period 1991-1995. Over the same period the GDP grew by a mean 2% p.a. There was therefore a fall in the energy-intensiveness of the Dutch economy between 1991 and 1995, but there is no sign of a 'decoupling' of these parameters from economic growth.

In the past, policy-makers have often been over-optimistic about CO₂ emissions²². There are four reasons for this, as follows.

Firstly, it is too often assumed that the measures will all be implemented in unmodified form. In practice, however, we see that some measures are rejected, some are modified and some postponed.

Secondly, lead times for climate and energy policy activities generally tend to be many years. It would be desirable to accelerate these, but careful decision-making on implementation can be time-consuming. Account must be taken of the long lead times involved. The Council recommends that the overall decision-making process on climate policy to the year 2010 be completed during the present term-of-office of this government so that there is a reasonable chance that it can be implemented by 2008.

²¹ RIVM: Milieubalans 98, Samsom H.D. Tjeenk Willink, Alphen aan den Rijn, 1998.

²² Examples of proposed policy which has not produced the expected effect include road pricing (repeatedly postponed), reduction in the speed limit (compliance below expectation), closed-loop three-way catalysts (degradation of performance with age) and the Energy Conservation (Appliances) Act (only rarely implemented).

Thirdly, over-optimism about the effectiveness of instruments must be guarded against. It has often hitherto been the case that part of the target group has been difficult to reach, success in changing behaviour was disappointing or there was an unexpected rebound effect. The Council therefore recommends that the outreach to the target group and the effect of the measure be better studied.

And fourthly, a whole variety of exogenous factors can often outweigh the actual measures. The fall in the price of crude oil, for example, has meant that, despite various increases in the duty on petrol, forecourt prices have declined in real terms.

The Council is therefore in agreement with the analysis and conclusions of the Advisory Council on Government Policy of some years ago: "It can be deduced from the CPB calculations that present energy conservation policy is much less effective than was assumed in the Policy Document on Energy Conservation. [As a result of this] energy consumption in 2000 will be 10% higher in 2000 than in 1989 [...]. It can be concluded from this that present policy is inadequate to achieve the objectives. This prompts the question as to how the instruments can be improved. [...] The costs are high and vary variable, and this militates in favour of financial instruments."²³

parameter (trend in % p.a.)	actual 1986-1990	objective 1991-1995	actual 1991-1995	forecast, GC 1996-2020
GDP	+3.0	+1.9	+2.0	+3.3
energy-intensiveness	-0.7	-1.8	-0.8	-1.9
<i>structural effect</i>	<i>+0.3</i>	<i>-0.1</i>	<i>+0.2</i>	<i>-0.6</i>
<i>conservation</i>	<i>-1.0</i>	<i>-1.7</i>	<i>-1.0</i>	<i>-1.3</i>
energy consumption	+2.3	+0.1	+1.2	+1.4

Table 3: Actual results, objectives and forecast energy consumption in the Netherlands, and its determinants²⁴.

²³ Advisory Council on Government Policy: Milieubeleid, Strategie, instrumenten en handhaafbaarheid. Reports to Government, no. 41, The Hague, 1992, p 155.

²⁴ Source: CPB.

CO₂ intensiveness of the economy

The Council here examines the issue of energy-intensiveness because CO₂ accounts for by far the largest part of the total emissions of greenhouse gases in the Netherlands²⁵. CO₂ emissions are strongly related to economic growth. The 1998 Coalition Agreement argues forcefully the need for decoupling CO₂ from economic growth²⁶. Although there are substantial opportunities for reducing the emissions of the other greenhouse gases in the period to 2010, and thus lightening the burden falling on CO₂, these will ultimately be exhausted.

CO₂ emissions rose by about 11% between 1990 and 1997. The GC scenario assumes the economy will continue to grow at 3.3% p.a. until 2020²⁷. Compounded to 2010 this is equivalent to 52%. If the carbon-intensiveness of the economy were to remain constant, CO₂ emissions would be 74% higher than in 1990. If the Netherlands seeks to reduce the emissions of each greenhouse gas by 6% by 2010 then on this scenario a reduction in the carbon intensiveness of 4.4% p.a. would be needed between 1997 and 2010. In historical terms this would be a remarkable performance over a period of this length. It is questionable whether this is feasible given recent experience and the theoretical possibilities.

During the 1960s the CO₂-intensiveness²⁸ of the Dutch economy rose by an average of 3.8% p.a. After the oil crises the CO₂-intensiveness of the Dutch economy assumed a downward trend, but this flattened out during the 1990s (see figure 1).

The CO₂-intensiveness can be reduced by improving energy efficiency, by using energy sources and technologies which emit less CO₂ and by structural changes in our production and consumption patterns. The expectations of the government with regard to each of these three categories look optimistic. It is assumed in the Policy Document on Energy Conservation that energy-efficiency can be improved by 2% p.a.²⁹. While this may be possible, it must be appreciated that seen in an international and historical per-

²⁵ In 1995 CO₂ accounted for 180 Mtons out of total greenhouse emissions of 238 Mtons.

²⁶ "a decoupling has been achieved for almost all environmental problems: pollution is reducing while production and consumption grow. This decoupling must be maintained. If we are to make the problem of energy consumption and climate change less intractable, these should also be decoupled from economic growth. But it must be established that this applies to all countries."

²⁷ If the CO₂ intensiveness of the Dutch economy remains constant then CO₂ emissions will also increase at 3.3% p.a. under the GC scenario.

²⁸ i.e. the CO₂ emissions per unit GDP (constant prices).

²⁹ It is indicated in this exploratory document of the Ministry of Economic Affairs that energy efficiency can be increased by between 1.6-1.7% and 2% p.a. by investing a sum of between NLG 2.7 and 3.1 billion p.a. spread across all the consuming sectors.

spective it would be an outstanding performance to improve energy efficiency by 2% p.a. over a long period³⁰.

The policy objective of increasing the share of renewable energy sources by 0.4% p.a. can also be considered extremely ambitious³¹. Finally the GC scenario assumes a shift in the structure of the economy will lead to a reduction in carbon-intensiveness of 0.6% p.a.³², which seen against developments over the last 10 years represents a significant reversal of past trends, even though such improvements have been achieved in the last few years.

Putting these three forecasts together, it can be concluded that on the most optimistic assumptions with regard to these three factors, CO₂-intensiveness in the Netherlands will reduce by 3% per year³³, i.e. considerably less than the 4.4% per year mentioned above. In order to bridge this gap, it will be necessary in putting together an effective package of measures to look at other CO₂ options, such as a shift towards low-

carbon or no-carbon fuels (including imported), CO₂ sequestration through afforestation, capture and underground storage of CO₂, emissions reductions in other countries or the purchase of emissions permits from other countries.

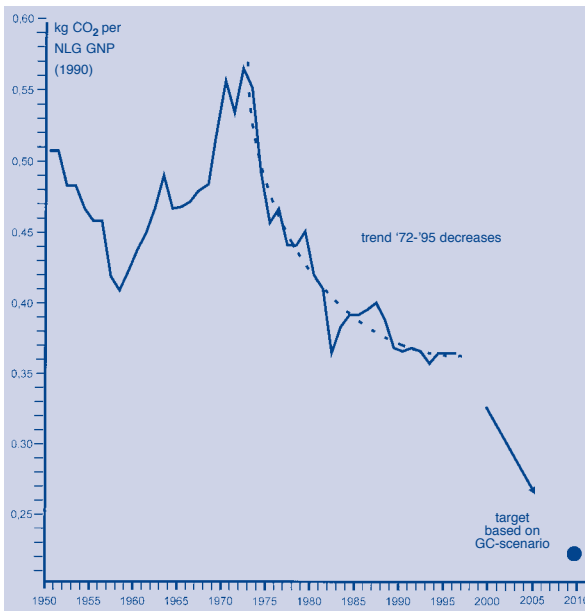


Figure 1: Trend in CO₂-intensiveness of the Dutch economy.

Source: Utrecht University, Department of Science and Society

³⁰ The IIASA study 'Global Energy Perspectives' published by the World Energy Council, London, 1998, mentions an increase in energy efficiency of 0.8% - 1.4% p.a. as feasible.

³¹ The present contribution of renewable sources is about 1%. The objective of 10% for 2020 implies a mean increase of 0.4% p.a.

³² This so-called structural effect is in part the consequence of a strong tertiarisation in the economy driven by rapid developments in IT.

³³ Sluijs, J.P. van der, and W.C. Turkenburg: NMP3 Thema klimaat: een kritische analyse van het probleemveld, de beleidsdoelstellingen en de maatregelen, VROM-Raad, achtergrondstudie 004, The Hague, 1998.

4 Towards a long-term strategy

4.1 General characteristics of climate problem and policy

Climate change is a long-term problem. Ultimately, global annual emissions of greenhouse gases need to be reduced to about 50% below their 1990 level and those in industrialised countries to about 80% below their 1990 emissions, by the end of the next century. The sheer magnitude of this task becomes plain when account is taken of the global economic growth likely to occur during the 21st century. The commitments entered into by Europe at Kyoto, and their translation to the commitments for the Netherlands, which involve reducing the emissions in 2008-2012 to 6% below their 1990 level, are therefore only a first step.

The Council therefore considers that the measures to be taken for 2010 must be seen in the context of needing to provide for the development of a long-term policy.

There are numerous uncertainties about both the effects of the enhanced greenhouse effect and the potential, cost-effectiveness and side-effects of the measures which will have to be taken. Furthermore the measures will have to be taken soon, while the effects will only reveal themselves in full in the very long term. Climate policy therefore needs to be built on a broad consensus.

The Council considers that a great deal of communications and debate are needed about the risks and the uncertainties associated with the climate problem, and about the sensible way to proceed in the face of these risks.

CO₂ lies at the heart of the problem. It is the greenhouse gas with the largest emissions, and more than 60% of the increase in the greenhouse effect is attributable to it. It is also the most intractable element of the problem, because it is released by the use of fossil fuels which is linked to innumerable production and consumption processes. The conclusion is inescapable that radical changes will be needed in our energy economy in order to meet the CO₂ emissions objective for the longer term.

Firstly, we will need to greatly reduce material and energy usage per unit product, partly through changes in the energy infrastructure which exploit the new requirements and opportunities: the development and application of radical new technologies in industry, high-performance insulation of housing, decentralised energy conversion systems, heat pumps, micro-CHP plants, integrated energy supply systems on industrial estates and new vehicle technology which makes use of fuel cells. Such developments will however require major technological progress and innovation in the energy infrastruc-

ture, if necessary linked to technical changes along entire production cycles. Enabling actions will need to be taken already within the present term-of-office of the government, for example related to the scale, technologies and fuels for energy supply systems in the built environment.

Secondly, the rate of introduction of renewable energy sources will have to be greatly accelerated.

These are the two pillars which have hitherto underpinned policy. But even if policy efforts are greatly intensified (in which, for example, the import of biomass and low-carbon electricity generation can play an important part), these two options will not have sufficient effect (see section 3.2). Other measures will be needed.

Thirdly, CO₂ emissions can be reduced by changing the sectoral structure of the economy. Structural shifts of this kind occur largely autonomously, being affected by developments on the world market, international trade flows and changes in consumption patterns (e.g. more services and quality products). Structural shifts are expected to contribute 0.6% per year up to 2010³⁴. It is an exceptionally difficult matter to influence the sectoral structure of a small, open economy, and such policy hardly appears a realistic option in the present political climate. From an international climate point-of-view, policy should focus on the carbon-intensiveness of consumption patterns. The most indicated instruments by which government can influence these are those which affect prices, e.g. taxes and tradeable emission permits.

Fourthly, substitution by low-carbon fuels (e.g. natural gas) can make a contribution in the shorter term.

And finally, it is also necessary that where fossil fuels are being used, the CO₂ emissions should be reduced, since for the time being fossil fuels will remain a major source. Work will therefore be needed on decarbonising processes where fossil fuels are used, if only because the use of oil and coal will inevitably continue to increase in large sections of the world. Relevant in this regard are the capture, storage and sometimes the recycling of CO₂. In particular consideration must be given to sound and secure techniques for the underground storage of CO₂. Although this option may seem merely palliative, the decarbonisation of fossil fuels to produce hydrogen fits in well with the transition to a hydrogen-based energy system and the widespread use of clean, energy-efficient fuel cells.

³⁴ The Dutch specialisation in energy-intensive sectors is by definition linked with relatively energy-intensive economies elsewhere, and does not present a problem in the context of the international climate problem.

Given the present state of the art the Council does not regard nuclear energy as an attractive solution, because of the associated safety, waste and proliferation problems. These are amongst the reasons why society is unable to muster the requisite level of support for the nuclear option.

The Council is aware that the realisation of these elements depends to a great extent on technological innovation. The Council agrees with the WRR (Advisory Council on Government Policy) that new technology can also help to modify behaviour. “Social regulation (public information, covenants) can play a role in bringing about changes in behaviour [related to energy conservation], particularly where the costs are low. But these instruments are not enough to induce emitters to take measures with high investment costs, particularly in a situation in which there are many sources. Technology policy can help to reduce these costs³⁵.”

Uncertainties regarding future technological developments and their application are still very great. A policy directed at technical innovation and which also creates the infrastructural and institutional conditions in which the new technologies will be applied is indispensable. This applies, for example, to energy supply systems in the built environment and to transport.

The Council is of the opinion that in meeting the reduction objectives for 2010, major progress must also be made towards the technological, infrastructural and institutional renewal which is also necessary in the longer term to move towards a low CO₂ energy system. This calls for an open approach, in which options need to be considered which fall outside the purview of the Options Document because they appear to bring little benefit in the shorter term or are costly, but which have a distinct potential for the longer term.

It is clear that climate policy costs money. These costs will lie between NLG 1 and 4 billion per year in the year 2010 if we are to comply with the Kyoto commitment. If a more ambitious reduction objective is set the costs will, on the basis of present data, rise steeply³⁶.

Because the costs are high, policy-makers are compelled to have close regard to cost-effectiveness. But not at any cost. Clearly the costs come before the benefits. It is

³⁵ Advisory Council on Government Policy: Milieubeleid, strategie, instrumenten en handhaafbaarheid. Reports to Government, no 41, The Hague, 1992, pp. 155-156.

³⁶ Central Planning Bureau: Centraal Economisch Plan 1998, The Hague, 1998. CPB Working Document 106, The Hague. 1998.

sensible to invest in promising long-term options if society can thereby reduce its emissions of, in particular, CO₂ more easily at a later stage. Investment of this kind is also important because structural-technical measures are likely to have a more durable effect than measures aimed primarily at changing behaviour. This applies particularly where the behavioural changes are imposed by regulations or are not accompanied by the corresponding technical, institutional and infrastructural modifications.

In the Council's view, options should not only be evaluated on the basis of their short-term effectiveness. The Council advises the government to devote explicit attention in the Climate Policy Implementation Document to investing in the future, and to look at developments within a time-scale which extends considerably beyond 2010.

The Council observes that it is difficult to determine in advance the effectiveness of climate policy. So far the main thrust of this policy has been to improve energy efficiency. In the past policy has often proved with hindsight to have fallen short of expectations (see section 3.2). Even if the government is in a position to select the most obviously cost-effective emissions abatement options, it does not have a good enough overview of the technical and economic possibilities to be able to steer the transition process itself. Furthermore in a growing economy CO₂ emissions depend on the differential growth of the different sectors of the economy, which the government has little influence over.

Increasing regulation in all kinds of different areas is not an appropriate response to this uncertainty. The area is too broad for this, the necessary changes too sweeping and the international dimension too great. But government policy designed to bring about a comprehensive transition to a CO₂-extensive energy economy can only be sufficiently effective if the importance of this objective is felt by all the parties involved (companies, other institutions, consumers), or even better, if CO₂ reduction is made to be in their interests. These parties, which have a much better understanding of opportunities for innovation, of costs and of applications than the government, will then identify and select the relevant options themselves. To this end it must be made attractive for the protagonists to develop and apply innovative solutions. It is therefore essential that climate policy should be based much more than hitherto on market-based instruments. It must be made economically attractive for these protagonists to take cost-effective measures and develop new options. In this regard there are two different routes which can be taken: that of the energy/carbon tax or that of allocating the available emissions space over sectors and companies by means of tradeable emissions permits.

Both of these approaches tend to cause the marginal costs of unit reduction of CO₂ to converge to the same level everywhere. The Council in fact advocates a market-based system of this kind not primarily because of the potential reduction of costs in the short term, but more because it will create the institutional and economic conditions for ongoing reductions in greenhouse gases in the longer term. It provides a means of dividing the costs fairly between the market partners, a necessary precondition for building ample support for climate policy. The benefits of a market-based approach increase rapidly the more sectors and countries that it embraces.

The Council recommends that a much more self-regulative model for implementing climate policy should apply, driven by market-oriented instruments. A choice will have to be made between extending the system of taxing fuels and/or greenhouse gases, or building a market for tradeable emission permits, both nationally and internationally. A combination of the two might also be possible, with the first alternative applying (in the first place) mainly to one part of the economy and the second to another part. In chapter 6 the Council looks further at new instruments for climate policy.

The Council also considers that the climate problem should also be influencing government policy in other areas. The Council recently advised, for example, that ICES funds should be made available in order to promote structural changes in the economy towards an information society and a service-based economy³⁷.

4.2 International aspects of the climate problem

The climate problem is global in nature. In physical terms the problem is independent of the geographical locations of the emissions. The locations in which the reductions should be made can therefore be chosen on completely different criteria. The developed countries have a major responsibility for the climate problem, however. These countries have accounted for most of the emissions of greenhouse gases since the industrial revolution, now accumulated in the atmosphere. Furthermore if developing countries were expected to contribute proportionately to the reduction objective they would be left insufficient space for growth and improved living standards. In the Council's view the provision in the Climate Treaty that the industrialised countries, with their high living standards and technological capacity, should make a relatively large contribution to solving the greenhouse problem is fair and right.

High emissions of greenhouse gases per inhabitant, as in the Netherlands, in no way implies that these should be reduced to the European or world mean. The place in

³⁷ VROM-Raad: Naar een duurzamer ruimtelijk-economische structuur. Advies 009, The Hague 1998.

which a reduction is achieved is, as we saw earlier, not relevant in climate change terms. This fact provides policy-makers with some latitude which is significant for two reasons.

Firstly, because there are substantial between-country differences in the costs of CO₂ reduction measures. If, for example, the OECD countries were to meet their commitments by taking measures where these are least costly - in the OECD area as a whole rather than each in their own country - then total costs would work out 40-50% lower³⁸. Moreover this is a highly dynamic situation. The differences in reduction costs per ton of greenhouse gas are changing rapidly over time because of between-country divergencies in incomes growth, economic structure and technical development. Fixing national ceilings for a fairly long period can run counter to this dynamic, and may eventually become difficult to maintain.

And secondly, because national energy consumption is affected by the international division of labour. In the Netherlands, for example, export-oriented, energy-intensive industry accounts for a major share of the energy consumption. In 1997, 22% of the CO₂ emissions related to net exports³⁹. Specialisation of this type is not a problem in climate terms provided a high carbon-efficiency applies. Indeed, energy-intensive production should be effected in those places where it gives rise to the least emissions⁴⁰.

A high degree of energy efficiency is needed for this, and this is more likely where there is specialisation in energy-intensive activities⁴¹. This is recognised, up to a point, in the way that commitments agreed under international climate policy have been allocated between countries, because the agreed reductions are related to emissions levels of 1990. But national ceilings, once set, can inhibit further specialisation in a dynamic global economy. The higher the production in these - export-oriented - sectors, the lar-

³⁸ Post-Kyoto: Effecten op het Klimaatbeleid van de Europese Unie, ECN-C-98-040, June 1998.

For the EU as a whole the CPB estimates a higher figure. Centraal Economisch Plan 1998, Chapter IV, De economische consequenties van Kyoto, The Hague, 1998.

³⁹ Buiten, G. and M. de Haan, ESB, 29-09-98, p. 727. The CO₂ emissions associated with the production of exports amounted in 1997 to 138 Mtons. The emissions in producing countries associated with Dutch imports were 92 Mtons. The balance of 46 Mtons represents 22% of the total Dutch emissions of 211 Mtons CO₂.

⁴⁰ An aluminium factory will be carbon-efficient, for example, if the electricity it consumes is supplied from the low-carbon generation of electricity (whether domestic or imported) in the country concerned.

⁴¹ To avoid misunderstandings: we are referring here to a high proportion of the economy in energy-intensive production compared with other countries. Whether this specialisation is also dominant in the sectoral structure of the country concerned or has a higher than average growth is an entirely different matter. A specialisation of this kind can coexist perfectly well with a specialisation in agriculture, or with a further tertiarisation of the economy. These remarks should not be read as a plea for such a specialisation in the Netherlands.

ger the contribution to the emissions total in the country in which this production takes place. Where fixed national ceilings apply, the dilemma arises as to whether the domestic sectors should make additional reductions in emissions, or the emissions of the export-oriented sectors should be curbed, with the attendant risks of changes in trade flows and the relocation of production. The latter can actually work out to be a less costly solution than retaining these activities at all costs. Furthermore there is a danger that actions which spare the energy-intensive sectors will stimulate production growth in those sectors. This does not alter the fact, however, that the relocation of these activities - which must in any case be a costly matter - will only be beneficial in international climate terms if the emissions per unit product are lower in the country to which relocation occurs. Specialisation in energy-intensive sectors such as the steel and aluminium industries, petrochemicals, sea and air transport⁴², which form part of a global market, does not sit easily with a system of national CO₂ ceilings to be met within national frontiers.

Both of these considerations argue for allowing countries the possibility of effecting reductions in other countries, or of redistributing the emissions space by inter-country, and possibly inter-company, trading.

The Council considers that any distribution of reductions between countries must properly satisfy the requirement of international equity, and endorses in this connection a heavier burden for the industrialised West. It also emphasises that the responsibility of countries to reduce emissions should not necessarily have to be met exclusively within their own frontiers. This responsibility relates primarily to their share of the financial and technological efforts to convert to a low-carbon energy economy. It therefore applauds the incorporation in the Kyoto Protocol of flexible mechanisms. This will encourage measures to be taken which are cost-effective in international terms and will not unnecessarily hamper international specialisation (including in energy-intensive industry).

The share of the reduction burden agreed for the Netherlands at the EU level is a political fact. The Netherlands carries a heavy burden compared with other countries given our relative specialisation in energy-intensive sectors, the efforts made during the 1980s and, above all, the switch to lower-carbon fuels such as natural gas already effected in an earlier period. Countries such as Germany and the UK are still in a position to put this relatively cheap option into effect. The Council supports the view that the target

⁴² In the case of sea and air transport, it is not only in an economic sense but also in physical terms that the emissions occur outside the territory of individual countries, and for the moment these fall outside the scope of the Kyoto Protocol despite their relevance for climate policy.

would be made considerably simpler if a European climate policy could be agreed, the main elements of which would be: a European energy tax, also for large-scale users - or, an alternative added by the Council, a system of tradeable emission permits - standards for vehicle engines and adequate provision for the use of flexible instruments in and between member states. The Netherlands is right to strive for a European policy given the EU target as a whole. But by retrospectively placing conditions, in the Coalition Agreement, on the 6% reduction, the Netherlands is jeopardising its credibility. The Council considers that the government, in formulating its own policy, should assume that these conditions will also be met.

5 Assessment of the Options Document

5.1 The Options Document

The emissions of greenhouse gases in 2010 will, if developments follow the Central Planning Bureau GC scenario, be some 50 million tons CO₂-equivalent higher than needed by the Netherlands to comply with the Kyoto Protocol. As part of the preparations for the Climate Policy Implementation Document, the government asked the ECN and the RIVM to draw up a list of the measures which could be taken by the Netherlands to meet these commitments. The so-called Options Document⁴³ which resulted confines itself to options which meet the following requirements:

- adequate data available to these institutes,
- adequate instruments available to implement them,
- adequate potential to contribute to 2010 target,
- adequately cost-effective.

The Options Document provides a detailed picture, broken down into domestic options (energy conservation in the transport sector and in other sectors, renewable energy, modifications in the centralised power generation system, other greenhouse gases and the sequestration of CO₂) and in other countries through ‘flexible instruments’. The 61 options, which if implemented would together reduce emissions by over 70 Mtons, would be more than enough to meet the Kyoto commitments. An estimate is made of the cost of each option, and the instruments by which the measures might be realised are discussed. The options are then ranked by cost-effectiveness on the basis of costs to the end-user. Finally, a sensitivity analysis is carried out to see whether the adoption of different criteria, for example the contribution in the longer term or national costs and benefits, would result in significantly different sets of measures being identified. This is only the case to a limited extent because in order to achieve a reduction of 50 Mtons, the bulk of the measures would have to be implemented anyway.

At the request of the Minister, the Council has considered the significance of the Options Document in designing an adequate climate policy. The Council does not regard it as its task to assess the merits of individual options, but rather concentrated on the question: “Are the findings of the Options Document adequate to allow a strategy for climate policy to be developed in the Implementation Document, which also offers good

⁴³ Beeldman, M., M.G.M. Harmelink et al.: Optiedocument voor emissiereductie van broeikasgassen, inventarisatie in het kader van de Uitvoeringsnota Klimaatbeleid, ECN/RIVM, Petten, 1998.

prospects for the longer term?”. It was assisted in this task by two experts, each of whom evaluated the Options Document in relation to this question⁴⁴. The criteria adopted by the Council in this regard are the points outlined in section 4.2.

5.2 Assessment of the Options Document

The Council would like to begin by observing that in its view the institutes which drew up the Options Document have carried out their assignment painstakingly, and this is reflected in the final result. The information will be very useful in drawing up policy. The Council nevertheless takes the view that policy cannot be determined by simply choosing a set of measures from the Options Document on the basis of the ranking given, such that the target will be met. This would ignore the following qualifications which the Council has in regard to the Options Document.

- The GC scenario is a reasonable choice for the Options Document. It should be realised, however, that this does not constitute a maximum estimate.
- There is uncertainty as to the costs of the various options.
- The presented list possesses too few options mainly effective in the longer term.
- The options are ranked according to an inappropriate cost criterion.

The Council considers these four points in further detail below.

The size of the reduction

The emissions in the year 2010 were calculated on the assumption that the GC scenario is realised. On this basis it is concluded in the Options Document that in order to comply with Kyoto the Netherlands would need to find additional reductions in emissions of about 50 Mtons. The Council considers this a reasonable assumption. The GC scenario contains both assumptions which are quite optimistic in relation to climate policy, e.g. in regard to energy prices and that energy efficiency will increase by 1.6% per year, as well as assumptions which are quite conservative, such as a high growth rate for GDP, which in itself increases energy consumption. There is a relationship between these two assumptions. Strong growth in the Netherlands, for example, is related to strong growth of the world market and with the speed of technological development, in particular in information and communications technology. A related trend is the tertiarisation of the economy and the shift to a more service-oriented economy, which is also occurring *within* the industrial sectors. This shift is related to socio-cultural developments. Also, high growth worldwide will promote energy efficiency because of the higher rate of technological development and replacement investment. In addition, higher global growth in the world market will tend to keep energy prices buoyant. Against this background, the calculated additional emissions reduction requirement appears reason-

⁴⁴ VROM-Raad, Bundel workshop klimaatbeleid, 6 October 1998, The Hague.

ble. It is not a maximum estimate, however, and if this set of interrelated assumptions proves to be optimistic, the emissions gap will be more than 50 Mtons⁴⁵, and climate policy will become more difficult and more costly.

Uncertainties as to the costs of the options

The Council thinks that the uncertainty attaching to the costs of the options is considerably greater than the Options Document gives to understand. On one hand the reduction in the cost of solar cells and the estimated price of imported biofuels appears too optimistic. On the other hand the costs of existing technologies may fall as a result of further technological progress, scale-up and the learning effect. Costs will also be affected by developments in the price of oil. If this should prove to be structurally lower than assumed in the Options Document then the costs of various options will rise. If options are going to be ranked by cost-effectiveness, it would be wise to explore the effects of uncertainty in the prices.

Effectiveness in the longer term

In section 4.2 the Council argued that priority should be given within the term-of-office of the present government to the policy and measures relevant for the lengthy and sustained process of transition. A further consideration is that innovation is also time-consuming, in terms of both research and institutional change and the implementation of technologies. This is certainly the case when we talk about changes in the way a societal function is performed, such as the transport of goods by underground pipeline. The Council notes however that the main focus in the 61 options listed in the Options Document is on those options which individually or together help to achieve the 6% reduction by 2008-2012, insofar as present knowledge permits. The Council has the impression that, in consequence, insufficient priority is given to options which, because they are insufficiently effective in the short term, fall outside the scope of the Options Document⁴⁶. Without any claim or ability to be exhaustive, the Council gives the following examples:

- The Options Document does not study at systems level the possibilities for a lower-carbon energy supply in the built environment associated with the relevant options for energy supply and the energy infrastructure. It is in fact information of this kind that is needed for a strategy aimed at a transition in the energy supply.

⁴⁵ The CPB also points this out. Other relevant characteristics of this scenario are: high dynamicity; rapid technological development, particularly in IT: this is one of the factors contributing to a further tertiarisation of the economy and a blurring of the distinction between industry and services; shift towards more renewable energy and replacement of coal-fired power stations by gas.

⁴⁶ Weterings, R.: Eindrapportage toetsing Optiedocument, in VROM-Raad Bundel workshop klimaatbeleid, 6 October 1998, The Hague.

- The Options Document discusses the possibilities of CO₂ sequestration and storage as isolated options even though some options in this connection are mainly significant in relation to the decarbonisation of fossil fuels to produce hydrogen, for use in clean and energy-efficient fuel cells.
- The Options Document contains very few options for export-oriented, energy-intensive industries (such as steel and aluminium) although this sector is very important for climate policy given its share of total energy consumption. Recent research indicates that new energy conservation options are also available for these industries. There is only one measure listed for freight transport, despite a 57% expected growth in ton-kilometres expected for the period 1990-2010.
- The options for passenger traffic, which is expected to grow much less than freight transport, are mainly related to the modification of driver behaviour. These will at best achieve a temporary effect, and will be imposed by regulation or promoted through large increases in petrol prices. Trends and the great potential for technological development in the medium and long term are disregarded (efficient engines, electric vehicles based on hydrogen fuel cells). Hybrid cars can have a much greater impact than behavioural changes (and reductions in unit emissions will further diminish the reduction effect of the 'behaviour modification' option). All kinds of options in the field of public transport are also passed over.

Looking from the point-of-view of the longer-term effectiveness of climate policy, the Options Document devotes a surprising amount of attention to the reduction of other greenhouse gases. At present the latter account for some 23% of the total, and this will reduce to 14% by 2010. The document devotes considerable attention to the reduction of these gases by 17 Mtons. Given the low cost of these reductions this is quite justified. But since there is much less to be gained in this area after 2010⁴⁷, so that even greater reductions will be required for CO₂, this should not be allowed to distract attention from CO₂ after 2010.

The Council therefore ascertains that the 61 options discussed in the report were not selected on the basis of the expected contributions to climate policy *after* 2010. And yet we need now already to be thinking about what can and must happen after 2010, and where necessary to be creating the necessary conditions in this regard. The Options Document does devote some attention to longer-term effectiveness⁴⁸, but this is not sufficiently explicit, too limited and all in all insufficient to serve as the basis for policy deci-

⁴⁷ The ECN estimates the total reduction potential between 1998 and 2020 at 19 Mtons.

⁴⁸ Beeldman, M. M.G.M. Harmelink et al.: Optiedocument, ECN/RIVM, Petten, 1998, chapter 13.

sions. In the opinion of the Council the Options Document does not provide sufficient material for a coherent strategy designed to lay a foundation for the much larger reductions which must be made after 2010.

The ranking of the options

The Options Document eventually ranks the options in order of decreasing cost-effectiveness for the end-user, based on the costs which the relevant 'actor' incurs, or the costs he saves as a result of his changed behaviour, allowing for taxes and other fiscal payments. These 'end-user costs' provide insight into the extent to which end-users - insofar as financial considerations play a role, and based on a certain discount rate - will be inclined to take certain measures. It is also possible to investigate in this way whether extra efforts - subsidies, levies, regulation - are necessary to induce them to take the desired measures. This approach is not suitable, however, for determining whether an option is cost-effective for society as a whole, as the Ministry of Housing, Spatial Planning and the Environment itself recognises⁴⁹, particularly since fiscal costs are very important for the end-user. This means that the magnitude of the energy tax affects the cost-effectiveness of measures⁵⁰. If the options are ranked by cost-effectiveness determined in this way, policy itself and/or planned policy such as the regulatory energy tax (RET) or an increase in excise duty on petrol influence this ranking instead of vice versa. Furthermore, options which allow taxes to be avoided, such as energy conservation options, score higher than, for example, substitution options. This is not correct in energy policy terms. Transfer payments such as taxes and levies, subsidies and value-added tax should not enter into considerations of the societal cost-effectiveness of options. Although by changing his behaviour a final user can obtain fiscal advantage, the government must make good the shortfall from another source if its expenditure remains constant (see box 3).

The Council therefore regards this approach as theoretically inapplicable for determining the most appropriate options for government policy in terms of cost-effectiveness. In fact the government should make its decision on the basis of the societal costs and benefits excluding transfer payments and including any external costs and benefits⁵¹. Regard should also be had as far as possible to possible synergies with other policy objectives for example in the field of acidification or congestion. The first step is

⁴⁹ Ministry of Housing, Spatial Planning and the Environment: *Kosten en baten in het milieubeleid: definities en berekeningsmethoden*, Publicatierieks Milieustrategie, 1998/6, p. 2.

⁵⁰ Beeldman, M., M.G.M. Harmelink et al.: *Optiedocument*, ECN/RIVM, Petten, 1998, p. 25, tables 3.1 and 3.2.

⁵¹ A set of measures based on minimising societal costs and benefits is by definition the cheapest for society. A graph on page 171 of the Options Document appears to show that a set of measures selected on the basis of minimising end user costs is cheaper than a set based on the lowest national costs. This apparently defies logic. It is only explicable if for the former set of measures part of the costs have been disregarded and are being borne by other groups.

Box 3: Cost definition used: basis and limitations

The term 'environmental costs' in the Options Document corresponds to the usage adopted by the Ministry of Housing, Spatial Planning and the Environment and defined in a report on costs and benefits in environmental policy⁵². The definition relates to the primary monetary costs (reduced by any financial benefits) of environmental measures - not only technical and organisational measures but also reducing activity levels for environmental reasons - incurred by those who take environmental measures: companies, other organisations, households. Included are: the direct financial consequences of reduced output and associated changes in the use of inputs (financial benefits such as costs saved by virtue of reduced energy consumption). The consequences for taxes and subsidies (VAT, excise duty, charges) are included where applicable. The cost of capital is assumed to be higher for industry and commerce than for the public sector, non-profit sector, agriculture and households (15% and 8% respectively for energy conservation).

Excluded are:

- costs the value of which cannot be readily determined (e.g. loss of comfort in event of a switch to smaller, fuel-efficient cars, speed limiters, foregone leisure time, additional uncertainty regarding the costs and benefits of an environmental measure);
- payment of regulatory taxes, because the receipts form part of total public funds; this increase in costs bears no relation to the costs incurred for environmental measures;
- indirect costs such as reduced employment or loss of production as a result of a decline in demand;
- environmental benefits due to a reduction in environmental pressure. Only a small part of these generally accrue to the person/organisation who takes the measures.

It is pointed out in this VROM report, in line with the present advice, that:

- this methodology is less appropriate where 'non-monetary costs and benefits' play a substantial role;
- taxes and levies should not be included - where environmental costs are being determined from a societal viewpoint - and environmental benefits attributable to reductions in the environmental pressure should be included.

⁵² Ministry of Housing, Spatial Planning and the Environment: Kosten en baten in het milieubeleid: Definities en berekeningsmethoden. Publicatierreeks Milieustrategie, no. 1998/6, pp. 1-3, 6, 9-11, 13, 45-47.

to order the measures on the basis of these primary criteria (i.e. total societal costs, scope for synergy). Next the choice must be made. And finally, it is necessary to determine whether the selected options can be implemented as they stand or whether enabling policies need to be pursued (e.g. taxes, subsidies, tax concessions) which will facilitate the measures or make them more acceptable for the relevant actors. In the case of the last step it is the end-user costs which are the relevant costs.

The Council draws attention to the fact that, in assessing the cost-effectiveness of measures related to consumption, regard must be had not only for the monetary costs incurred by consumers or the monetary benefits associated with the reduction in certain forms of consumption. It is an important principle that in the case of policy which actually affects consumer demand (e.g. because of a change in taxes, levies or excise duty) account should be taken of the net loss in amenity suffered by consumers. If these are not dealt with carefully, there is a risk that measures will be taken which will generate unexpected resistance because loss-of-amenity effects have been disregarded. This could in turn erode support for climate policy as a whole. The Council therefore notes with some concern that the traffic measures presented in the Options Document as very cost-effective make no or only very partial (reduction in speed limits) allowance for amenity effects⁵³.

Finally, it should be pointed out that the main relevance of this issue of the ranking of the options is where it is the government itself which will determine the options. If government confines itself to setting the boundary conditions, as is advocated in this advice, then it is the actors who select the measures, and for them the end user costs do of course play an important role. This only results in a cost-effective solution for society as a whole if government directs its fiscal measures as far as possible at greenhouse emissions in general rather than at specific activities.

⁵³ According to the Options Document, a further increase of 50 (Dutch) cents/litre on the price of petrol would reduce CO₂ emissions from passenger traffic by 1.2 Mtons, as a result of reduced car-use and the purchase of more fuel-economic cars. Although this measure is designated 'very cost-effective' for motorists (they are considered to 'save' NLG 850 per ton CO₂ reduced), they are apparently willing only to reduce emissions by 0.2 tons CO₂. This can only be explained if account is taken of the benefits of motoring. It can then be understood why these measures are unpopular rather than being regarded as an opportunity to save money. If passenger traffic is indeed going to be made responsible for making a reduction of this magnitude, this would require, on the basis of maximum (national) marginal costs of NLG 150 per ton, a sum of NLG 180 million per year (assuming this sector is permitted to implement options outside the sector, such as projects for CO₂ scrubbing). On the basis of 5.7 million cars, this would be only NLG 30 per car, which could be raised, for example, by an increase in the annual vehicle tax.

5.3 Options Document and instruments

The Options Document presupposes a great confidence in the power of national government to form a satisfactory picture of the options and their costs now and in the future. This confidence strikes the Council as being a little naïve because this enormously complex area is in a state of permanent flux, new options are constantly becoming available and the relative costs can change rapidly. The Council advocates that the rather 'closed' perspective of the Options Document, in which a number of options are selected on the basis of present knowledge, should give way to a more 'open' approach which allows for uncertainties and surprises, does not discard options too quickly on grounds of impossibility, and gives more attention to the conditions important for their feasibility and effectiveness.

In the Options Document a specific instrument is mentioned for almost every option, implying an ominously high administrative burden. These are drawn from the existing arsenal of instruments, about which reservations were expressed earlier (see section 4.2).

Underlying the Options Document is the model of a government which has a sound basis on which to select the relevant options, which is responsible for the solutions, and which is able to implement them by means of a top-down approach. The Council does not regard this as an adequate model of the government's role, particularly in relation to the climate problem. That problem is after all characterised by uncertainty, not only about the nature of the climate question but also about technical possibilities, societal costs, feasibility and the political-administrative relationships within which the policy is pursued.

5.4 Conclusions on the Options Document and policy to 2010

Dutch energy policy faces a triple challenge.

- 1 A cost-effective strategy needs to be devised in the short term for reducing emissions to 6% below their level of 1990.
- 2 The Netherlands needs to invest in long-term reduction options which will guide our economy through the transition which it must undergo.
- 3 New instruments need to be developed for the implementation of climate policy.

Although important steps can be taken at national level in regard to the second and particularly the third of the above challenges, these will have to be tackled at least partly at the European level. Ultimately, a successful climate policy will depend on a coordinated international effort, and failing this there is a danger that all three challenges will prove infeasible.

The main task of the Dutch government during the coming period will be not so much the selection of options as the creation of the conditions which will ensure that these options are selected by the relevant sectors and actors themselves. This will guarantee, subject to certain conditions, maximum efficiency and cost-effectiveness, and will prevent potential measures overlooked by government remaining unexploited. It will also relieve the administrative burden. Essential conditions include the setting of emissions ceilings (with the associated ability to trade emission permits), the very active use of pricing, or a combination of both of these. It is important that conditions of this kind are harmonised internationally as far as possible. In the Council's opinion, the desired transition process will get going much too slowly if this does not happen.

The Council realises fully there is still a long way to go after Kyoto before a fully fledged emissions trading system can be established at the international level. Furthermore, early progress needs to be made in the fairly short term towards the target for 2008-2012. There is always a strong temptation to simply carry on as before. Faced with this difficult dilemma, the Council opts for a leap forward, and for proceeding vigorously with the introduction of new policy instruments.

Only if it is becoming apparent that an international energy tax or an emissions trading system will not be set up in time or if certain sectors are not suited to this approach will the government also have to select the options itself and ensure their implementation with appropriate instruments (in the relevant sectors). The options can then be taken in order to societal cost-effectiveness (and thus with societal support), working with a temporal horizon appropriate to the climate problem, and giving sufficient priority to measures which are important for the desired transformation of the energy economy: in the construction, transport, power generation and energy-intensive sectors.

The Council considers that options which involve investing in modifications to plants which will in any case be replaced soon after 2010 will have little lasting effect on emissions. Options related to consumption patterns where price-elasticities are very low will have little effect, and will seriously undermine support for policy. Against this background, the Council is certainly not convinced that options such as postponing the decommissioning of Borssele nuclear power station, converting existing coal-fired power stations to natural gas, steep rises in the excise duty on petrol or regulations aimed at reducing speeds on motorways are important in purely climate policy terms.

The Council acknowledges that in the short term relatively cheap options are advantageous because this allows time to be bought, as it were, for the development of long-term policy.

This is why the Council recommends that intermediate objectives be set for the years 2002 and 2006. These objectives would relate not so much to the reduction of greenhouse gases in physical terms, particularly since over such short periods emissions are too heavily affected by short-term fluctuations and policy has little effect over such a short term. The intermediate objectives should relate rather to the development of instruments for climate policy and to initiating the transition towards a low carbon energy economy. The Council would like to see, in both cases, a clear, phased timetable set forth in the Climate Policy Implementation Document, with measurable goals being formulated for each phase. The objectives for the development of new instruments might relate, for example, to the extent to which use is being made of the possibilities for national and international emissions trading, Joint Implementation and the Clean Development Mechanism. Sensible intermediate objectives can be formulated related to the choice of instruments and the creation of the necessary regulations. The objectives with regard to the transition could relate to the five components of this transition (energy conservation, renewable sources, substitution by low-carbon fuels, decarbonisation of fossil fuels, shift in the sectoral structure). Intermediate objectives could be derived from these.

The Policy Document could also contain suggestions for monitoring progress made towards these two objectives in addition to monitoring progress in achieving the physical reduction, together with the underlying developments, so that the timely adjustment of policy is possible.

Furthermore, while the government is still unsure whether an international energy tax or a national or supranational emissions trading system will be set up in good time, it must keep a few options up its sleeve to ensure that the objective for 2010 is met. It is necessary to know when, at the latest, implementation of each of these measures needs to be started. Sufficient public funding needs to be earmarked in good time for this.

6 New instruments for climate policy

The Dutch government is faced with the task of getting its emissions down to the agreed ceiling of 205 Mtons by 2010. This task is not a simple one, and requires clear answers to the following questions.

- What policy instruments are needed to ensure a truly effective policy which combines a fair (initial) distribution of the reduction burden with efficiency in the choice and implementation of measures?
- What should we make of the possibilities opened up in Kyoto for achieving part of the reductions in other countries having regard to the importance of a cost-effective approach to climate policy, and to the longer-term aspects which are so important in climate policy? What proportion of the total could be met by reductions in other countries?

6.1 Efficacy and cost-effectiveness at home

6.1.1 The need for new policy instruments

Climate policy needs to be made significantly more effective, a fair distribution of costs - both between countries and between sectors - needs to be achieved, and cost-effectiveness must be optimised. These points are elaborated further below.

Fair distribution of costs

There also needs to be a fair distribution of costs over sectors. The reduction objectives should in principle be related to the magnitude of the emissions, allowing for measures already taken in regard to climate policy. The total size of the reductions can therefore vary enormously. It would be unfair if companies could only meet their commitments by taking measures which were much more costly than in other sectors (if the between-sector differences in marginal costs are large). In distributing the costs over the sectors, allowance also has to be made for between-sector differences in the ability to pass on costs to customers, such as between the 'exposed' and 'sheltered' sectors. Until now this has been done by exempting the energy-intensive sectors from the regulatory energy tax.

Now that a ceiling has been agreed for CO₂ emissions, the Council considers it necessary to reconsider this approach. As their production grows so their contribution to the national reduction becomes smaller in a relative sense. Other sectors then have to reduce their emissions even more to get Dutch emissions within the ceiling agreed for 2010. This increases the costs of climate policy for the national economy even further, which will take its toll of employment and competitiveness. If we are to strive for a fair distribution of costs we therefore need to review this problem.

Effectiveness

It was mentioned earlier in this advice that it is very difficult to decouple CO₂ emissions from economic growth. The present instruments, aimed primarily at increasing energy efficiency, provide few guarantees that the desired emission reduction will actually be achieved. In a complex, dynamic, international economy, the national government has little influence over energy use, and over the product and process innovations in international industry which are necessary in order to achieve large increases in efficiency. Policy has a strong top-down character, with the government assuming the role of problem-owner, and other actors having little responsibility, stake or room for manoeuvre. And yet they are the ones who possess the technical and economic know-how. The limited effectiveness of policy has a knock-on effect on policy efficiency. If the effectiveness is poor, then it becomes necessary to adopt relatively costly alternatives alongside the cost-effective ones in order to get within the ceiling, and the costs of climate policy rise.

Efficiency

The Council sees a danger that the costs of policy could be pushed unnecessarily high. By 2010 these could already amount to several billion guilders per year, and could reach a level of NLG 8 to 10 billion by 2020⁵⁴. The latter will depend on the ensemble of measures implemented and the extent to which reductions are made in other countries. The measures selected can only be considered cost-effective if the marginal reduction costs are approximately equal in all sectors. However the present instruments provide no mechanism by which this 'cost levelling' can be achieved. The government itself has an insufficient grasp of the present between-sector differences in the technical possibilities and costs of reducing greenhouse emissions. Given that the situation with regard to both these factors is a dynamic one, the government has no hope of keeping up.

Furthermore, research⁵⁵ has shown that a number of cost-effective measures are known which remain out of reach of the government because of gaps in its present arsenal of instruments. These are, in particular, options in other countries (see section 6.2), but also relatively cheap options in export-oriented companies. The approach so far in regard to the latter has been to conclude covenants on energy conservation with them (the so-called multi-year agreements or MYAs). The markets in which these companies operate circumscribe the possibilities. These markets are characterised by stiff interna-

⁵⁴ Central Planning Bureau: Working Document 106, Macro-economische effecten van twee beleidsvarianten om emissie van broeikasgassen te beperken, 1998. In *De economische consequenties van Kyoto*, chapter IV, spring 1998 the costs to the Netherlands of a reduction of 31 Mtons by 2010 were estimated at NLG 2 to 3 billion per year.

⁵⁵ Duijze, P. van et al.: *Verhandelbare CO₂-emissierechten*, VROM-Raad, achtergrondstudie 002, The Hague, 1998.

tional competition and, for those located in the Netherlands, relatively low energy prices compared with those applying in other sectors. Wholesale users, for example, are exempted from the regulatory energy tax (RET). Relatively low energy prices have been agreed with some sectors, e.g. glass horticulture, aluminium industry. There are other policy instruments, such as the MYAs, in which agreements have been made about improvements in energy efficiency. In consequence, only those CO₂ reduction options are implemented which are very cost-effective. There are two drawbacks to this. Measures with a smaller or no return are not taken in these companies, even though some of these are relatively cheap compared with measures which have to be taken elsewhere in the economy in order to fulfil the Kyoto commitment. After some time, once the most cost-effective options have been implemented, a substantial contribution to the national emissions reduction will depend on continuing technical development. Low energy prices are not much of an incentive in this regard. And yet the role of these companies in climate policy should be increasing rather than decreasing given their share in the total emissions of greenhouse gases, their technological potential and their capacity for innovation. This is why comparable policy needs to be pursued in other countries, so as to prevent competitive distortion.

6.1.2 Energy efficiency benchmarking: a new instrument?

Thanks mainly to the MYAs, much has been done in the energy-intensive sectors to improve energy efficiency. The sectors involved have offered to supplement this by adopting benchmarking. This would involve making a commitment that each factory or product will be amongst the world leaders in terms of energy efficiency. This approach by the industry exposed to international competition appears to be a good one providing it focuses on *carbon efficiency*.

The Council is not without reservations about this approach, however. Benchmarking is an effective means of promoting the *diffusion* of less polluting technologies. Once the company has gained its place amongst the leaders, however, it has no incentive to make further progress. As far as *development* is concerned, one is again reliant on the innovative dynamic of the market itself. Not that the situation is static: the world marketplace is a dynamic place peopled by many competing players. But it is doubtful that the rate of technological development is high enough *in the direction needed for climate policy*. When, as in the Netherlands, the companies concerned are already amongst the world leaders (or are very close), the pace of improvement could fall to a level far below that adopted in the MYAs so far. The balance between the efforts of the exposed and the sheltered sectors in bringing the total Dutch emissions under the agreed ceiling could be upset. The Council urges fairness in the distribution of costs and a substantial contribution by the exposed sectors. Dutch companies in the internationally competing, energy-intensive sectors must continue - even when they are amongst the

world leaders - to invest where there are opportunities to increase their carbon efficiency at a reasonable return (for example on the basis of an internal rate of return of 15%). This requirement should only be waived where it would lead to an unacceptable competitive handicap for the sector concerned. Further reflection on this matter is needed.

6.1.3 New instruments: towards regulatory taxes or tradeable emission permits

In the Council's opinion the answer is not to be found in increasing regulation, though regulation is necessary in some areas, such as in the construction industry. The field of climate policy is too broad, the changes needed in the energy system too radical, the importance of innovation too great and the degree of globalisation too great for this. The government would be wise to seek to shed the responsibility for steering through much of the direct changes by means of regulations, licences and similar instruments. The Council regards the active cooperation of companies, citizens and local government as indispensable, both in making strategic choices and in searching for practical solutions. The answer must be sought in a redistribution of the responsibilities between the public authorities and society at large, with a more important role for general, market-oriented instruments.

There are two largely comparable instruments which correspond well with the need for a more self-regulating society: regulatory taxes and tradeable emissions permits. Both of these reflect environmental scarcity in prices, promote the selection of the most cost-effective measures within the domain in which these instruments apply and stimulate the development of new technologies on an ongoing basis. These two instruments are compared in box 4.

The effects of both instruments are therefore largely the same, although implementation varies. The instruments are also not mutually exclusive. The Council considers it essential that one of these instruments, or a combination of both, should be introduced for climate policy. The government should therefore study which of these instruments enjoys the greater support, particularly amongst industry. The Council itself suspects that this will be the tradeable emission permits option because political decisions play a substantially smaller part here than for a carbon tax, since the latter involves the recycling of the tax revenues. There is as yet little experience of running such systems, however. The system should therefore be built up step by step, and carefully corrected on the basis of experience. In any case the Council calls on the government to seriously study (as long as no progress on taxes is made within the EU) the possibilities for flexible instruments, and in particular emissions trading within and between countries and within and between sectors in particular.

Box 4: Comparison between a regulatory tax and tradeable emission permits

In the case of a regulatory tax the government collects a fixed sum per unit emissions of CO₂ or CO₂-equivalent. The reduction measures are chosen freely by the emitters. They will reduce their emissions to the point where the costs of further reduction are identical to the magnitude of the tax, so that such further reduction would not be rational in economic terms. The marginal reduction costs will therefore tend towards the level of the tax.

In a system of tradeable emissions permits a ceiling is fixed within which the emissions of (some or all) sectors must remain. The permitted emissions are distributed over the sectors. Each emitter is therefore allocated a quota, and is completely free in choosing measures to remain within the emissions allowance. Emitters can purchase further emissions rights, or sell them to those who would otherwise have to pay relatively high costs to reduce emissions. The price tends towards the lowest marginal costs at which all actors can remain within the allocated emissions space.

There are therefore major correspondences between the two instruments:

- the government is primarily responsible for translating the climate objective into either ceilings for the sectors or a tax rate (in both cases these parameters will periodically have to be made more stringent);
- actors are free in their choice of measures, and the costs per unit reduction will be the same (for the same magnitude of reduction);
- supranational policy is necessary to get internationally competing companies properly involved;
- in both cases their operation is impeded in equal measure by a low price-elasticity of energy consumption;
- the monitoring of emissions is a condition for both instruments.

The main differences are:

- 1 The tax rate is fixed - which means that the market participants concerned know where they stand. The volume of emissions will depend on the rate of tax, and on factors, mostly uncertain, which will determine the response to the price mechanism. The rate of the tax needed to achieve the desired target will have to be determined by trial and error. If the international commitment looks like not being met, this tax rate will have to be adjusted. In a system of tradeable emission permits, the volume of the emissions is fixed, which means that climate policy-makers know where they stand. The price of emissions reductions will depend on the interplay of supply- and demand-related factors, not all known in advance. This means that the price can fluctuate, which is undesirable for the market participants. 'Banking' (averaging out over a longer period) can limit this effect.

- 2 In the case of taxes there will be a fiscal charge on the residual, unabated emissions, which for large-scale users can signify a considerable increase in costs. This means that the proceeds of the tax must be recycled. This recycling of the tax revenue cannot simply be proportionate to the emission, because the tax would then be self-defeating. The recycling of taxes will produce winners and losers. Sectors will therefore be subject to political decisions, in regard not only to the magnitude of the tax, but also the extent to which and how the tax revenues are recycled.
- 3 A substantial international tax does not sit well with the prevailing practice of setting national targets; the accent would then lie on meeting the target for Europe as a whole. An international TEP system can be more easily combined with a system of national targets.
- 4 The regulatory tax fits well with the national collection of taxes. The decision-making about this fiscal instrument must be unanimous, which is an added complication. There has been a limited success at the national level in the form of the 'regulatory energy tax' for retail users. There is for the moment considerable resistance within the EU to such a tax. The likelihood of a global tax is at present negligible. Tradeable emissions permits interface well with the system of the international distribution of targets and flexible instruments as provided in the Kyoto Protocol, but the right institutional conditions must be created at national level. A sticking point with regard to tradeable emission permits is their initial distribution, which will require careful analysis and a great deal of political stamina. Afterwards the likelihood of government intervention is small. An experiment with tradeable emission permits is announced in the 1998 Coalition Agreement. A decision in the EU on the use of this policy instrument can be taken by qualified majority. The US are apparently strong proponents of an international free trade in emissions permits. There have been good experiences there with emissions trading in a fairly manageable situation with a small number of sources, involving the abatement of sulphur dioxide in the power generation sector. The Danish government is preparing a bill of law on tradeable CO₂ quotas for the energy production sector. One or two international corporations are already experimenting with trading between sites in different countries.

Market-based instruments and the exposed sectors

The Council realises that market-based instruments (regulatory tax or marketable emissions permits) may pose problems for the sectors exposed to foreign competition. A national energy tax would soon put them at a competitive disadvantage, given their energy-intensiveness, and this is why they have so far been exempted from the RET. A system of marketable emission permits would, as long as these sectors can only purchase emission permits on the domestic market, rapidly drive prices up high (particularly if they had to buy a lot). This would impose an economic constraint on them without any clear advantages for international climate policy. This might encourage them to sell their emissions rights and relocate their production in another country. On the other hand if the government were to be generous in allocating their emission permits then the targets for the other sectors would remain high and the exposed sectors would be handed a large allocation of negotiable assets on a plate. There is still a risk that it will be more attractive for them to sell their emission permits. These sectors can therefore only be brought within a ceiling if there is sufficient scope for buying in emissions permits on the international market at a price they find reasonable. In a first phase it would be possible to create some space through emissions trading between the Dutch government and other countries. This might possibly be supplemented by internal emissions trading between various sites of the same international corporation (for which agreement would have to be obtained from the country concerned). The alternative of a substantial energy tax would equally only be sensible for these sectors if this tax is applied internationally. The Council therefore considers that both types of market-based instruments are only sensible for the export-oriented industry if they can be applied internationally on a sufficiently large scale.

TEP system and initial distribution

As far as the initial distribution is concerned, the Council thinks that in theory a distribution can be found in which everyone concerned does better than for any other possible distribution. 'Grandfathering' on the basis of present emissions (a criterion which is extensively used in the present target group policy) would seem to be a reasonable starting point in negotiating the distribution which will produce an equitable sharing of the reduction burden⁵⁶. In the Council's view, the main obstacle will be the political decision to adopt the system rather than the allocation itself.

⁵⁶ Duijze, P. van et al.: *Verhandelbare CO₂-emissierechten, VROM-Raad, achtergrondstudie 002*, The Hague, 1998.

Of course the government should not throw away its old shoes until it has new ones. But battered old shoes, if they really have too many holes, need to be replaced. In setting up a system of tradeable property rights, careful attention must be paid both to the distribution of the emissions permits over sectors and companies and to the legal provisions relating to property, the monitoring of emissions, trading of emission permits, etc. It therefore seems appropriate that such a system should be established first at the national level, starting with a number of sectors. This can then be extended to the international level. The Council urges that the Netherlands vigorously promotes the establishment of an international TEP system for companies, in which the Netherlands should participate at the earliest possible moment. The Treaty of Amsterdam, which provides that industry should be located in the economically most appropriate sites, provides a clear basis for this. In anticipation of this, a TEP system should be introduced for as many sectors as possible in the Netherlands, either directly or via the fuel suppliers⁵⁷.

6.1.4 Making a start: a three-pronged approach

The Council urges that the first steps be taken in the near future - as soon as it is clear that this is the preferred option - towards a TEP system in the Netherlands. This must be done cautiously. Study will be needed to identify the sectors which could participate in the first phase of a TEP system without undue problems.

As long as export-oriented sectors remain outside this scheme, a means needs to be devised by which optimum use can be made of their reduction potential without jeopardising their competitiveness. This would help to make Dutch climate policy more effective: the Dutch public would pay for the commitments assumed by their government, but costs would be limited by ensuring that their money goes towards the relatively low-cost reductions in the energy-intensive industries⁵⁸.

There are two ways in which this could be done: via government subsidies, or by means of a system in which a market is created for proven abatement measures⁵⁹ which the sectors are not obliged to take themselves under existing requirements. In the first case the taxpayer contributes to the costs of unprofitable but relatively cheap emissions reduction options in the export-oriented companies. In the second case this is done through the sectors directed towards the domestic market (and their customers). The reduction certificates they acquire would permit them to avoid relatively expensive meas-

⁵⁷ Duijze, P. van et al.: *Verhandelbare CO₂-emissierechten, VROM-Raad, achtergrondstudie 002*, The Hague, 1998.

⁵⁸ The possibility of a similar scheme for motorists, in which a fund is for example established through an increase in the excise duty on petrol, might be investigated.

⁵⁹ This proposal for tradeable reduction certificates (TRC) was developed within the Ministry of VROM.

ures, or reduce their payment under the RET⁶⁰. This would effectively introduce a form of Joint Implementation within the Netherlands. Both possibilities suffer from the disadvantage that the 'polluter pays' principle is insufficiently applied to the export products concerned. It would be Dutch citizens and consumers who are paying for Dutch climate policy in these sectors rather than the foreign customers. Since it was the Dutch government which adopted this target on behalf of its citizens, it is admissible that it should assume these extra costs. But if this competitive advantage results in an expansion in these activities, this will lead to extra CO₂ emissions and therefore, because of the existence of the ceiling, to unnecessary costs for climate policy in the domestic sectors. It is therefore of the utmost importance that a way be found as soon as possible of ensuring that the internationally-oriented sectors face up either to ceilings or to substantial international taxes.

Having regard to all this the Council considers it sensible to investigate the possibility of pursuing a course comprising three interrelated components.

- Institute a system of tradeable emission permits for some of the sheltered sectors⁶¹. The remainder not covered in the first phase will continue to be dealt with by regulation and covenants. In addition, a procedure must be introduced for the sheltered sectors which enables them to contribute cost-effectively to the reductions needed for the 2010 target, either through subsidies or through a system of negotiable reduction certificates.
- Until an adequate system of international emissions trading is possible, MYAs will continue to be the indicated policy instrument for the exposed sectors. All measures which increase carbon efficiency and show a reasonable return must be taken, as well as the measures needed to ensure that they remain amongst the world leaders in carbon efficiency.
- Now that Kyoto has given the go-ahead to international emissions trading, emissions permits can be acquired which can be sold on to all those sectors for which a ceiling has been established. If sufficient emissions permits can be created in this way, the exposed sectors can also be brought within the ceiling.

⁶⁰ A reduction in the contribution would mean limiting the funds available for relieving taxation elsewhere, and therefore the scope for reducing taxation on employment. The RET is however primarily a regulatory tax which seeks to induce actors to reduce their tax burden by taking climate measures. The proposed construction is consistent with this. Energy distribution companies - which debit their customers with this tax - could be allowed to reduce this payment to the extent that they contribute to financing CO₂ reductions in the exposed sectors. In this way, households will benefit from the lower costs of climate policy.

⁶¹ Duijze, P. van et al.: Verhandelbare CO₂-emissierechten, VROM-Raad, achtergrondstudie 002, The Hague, 1998.

If interest in inter-company trading continues to grow abroad, and if Dutch experience with this option is good, then the next step can be taken towards international emissions trading between companies, either within or between sectors. It will take years to create such an international system, although the distribution of ceilings between developed countries means that a very important step in this direction has been taken. A second obstacle is posed by the existence of large companies in developing countries which are not bound by such ceilings.

6.2 Reductions abroad through flexible instruments

The principle of reductions abroad

For many, the thought jars that affluent countries such as the Netherlands and the US should be able to realise a major part of their agreed emission reductions at lower cost through the use of flexible instruments such as emissions trading or Joint Implementation. It has overtones of buying off environmental debt in less affluent countries while being free to continue to emit CO₂. The Council views this analogy, though understandable, as misguided. As argued in section 4.3, the responsibility of the West should be reflected primarily in the targets assigned and in the allocation of the costs rather than in the geographical location where the reduction is actually effected. This responsibility must be discharged in a highly globalised economy, in which the international division of labour is one of the influences on national energy use. There are large between-country differences in economic development and in the natural possibilities for reducing greenhouse emissions. Constraining countries to achieve their reductions within their own national boundaries would greatly reduce the cost-effectiveness of international climate policy and run counter to a dynamic international division of labour. Both effects are counter-productive for international climate policy, which will benefit from a combination of high cost-effectiveness and the creation of the financial space to invest in the innovation and transition processes required to progress towards a CO₂-extensive energy system. It must not be forgotten that the third world accounts for a rapidly increasing share of emissions: 6000 Mtons in 1990 (30% of the global total) rising to 12,000 Mtons in 2010. In the next phase of world climate policy many more countries will have to be made subject to emissions ceilings.

A first objection to implementing cheap emissions reductions in other countries is that it means that large sums of money will leave the country. Large financial impulses are thereby lost to our own economy. But there is no difference in economic terms between the import from abroad of, for example, goods for consumption and paying for emissions reductions in that country. They each involve exchanging money for foreign goods or services, without there being a spin-off for Dutch production or productivity. The same objection could be made to the imports of consumer goods, three-way cata-

lytic converters or foreign holidays, and this boils down to an objection to foreign trade itself ('Buy Dutch', however expensive). The Council does not therefore subscribe to this objection to flexible instruments. Both trade partners benefit from trading emissions or project-related emission reductions, one because lower costs for climate policy mean more room for consumption and productive investment, the other because part or all of the expenditure on reduction measures is an inflow into the economy. These advantages are greater insofar as the transfer of funds and technical know-how are actually employed in the economy concerned. In short, both countries will find that national ceilings no longer function as a strait-jacket (or oversize coat), but rather as an agreed emissions permit which can be added to or encashed in the marketplace. There is also greater margin for national differences in the energy- or carbon-intensiveness of expenditure patterns.

A second frequently aired objection against utilising cheap options in other countries that it is too prompted by mercantile thinking. It relieves the pressure at home, and therefore removes a vital incentive to innovate⁶². New, more efficient technologies cannot be produced to order, and the target for 2010 will have to be achieved mainly with existing technology. The more that must be achieved within the Netherlands the greater the costs will be, and this will detract from the financial resources available to invest in innovation. Choosing for low-cost options, including those existing abroad, makes it in principle easier for government and industry to invest in rather longer-term developments which facilitate transition to a new energy economy. The investment referred to will be in research and particularly development, so as to generate the innovations needed for a later reduction period. Government and industry will between them have to ensure that these investments are made, and the room created by using 'flexible instruments' will facilitate this. This could be arranged through, for example, covenants in which the different sectors undertake to invest, where flexible instruments are used, an agreed percentage of the benefit from their use in relevant technological research and/or in technology policy programmes.

The Kyoto agreements

Agreement was reached at Kyoto on the principle that part of the emissions reductions to which a national state has signed up can be realised at its own cost in another country. The following possibilities were provided.

- 1 *The co-financing of projects in other countries* in which emissions are reduced and a part of this reduction can be credited to the Netherlands. The credits will be divided by mutual consent. A distinction is made between:

⁶² If valid, this objection could be raised against energy conservation, the reduction of other greenhouse gases or traffic rules, which allow difficult decisions to be postponed.

- Joint Implementation: the financing or co-financing of projects in Annex I countries;
 - Clean Development Mechanism: the financing or co-financing of projects in developing countries in which the projects must also meet objectives of development policy. These countries did not (yet) accept a target at Kyoto, and so the way in which these reductions are credited will need to be sorted out.
- 2 *The purchase of emissions rights from other countries*, both in and outside of Europe, which are willing to sell part of these rights. These countries are limited to those which signed up for emissions ceilings at Kyoto. This emissions trading can in principle be carried out either between countries or between companies in these different countries. Where the government buys quotas, the emissions rights so acquired could be auctioned domestically amongst the target groups of climate policy. Ground rules for the use of these instruments and for their use in relation to domestic efforts still need to be established.

Emissions trading in the European Union

So far, little attention has been paid to the possibilities for emissions trading within the European Union. The Council considers this regrettable. The Kyoto Protocol does not impose any restriction whatsoever on trade in emissions rights between EU member states. The EU is treated as an economic bloc in the Protocol. In view of the substantial differences in marginal costs between the member states, the Netherlands would do well to investigate at an early opportunity how our country can take advantage of this, and what possibilities there are in this context for innovative European projects.

Emissions trading in Central and Eastern Europe

There has been much more interest in trading with Eastern Europe. This is understandable given the even greater differences in energy-efficiency between Eastern and Western Europe, and the opportunities for CO₂ sequestration through afforestation. How much the Netherlands will be able to buy into this 'market' is uncertain. A lot depends on the economic development in these countries themselves and the consequential energy use, on the interest manifested by other countries in emissions trading, and on the interest in Joint Implementation projects⁶³. Box 5 describes the so-called trade in hot air.

⁶³ This always refers to investment additional to the measures taken by the country itself, so that JI can increase tradeable emissions. In the case of countries which remain below their ceiling, there is no interference whatsoever between JI projects and emissions trading.

Box 5: Trade in hot air

The emissions allowances for 2010 assigned to Annex I countries in the Kyoto Protocol are formulated as a percentage of their 1990 emissions. Assumptions were made about growth between 1990 and 2010. It is very likely that the countries of Central and Eastern Europe, which since 1990 have been suffering stagnation, will not make use of the emissions space assigned to them. If the emissions rights assigned to them in Kyoto but not used by them are sold to other countries then they will be used, since the country which acquires them will have to reduce their domestic emissions correspondingly less. It seems rather galling that neither country should then have to reduce its emissions. This has been described by some as trade in hot air, which will undermine the effectiveness of the Kyoto Protocol. It must be acknowledged, however, that the emissions of the two countries together will remain within the ceilings agreed at Kyoto. The global emissions in 2010 would not be any lower if this trade were not permitted. The global costs will be lower, however, and the unused emissions space will have provided a small windfall to Eastern Europe. The Council therefore affirms that the problem of this trade in hot air is not caused by the principle of emissions trading as such. Although the stagnation in Eastern Europe might in theory have represented an opportunity to agree more stringent reduction objectives, the Council considers the international agreement on ceilings achieved more important, and regards as understandable the reluctance of these countries to hand back to the global community free-of-charge the emissions rights unutilised as a result of economic stagnation.

Joint Implementation and Clean Development Mechanism

If a country is involved in a foreign investment project in which demonstrable emissions reductions are achieved, these reductions can be credited wholly or partly to the country's own national emissions commitment. It may be more sensible, particularly for developing countries, not to let their low-cost reduction possibilities go 'for a song', but to keep them until the time when they are themselves confronted with more severe reduction obligations. But the Council does not go along with this line of thought.

First of all it is too static, because the countries concerned will in the meantime benefit from the transfer of finance and technology. Furthermore technology does not stand still, so that the costs of options which are presently expensive for them may gradually fall.

Secondly, it will only be possible to conclude a global treaty in the next 'Kyoto round' if in the international division of the reduction burden - and non-Annex I countries will have to accept a ceiling next time - account is taken of considerations of equity,

and therefore with differences in level of development. It will again be desirable for reasons of efficiency to make use of the cost differences then prevailing between North and South⁶⁴. Both will then again be able to benefit.

In conclusion, the transfer of emission credits is not the transfer of a right in perpetuity, but is project-related, and thus valid for a certain period.

The Council is not in any way seeking to suggest there are no problems related to CDM projects. Proper ground rules are needed to prevent donor countries imposing investments which are contrary to the interests of the developing country concerned, or credits being provided for activities which would have happened anyway. It is also to be expected that in the international code of practice for CDM to be drawn up in the year 2000, a provision will be included that development aid moneys cannot be used for CO₂ reduction projects, particularly where this is at the expense of other important purposes⁶⁵.

Limitations applying to JI and CDM

Project-based emissions reductions involve quite high transaction costs (up to 20%) for matters such as project identification, feasibility studies, administration, determining the reference scenario and monitoring. These costs reduce the cost advantage per ton of CO₂.

The Buenos Aires agreements

In view of the considerations outlined earlier in this section the Council sees no reasons of principle why there should be a limit on the proportion of the emissions reduction which can be realised in other countries. The Kyoto Protocol states, however, that this possibility must be seen as supplementing efforts made by the country internally. There was an important political reason for this: the Western countries must be able to show the South that they are really willing to take action at home. The intention was that the relevant provision would be firmed up in Buenos Aires, but it has not yet been possible to reach agreement. The Council suspects that the 50% of the total additional emission reductions needed to meet the Kyoto targets mentioned in the 1998 Coalition Agreement is a reasonable estimate of the maximum proportion that will in practice be used for flexible instruments. In any case the scope for reduction outside the OECD is certainly not unlimited. In all countries, including the US, there will be at least some

⁶⁴ Abatement costs can fall as a result of technical progress made in the intervening period. If that happens worldwide then continued cost differences will continue to stimulate trade. If such innovation occurs only in the West then interest in purchasing reductions elsewhere will decline.

⁶⁵ It is therefore a bit delicate that the NLG 500 million reserved for CDM during the term-of-office of the present government falls under the overseas development aid budget.

potential measures which will be cheaper than the price which will apply on the world market for emissions rights (estimated by some at about US\$ 50 per ton CO₂). It is certain that changes will also be necessary in Western countries after 2010. It is therefore to be expected that no country will elect to meet its entire commitment by means of flexible instruments.

Conclusions

The Council concludes that the division of the global emissions space between countries can lead to problems in reconciling ecology and economy, particularly if countries can only make reductions at home. Despite the findings of the Options Document that the Netherlands is in a position to reduce emissions to the agreed level exclusively by means of domestic measures, the Council does not consider it advisable to pursue the option of autarky in relation to climate measures. On the contrary, the Council favours the concept of meeting the reduction commitments in part in other countries. It advocates the establishment of a broad-based market for the trading of emission permits, both within and outside of the European Union, and also supports participation in concrete investment projects both in Annex I countries and in developing countries as a means of securing a contribution towards the Dutch reduction target. The government and industry together must ensure that sufficient of the financial elbow-room it acquires by taking advantage of flexible instruments is invested in R&D and other applications needed to achieve the necessary transition in our country. The Council sees no reasons of principle why a maximum should be set in advance for this, but acknowledges that such a maximum is expressly called for in the Kyoto Protocol, and points out that in the long run substantial reductions will have to be achieved at home in any case. It thinks that 50% is a reasonable estimate of the proportion of the total necessary reductions that will in practice be used in other countries in the period to 2010.

The Council doubts, however, that governments should operate in the markets for emissions rights. Companies are much better equipped than governments to identify and exploit cost differences for trade and investment (also within the multinationals). A system of emissions trading requires a clear demarcation between the roles of government and industry, with the former confining itself to running the system, distributing ceilings and enforcement.

List of Annexes

- 1 Abbreviations
- 2 The advice request
- 3 The supplementary advice request
- 4 The composition of the Council for Housing, Spatial Planning and the Environment

Annex 1: Abbreviations

AER	(Dutch acronym for) General Energy Council
CDM	Clean Development Mechanism
CFCs	Chlorofluorocarbons
CH ₄	Methane (a greenhouse gas)
CoP	Conference of the Parties
CO ₂	Carbon dioxide (the main greenhouse gas)
CPB	Central Planning Bureau
ECN	Netherlands Energy Research Foundation
EU	European Union
FACE	Forests Absorbing Carbon dioxide Emissions, initiative of the SEP involving the worldwide planting of new forests as part of climate policy
GC	Global Competition, the CPB scenario with the highest growth rate
GDP	Gross domestic product
HFCs	Hydrofluorocarbons (a group of greenhouse gases)
ICES	Interdepartmental Committee for strengthening the Economic Structure
IT	Information technology
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
Mton	Millions of tons
MYAs	Multi-year agreements
NLG	Dutch guilders
N ₂ O	Nitrous oxide
OECD	Organisation for Economic Cooperation and Development
PFCs	Perfluorocarbons (a group of greenhouse gases)
ppmv	Parts per million (by volume)
RET	Regulatory energy tax
RIVM	(Dutch acronym for) National Institute of Public Health and the Environment
RLG	(Dutch acronym for) Council for the Rural Area
RMNO	(Dutch acronym for) Advisory Council for Research of Nature and the Environment
RVW	(Dutch acronym for) Council for Transport, Public Works and Water Management
SEP	(Dutch acronym for) Association of Electricity Producers
SF ₆	Sulphur hexafluoride (a greenhouse gas)
TEP	Tradeable emission permits
TRC	Tradeable reduction certificates
VAT	Value added tax
VROM	(Dutch acronym for Ministry of) Housing, Spatial Planning and the Environment

Annex 2 The advice request

Translation of letter requesting an advice for the preparation of the “Climate Policy Implementation Document”

From: (then) Minister of VROM (Mrs. Margaretha de Boer)
To: Chairman of VROM-Council
Dated: 28 May 1998

Dear Chairman

1. Introduction

It was announced in the Third National Environmental Policy Plan that the government would draw up a Climate Policy Implementation Document intended to broaden and intensify Dutch climate policy. The precise magnitude of the effort which will have to be made by the Netherlands has not yet been settled, and this will depend on the outcome of the EU negotiations on burden-sharing. The meeting of the Environment Council in June 1998 is likely to take a decision on this. Also of importance for national policy is the form which the so-called flexible instruments (Joint Implementation, emissions trading, Clean Development Mechanism) will assume during the Buenos Aires Conference (CoP4, November 1998), and the extent to which the Netherlands will wish to make use of them. The results of this climate conference are important for the content of the document, and the latter is therefore expected to be issued several months after this conference.

As part of the preparations for the Climate Policy Implementation Document, an ‘Options Document’ is being drawn up, in which possible measures are described. The Options Document will also present a number of sets of options, in which given proportions of domestic and foreign measures are proposed to cover a particular policy deficit. No choices will be made in the Options Document, which will be completed this summer, but it does constitute the information base for a number of important decisions which must be taken in the policy document. The Options Document is being drawn up under contract by the Dutch Energy Research Centre (ECN) and the RIVM, in collaboration with the CPB.

I hereby request you to prepare an advice for the purpose of the Climate Policy Implementation Document, in which you should consider the Options Document. The context in which the Climate Policy Implementation Document is being prepared will be outlined below, together with further specifications related to my advice request.

2. Context in which the Climate Policy Implementation Document is being prepared

The central objective of the Climate Policy Implementation Document is the translation of the agreement on emissions reductions set forth in the Kyoto Protocol into policy in terms of measures and instruments such that the Netherlands can have the requisite confidence that it will meet its reduction commitments (based on the EU burden-sharing) during the budget period 2008-2012.

As the first step towards the final Climate Policy Implementation Document, an ‘Options Document’ is being drawn up in which the various types of climate policy

measure (such as energy conservation, renewable energy, CO₂ sequestration, other greenhouse gases, flexible instruments for reductions in other countries and CO₂ storage) are described, giving for each option its reduction potential, costs, cost-effectiveness, 'instrumentability', the implementation timescale, the level of support enjoyed and the associated risks.

The Options Document will also formulate and work through several sets of option so that, starting from a particular reduction commitment to be achieved by the Netherlands, a picture can be formed of possible measures, policy instruments, costs, etc. It also makes clear what the consequences would be if a decision were made not to take a given measure. The Options Document will list the options rather than make choices. The choices will have to be made in the Implementation Document.

3. Advice request

In view of the above I would like to specify my request for an advice in greater detail. I would like to ask you for:

An assessment of and an advice on the Options Document and the sets of options it contains.

- An assessment of and an advice on the extent to which the Netherlands should make use of flexible instruments (JI, Clean Development Mechanism, emissions trading). Aspects to be included in the assessment are cost-effectiveness, the level of international support for these instruments and the impact on national reduction policy in succeeding budget periods having regard to the likely temporary availability of flexible instruments.
- An assessment of and an advice on the appropriate policy instruments (emphasis on regulatory or market-oriented instruments such as taxes/levies and emissions trading).
- An assessment of the policy for achieving the reduction commitments in the first budget period, bearing in mind the need for more ambitious commitments in budget periods after 2012.
- An advice on possible damage limitation policy if the reduction target is not achieved. Possibilities include the introduction of ceilings, sanctions and the pursuit or preparation of contingency policy.
- An assessment as to the desirability of 'climate-only' measures such as CO₂ storage.

Preparations are now being made for the Climate Policy Implementation Document. I consider it very important that an advice by the Council for Housing, Spatial Planning and the Environment should play a role in the policy choices to be made in this document. I would therefore appreciate it if the advice could be made available by 1 November 1998 at the latest.

Finally, I should like to ask you to involve other advisory councils in the advice, particularly the advisory councils of the ministries involved with the Climate Policy Implementation Document: Agriculture, Nature Management and Fisheries, Traffic, Public Works and Water Management, and Economic Affairs. The Minister of Economic Affairs has also asked the General Energy Council for an advice on the consequences of the Kyoto obligations for energy policy.

Yours faithfully,

The Minister of Housing, Spatial Planning and Environmental Management

Margaretha de Boer

Annex 3 The supplementary advice request

Translation of letter containing additional requests regarding an advice for the preparation of the 'Climate Policy Implementation Document'

From: Minister of VROM, Mr. J.P. Pronk
To: Chairman of VROM-Council
Dated: 9 November 1998

Dear Chairman

My predecessor requested you, in a letter dated 28 May 1998, to prepare an advice for the purpose of the Climate Policy Implementation Document in which you would also consider the 'Options Document for reducing the emissions of greenhouse gases' which was to be drawn up by the Dutch Energy Research Centre (ECN) and the RIVM. The Options Document, recently published by these two institutes, is attached to the present letter.

I would also request you to deal with the results of the fourth Conference of the Parties to the Climate Treaty (CoP4), being held during 2 to 13 November in Buenos Aires, in your advice. The results of this Conference, which my department will inform the Council about as soon as possible after its conclusion, will be important for the contents of the Implementation Document. I should like to have your assessment and advice. I would appreciate it if the advice could be made available before the end of the year, so that it can play a role in the policy choices which will come up in the Climate Policy Implementation Document.

Finally I should like you to consider organising, if possible in the month of January 1999, a debate on the Options Document and the advice of the Council. In order that the results of the debate can contribute to the policy document I would appreciate having the results by 1 February 1999. I am willing to provide the necessary logistical and financial support to the Council for this purpose.

Yours faithfully

The Minister of Housing, Spatial Planning and Environmental Management

J.P. Pronk

Annex 4 Composition of the Council for Housing, Spatial Planning and the Environment

The Council for Housing, Spatial Planning and the Environment is made up as follows:

Dr Th. Quené, Chairman
Ms M.M. van den Brink
Mr L.C. Brinkman
Ms M. Daalmeijer
Professor J.W. Duyvendak
Professor R. van Engelsdorp Gastelaars
Mr J.J. de Graeff
Professor W.A. Hafkamp
Ms F.M.J. Houben
Professor J. de Jong
Ms M.C. Meindertsma
Mr P.G.A. Noordanus
Professor I.S. Sariyildiz
Professor J. van der Schaar
Professor W.C. Turkenburg
Mr T.J. Wams
Ms L.M. Wolfs-Kokkeler

Observers

Mr P.J.C.M. van den Berg, on behalf of Central Planning Bureau
Professor N.D. van Egmond, on behalf of RIVM
Mr Th. Roes, on behalf of Social and Cultural Planning Bureau

General Secretary

Mr W.A. Haeser

External member of the working party which prepared this advice

Dr B. Metz, RIVM

Secretariat personnel involved with this advice

Mr R.C.H. Flipphi
Ms J. Crince-van der Tol
Mr P.A. van Driel
Mr D.H. van Dijk
Mr J.J.H. Egberts
Mr A.J.F. de Vries
Ms A.C. van der Zwan-van der Kramer