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THE INTERACTION BETWEEN THE EU EMISSIONS TRADING SCHEME AND ENERGY POLICY INSTRUMENTS IN THE NETHERLANDS

Implications of the EU Directive for Dutch Climate Policies

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Acknowledgement/Preface

The present report is part of the Dutch contribution to the research project *Interaction in EU Climate Policy* (INTERACT). This project explores the potential interactions between the operation of the proposed EU Emissions Trading Scheme (EU ETS) and other, related energy and climate policy instruments in EU Member States. The Interact project is supported by the European Commission under its Fifth Framework Programme 'Energy, Environment & Sustainable Development' (Project no. EVK2-CT-2000-0067). It is co-ordinated by SPRU at the University of Sussex (UK), and involves four other research institutes in France (CIRED), Germany (ISI), Greece (EPG) and the Netherlands (ECN). More details about the Interact project, including a list of publications delivered by the research partners, can be found at http://www.sussex.ac.uk/spru/environment/research/interact.html.

The Interact project is registered at ECN under number 7.7358. For information on the ECN contribution to the project you can contact Jos Sijm by email (sijm@ecn.nl) or by telephone (+31.224.568255).

Abstract

The present study analyses the potential interactions between the EU Emissions Trading Scheme (EU ETS) and some selected energy and climate policy instruments in the Netherlands. These instruments include:

- The *Benchmarking Covenant* (BC): a negotiated agreement with energy-intensive industries in order to improve their energy efficiency.
- The *Regulatory Energy Tax* (REB): an ecotax on the consumption of gas and electricity, including the partial exemption of this ecotax on renewable electricity.
- The *Environmental Quality of Electricity Production* (MEP): a feed-in subsidy system for producers of renewable electricity.
- The system of *Tradable Green Certificates* (TGCs): a system of guarantees of origin to promote renewable electricity based on the partial exemption of the REB.

A general finding of the present report is that once the EU ETS becomes operational, the effectiveness of all other policies to reduce CO_2 emissions of the participating sectors becomes zero. The report explores the specific implications of this general finding for the coexistence of the EU ETS and the selected policy instruments in the Netherlands. It concludes that this coexistence will have a significant impact on the performance of both the EU ETS and the selected instruments in the Netherlands.

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SUMMARY/POLICY BRIEF

S.1. Introduction

This policy brief presents an overview of the implications of the proposed EU Emissions Trading Scheme (EU ETS) for some selected energy and climate policy instruments in the Netherlands. It summarises the results of research that has been conducted by the Energy research Centre of the Netherlands (ECN) as part of the EU-funded project *Interaction in EU Climate Policy.*

S.2. Climate policy context

The Netherlands signed the Kyoto Protocol along with the other Member States of the EU in 1998. It was agreed that the Dutch contribution to realising the EU commitment under the Protocol would be to reduce emissions of greenhouse gases by an average of 6 percent per year in the period 2008-2012, relative to 1990.

In order to meet its Kyoto target, the Dutch government launched the so-called 'Climate Policy Implementation Plan (CPIP), consisting of two parts. Part I (1999) deals with domestic measures to mitigate GHG emissions, while Part II (2000) presents the initiatives that the Netherlands will be taking abroad by means of the Kyoto mechanisms. It was agreed that half of the required emissions reductions would be realised abroad. The other 50 percent will be achieved at home, of which about two-thirds will be realised by reducing CO_2 emissions and one-third by reducing other GHGs.

According to the most recent projections, total GHG emissions in the Netherlands without implementation the policy measures of the CPIP would amount to about 239 $MtCO_2$ equivalents in 2010, while the Kyoto target corresponds to a limit of, on average, 199 Mt per year over the period 2008-2012. This implies that the total reduction assignment for the year 2010 is about 40 $MtCO_2$ equivalents. Following the CPIP principles mentioned above, this means that the domestic reduction target amounts to 20 Mt CO_2 equivalents per year (of which about 13-14 Mt will be achieved through CO_2 reductions).

Besides the division between CO_2 versus other GHG reductions, Part I of the PCIP specified some other criteria with regard to the selection of policy instruments to reach the domestic GHG mitigation target. These criteria included that policy measures should be cost-effective, spread the effort in a balanced way across target groups, encourage structural changes, which reduce CO_2, and allow target groups flexibility in what actions they take while assuring that results are achieved. These criteria have led to emphasis on negotiated agreements with target groups and market-oriented instruments such as fiscal incentives, subsidies and information programs.

S.3. Selected climate policy instruments in the Netherlands

A total of four policy instruments were selected for an exploration of their potential interactions with the EU ETS. These were chosen on the basis of their relative importance and their coverage of different target groups. The instruments include:

- The *Benchmarking Covenant* (BC): a negotiated agreement with energy-intensive industries in order to improve their energy efficiency.
- The *Regulatory Energy Tax* (REB): an ecotax on the consumption of gas and electricity, including the partial exemption of this ecotax on renewable electricity.

- The *Environmental Quality of Electricity Production* (MEP): a feed-in subsidy system for the producers of renewable electricity.
- The system of *Tradable Green Certificates* (TGCs): a system of guarantees of origin to promote renewable electricity, based on the partial exemption of the REB.

As the MEP, the TGCs and the exemption of the REB all serve the same purpose, i.e. encouraging renewable energy, they have been grouped together as 'renewable energy support policies' when exploring the potential interactions with the EU ETS. Table S.1 lists the selected instruments and indicates the nature of their interaction with the EU ETS.

Table S. 1 *The nature of the potential interaction between the EU ETS and selected policy instruments in the Netherlands*

Category	Instrument	Acronym	Direct	Indirect	Trading
Negotiated agreements	Benchmarking Covenant	BC	✓	✓	
Carbon/energy taxes	Regulatory Energy Tax (levy on gas and electricity use)	REB		✓	
Support for renewables	Environmental Quality of Electricity Production (feed-in subsidy)	MEP		✓	
Support for renewables	Regulatory Energy Tax (reduced levy for green power)	REB		✓	
Support for renewables	Tradable Green Certificates	TGC		✓	✓

A comprehensive analysis of the potential interactions between each of the above instruments and the EU ETS has been conducted as part of the Dutch contribution to the Interact project. The following three sections provide a summary of this analysis. In each case the scope, objectives, and operation of the instruments are compared, policy options are identified and specific policy recommendations are provided. The final section deals with some general policy implications of the EU ETS for national climate policies.

S.4. Interaction between the EU ETS and the Benchmarking Covenant

The Benchmarking Covenant is one of the key instruments of current climate policy in the Netherlands. The Covenant is a voluntary agreement, signed in July 1999 by the Dutch government and the energy-intensive industry, including the electricity production sector. The central goal of the Benchmarking Covenant (BC) is to reduce greenhouse gas emissions from energy-intensive industries by improving their energy efficiency without compromising the international competitiveness of these industries. According to the BC, participating industries are required to become part of the top-of-the world in terms of energy efficiency as soon as possible, but no later than 2012. In return, the government will refrain from implementing additional specific national measures aimed at further reducing energy use or CO_2 emissions by these industries.

S.4.1 The scope of the instruments

In terms of sectoral coverage (notably of companies involved) there is a high degree of overlap between the major target groups of the EU ETS and the BC. Nevertheless, there are a few companies (with a relatively large amount of installations) that have joined the BC but which are not covered by the EU ETS. On the other hand, there are several companies which are subject to the EU ETS but which do not participate in the BC (although most of these companies have signed alternative Long-Term Agreements on energy efficiency).

S.4.2 The objectives of the instruments

There is a high degree of overlap and synergy between the primary objectives of the two instruments, i.e. improving energy efficiency (BC) versus mitigating CO_2 emissions cost effectively (EU ETS). Although improving energy efficiency and reducing CO_2 emissions usually converge in the same direction, there are some cases in which these objectives may diverge or even conflict. In addition to a situation of growing output (in which energy efficiency per unit of production may improve while CO_2 emissions may increase), these cases refer particularly to changes in fuel mix as well as to those situations in which the coverage of the emissions/energy sources differ between the BC and the EU ETS. These differences in coverage of emissions/energy sources include especially the coverage of (i) direct versus indirect emissions, (ii) energetic versus non-energetic emissions and (iii) energy/emissions from waste, biomass or non-fossil sources. In all these cases, the objectives of improving energy efficiency (BC) and reducing CO_2 emissions (EU ETS) may not only move in different tempi but also in different directions.

S.4.3 The operation of the instruments

The interaction between the EU ETS and the BC raises a variety of issues, such as (i) the impact of the EU ETS on electricity prices, (ii) the impact of the EU ETS on generating heat/power, or (iii) the question whether the BC could be used as a basis for the allocation of EU ETS allowances. These issues will be briefly summarised below.

The impact of the EU ETS on electricity prices

The EU ETS may have a significant impact on the price of electricity, which, in turn, may have a significant, although opposing impact on the two major sectors covered by the Benchmarking Covenant, i.e. the power producers versus the energy-intensive industries (which are the main consumers of electricity). By means of a numerical example, it is shown that emissions trading at an allowance price of €10/tCO_2 may lead to an increase of the electricity price in 2010 by 0.42 ct/kWh. Based on a commodity or producer cost price of 2.7 ct/kWh before emissions trading, this implies an increase of that price of some 15 percent due to the EU ETS.

If the EU ETS will indeed result in an increase of the average electricity price by 0.42 ct/kWh, it will have a significant impact on the two major sectors covered by the Benchmarking Covenant. In case of free allocation of allowances, a large amount of economic rent -more than €400 million - will accrue to the power sector, while industries that compete on global markets cannot pass on an increase in the electricity price to their customers. As a result, the supply of these industries declines when the electricity price is raised.

The impact of higher electricity prices on energy-intensive industries could, in theory, be relieved by auctioning allowances to the power sector and channelling a part of the auction revenues to the (large-scale) consumers of electricity. Another option to compensate energy-intensive industries for higher electricity prices is to allocate free allowances for the generation of power to these end users rather than directly to the electricity producers, while these producers remain responsible for surrendering allowances according to their emissions. Hence, this option includes the separation of the *allocation* of allowances - i.e. indirectly to (large-scale) electricity consumers - from the *compliance obligations* for emissions, i.e. direct to power producers. As a result, the end users of electricity can sell these allowances (to the power producers) as they do not really need them, thereby compensating these end users for the higher electricity prices. In addition, in both options accruing large amounts of economic rent to power producers would be avoided.

A major disadvantage of both options is that, when implemented only in one Member State such as the Netherlands, it will affect the competitive position of both its electricity producers and (industrial) end users compared to those of other Member States. Moreover, another disadvantage - notably of the option to allocate allowances indirectly to industrial end users of electricity - is that it may significantly increase the administrative complications and, hence, the administrative demands of the EU ETS. Therefore, unless these options are implemented in all EU Member States together and their administrative demands have been adequately settled, they may not be acceptable for individual Member States from a socio-political point of view.

The impact of the EU ETS on generating heat/power
An interesting interaction issue between the EU ETS and the Benchmarking Covenant concerns the treatment of energy use and concomitant emissions due to the generation of (off-site) heat and power, including combined heat and power (CHP). In a direct (downstream) emissions trading system such as the EU ETS, emissions due to the generation of heat/power are attributed to heat/power producers. The Benchmarking Covenant, on the contrary, is based on an indirect approach of energy use and concomitant emissions, in which the emissions of power/heat are attributed to the end users.

Whereas the indirect approach of the Covenant encourages energy efficiency, the direct approach of the EU ETS may lead to sub-optimal shifts in energy use in cases where electricity or heat can be substituted for fuel. For industry, replacing direct fuel consumption by purchased heat or electricity might be an attractive way to retain allowances for selling on the market. This would occur particularly if electricity and heat prices do not adequately reflect emission costs, e.g. because of fierce competition and ample allocation of free allowances in the energy sector.

The Benchmarking Covenant as a basis for allocating EU ETS allowances
A major interaction issue concerns the question whether the BC could be used as a basis for allocating EU ETS allowances. The major advantage of such an approach would be that it fits well within existing climate policies in the Netherlands, that it would meet several allocation criteria specified in Annex III of the EU ETS Directive, and that it would increase the political acceptability of the EU ETS among the participating companies of the BC.

However, allocation of allowances based on the Benchmarking Covenant is likely to imply that the socio-economic benefits of emissions trading in the Netherlands will be relatively low. Moreover, the conversion of energy efficiency benchmarks into CO_2 emission quotas raises a variety of practical implementation issues, which may lead to high information and transaction costs. Overall, in a multi-criteria assessment, the coexistence of the EU ETS and the BC, notably when the allocation of the emission allowances is based on the BC, scores relatively high in terms of industrial competitiveness and political acceptability, but relatively low in terms of economic efficiency and administrative simplicity.

S4.4 Policy options

In order to improve the interaction between the BC and the EU ETS, several policy options have been considered, including:
1. relieving BC restrictions on EU ETS,
2. using alternative allocation rules,
3. auctioning of EU ETS allowances,
4. allocating allowances to electricity end users,
5. tightening the EU ETS cap to participating sectors,
6. abolishing the BC when the EU ETS is introduced,
7. mixing the previous options.

Based on a multi-criteria assessment, it turns out that each option separately - except Option 4 - scores higher than the baseline option (i.e. the coexistence scenario of the EU ETS and BC alongside each other, with allocation based on the BC). Option 7, i.e. a mixture of Options 2-6 (except Option 4), shows the best policy performance.

S.4.5 Policy recommendations

- The costs of emissions trading should be reflected in the price of electricity and heat. This could be achieved by either auctioning (a part of) the allowances or granting a limited amount of free allowances to the energy sector (so that additional allowances have to be bought at an auction or market). Auctioning would offer the opportunity to compensate industrial end users for the higher energy prices due to emissions trading, thereby protecting their competitive position.
- Regardless the method of allocating allowances, the Benchmarking Covenant could be considered to be abolished once the EU ETS becomes operational, since there are no convincing reasons to continue the existence of the BC alongside the EU ETS.

S.5. Interaction between the EU ETS and the Regulatory Energy Tax

The Regulatory Energy Tax (REB, after its Dutch acronym) was introduced in 1996, mainly as a levy on the use of gas and electricity by households and small-scale industry. The revenues from the REB have been mainly used to reduce other taxes and social premiums imposed largely on households and small firms (i.e. the so-called 'greening of the fiscal system').

S.5.1 The scope of the instruments

There is hardly any overlap or interaction between the direct target groups of the EU ETS and the REB. The groups directly affected by the EU ETS consist exclusively of large energy users, while the REB is imposed predominantly on the consumption of fossil electricity and gas by small- and medium-scale energy users (including households and firms). However, there are some major interactions between the indirect target groups of these instruments. For instance, the group of small- and medium-scale fossil energy users is affected directly by the REB (through taxation of conventional energy use) and indirectly by the EU ETS (through higher prices resulting from CO_2 abatement costs). Hence, this group will be subject to double regulation and may be charged double, depending on whether and to which extent the EU ETS will result in higher consumer prices for fossil electricity.

S.5.2 The objectives of the instruments

Although the EU ETS and the Dutch ecotax are predominantly focused on different direct target groups, there is a major overlap or synergy between the objectives of these instruments. The EU ETS is primarily aimed at reducing CO_2 emissions, thereby indirectly encouraging the saving of fossil fuel use in general and the switch to renewable energy in particular. On the other hand, both the primary objective of the REB to encourage the saving of fossil energy use in general and its additional objective to promote the switch to renewable energy consumption in particular contribute to the objective of reducing CO_2 emissions.

S.5.3 The operation of the instruments

The interaction between the operation of the EU ETS and REB concerns particularly the consumption of one commodity, i.e. electricity generated from fossil resources. Due to this interaction small-scale electricity consumers are subject to 'double regulation' or 'double charging' in the sense that, on the one hand, they have to pay a relatively high REB tariff (including some carbon taxation) and, on the other hand, they pay higher electricity prices due to the EU ETS (including some internalised costs of carbon reduction).

S.5.4 Policy options

A multi-criteria assessment of the coexistence of the EU ETS and an unchanged REB scores relatively low with regard to the criteria economic efficiency, social equity and political acceptability (particularly when the price of an emission allowance becomes high). This assessment provides the starting point for considering two alternative policy options that might improve the overall performance of the interaction between the EU ETS and the REB. These options include:

1. reducing the double regulation of the EU ETS and the REB on electricity use, either by reducing the REB on electricity (Option 1a) or by abolishing it completely (Option 1b),
2. improving the social equity of the REB by expanding its sectoral coverage.

Whereas the overall performance of Option 1a is higher than the baseline option of the coexistence scenario, it is lower for both Options 1b and 2. Notably the performance of Option 2 is quite poor. The major reason for this poor performance is that the effectiveness of an energy or carbon tax on reducing CO_2 emission levels by the participating sectors will be zero as these levels are fixed by the emission cap (although it may affect the replacement and, hence, the trading of emissions among these sectors). This finding is also relevant to the dragging discussion on implementing a carbon or energy tax throughout the EU. Although the ultimate judgement over such an ecotax depends on its specific purposes and characteristics (including its sectoral coverage), such a tax cannot be recommended on grounds of cost-effectiveness if it is mainly aimed at reducing CO_2 emissions by sectors participating in the EU ETS.

S.5.5 Policy recommendations

- If the EU ETS results in higher electricity prices, it could be considered to reduce the REB on electricity consumption by small-scale end users proportionally in order to avoid double taxation of these end users.
- Energy users should pay for carbon emissions, whether through taxation or emissions trading. For each target group, only a single instrument should be used for carbon pricing. Therefore, sectors participating in the EU ETS should not be subject to national or EU carbon/energy taxation.

S.6. Interaction between the EU ETS and renewable energy support policies

Recently, the Dutch system of supporting renewable electricity has been drastically reformed. Starting from mid-2003, the major elements of the new system of supporting renewable electricity includes:

- *The MEP feed-in subsidy*
  The essence of the MEP is to stimulate the environmental quality of generating electricity, notably by granting a subsidy to domestic producers of renewable electricity for each kWh fed into the grid.
- *The ecotax benefit*
  Starting from mid-2003, the REB tariff on renewable electricity will be set at 3.49 cent per kWh, compared to 6.39 ct/kWh for grey electricity, implying that the support due to the differentiation of REB rates on grey versus green electricity will amount to 2.9 ct/kWh.

- *The green certificate system*
  In the Netherlands, the green certificate system serves to facilitate the operation of a renewable electricity market based primarily on the promotion of a voluntary demand for green power. This demand is encouraged through the ecotax reduction on renewable electricity. The energy supplier, however, can only claim the tax reduction, if he surrenders to the tax authority an amount of green certificates corresponding to the amount of renewable electricity delivered to a green power consumer. Hence, in the Dutch system, there is a close link between the green certificate scheme and the ecotax incentive for renewable electricity.

S.6.1 The scope of the instruments

There is no overlap or interaction between the *direct* target groups of the EU ETS and the Dutch renewable support system. The EU ETS directly targets large fossil fuel users, including electricity generators, while the direct target groups of the Dutch renewable support system comprise, on the one hand, renewable electricity producers (through both the MEP and TGCs) and, on the other hand, renewable electricity consumers (through the ecotax benefit). However, the *indirect* interactions between the target groups of the EU ETS and the Dutch renewable support system are manifold, significant and complex.

S.6.2 The objectives of the instruments

Although the EU ETS and the Dutch support system for renewable electricity are focused on different target groups, there is a major overlap or synergy between the objectives of these instruments. The EU ETS is primarily aimed at reducing CO_2 emissions, thereby indirectly encouraging the saving of fossil fuel use in general and the switch to renewable energy in particular. On the other hand, the Dutch support system for renewable electricity is primarily aimed at promoting the use of renewable electricity.

Nevertheless, once the EU ETS becomes operational, renewable energy policies could, in principle, be abolished from a static CO_2 efficiency point of view, as the EU ETS will realise the CO_2 target of the participating sectors at the lowest costs. However, there are other reasons to justify renewable energy policies within the context of the EU ETS. Perhaps the most important argument for supporting renewable technologies within the context of CO_2 mitigation is that a widespread diffusion of these technologies may result in a substantial fall in the costs of renewable energy and, hence, in meeting major cutbacks in CO_2 emissions at affordable costs (i.e. the so-called dynamic CO_2 efficiency argument).

S.6.3 The operation of the instruments

Although renewable energy policies should be accounted for when setting national quota under the EU ETS, the Directive opts for a formal separation between the markets for green certificates and emission allowances, i.e. green certificates cannot be converted to emission allowances (or vice versa) and, subsequently, traded among each other. Nevertheless, despite this formal separation between the markets for green certificates and emission allowances, in practice there will be all kinds of linkages and interactions between these markets, running through the power market. Based on a detailed analysis of the Dutch situation, it is concluded that the operational linkages and interactions between emissions trading and renewable energy policies in general, and between the markets for power, green certificates and emission allowances in particular, are quite intricate and sometimes complicated. Overall, however, there seem to be no major problems or conflicts between the operation of the EU ETS and the Dutch support policies for renewable electricity.

On the contrary, the operation of the instruments seems to be mutually reinforcing in the sense that obtaining the operational target of one instrument enforces the achievement of the target of the other. The only problem might be the double or over-stimulation of existing MEP-subsidy receiving producers due to the interaction of the EU ETS and the Dutch system for supporting renewable electricity.

S.6.4 Policy options

Nevertheless, the recently introduced renewables support system in the Netherlands is still subject to both political discussion at home and the need to harmonise it with ongoing developments of similar policies elsewhere in the EU. Therefore, four alternative policy options have been considered with regard to the question whether these options result in an improved interaction between the EU ETS and the Dutch policies of supporting renewable electricity.

These options include:
1. reducing the double regulation of existing MEP producers,
2. abolishing the REB support while raising the MEP support proportionally,
3. introducing an obligatory quota system for renewable electricity,
4. encouraging one-way trading between green certificates and emission allowances.

The overall performance of Options 1-3 does not deviate significantly from the multi-criteria assessment of the coexistence scenario (i.e. the baseline option of the EU ETS and the Dutch renewable electricity support system in their present form). The performance of Option 4, however, is quite poor. Allowing one-way trading between green certificates and emission allowances does not serve any real purpose that could be achieved better by other, more sensible means, while it creates a variety of problems, notably double crediting, which undermines the environmental effectiveness and integrity of the EU ETS. Moreover, the present study has shown that there will already be a positive, mutually reinforcing interaction between the objectives of the EU ETS and renewable energy policies in general and between the operation of the markets for emission allowances and green certificates in particular, despite (or perhaps, owing to) the formal separation of these markets proposed by the Directive on the EU ETS. Therefore, the option of allowing one-way trading should be rejected, while the option of the EU ETS Directive to introduce a formal separation between the markets for green certificates and emission allowances should be supported.

S.6.5 Policy recommendations

- When determining the MEP feed-in subsidies to renewable electricity producers for a period of 10 years, the potential impact of the EU ETS on electricity prices should be explicitly considered.
- The market for green certificates and emission allowances should be formally separated.

S.7. Policy implications

Within the context of the EU ETS, it is important to distinguish energy policies that affect fossil fuel use (and, hence, CO_2 emissions) by the participating sectors versus the non-participating sectors because the effectiveness and the justification of these two sets of policies change once the EU ETS becomes operational. If a country joining the EU ETS has set a certain reduction target for its non-participating sectors, then national policies affecting fossil fuel use by these sectors are both necessary, effective and justified in order to control the emissions of these sectors and, hence, to meet the Kyoto commitments. On the other hand, in the absence of market failures and once a cap is set, national policies affecting the fossil fuel use of its participating sectors are neither necessary, neither effective, nor justified to control the CO_2 emissions of these sectors in the most efficient way.

The latter statement with regard to energy policies affecting the participating sectors is based on the following two considerations:

- Policies affecting fossil fuel use of participating sectors do influence the domestic CO_2 emissions of these sectors, but not the national emissions accounts of these sectors or the Country As a whole as the national quota of emission allowances allocated to these sectors is fixed. Hence, any change in the domestic emissions by these sectors is compensated by a similar change in emissions traded by these sectors.
- The operation of the EU ETS results in a situation in which the primary environmental objective of the scheme (i.e. the emissions cap) is achieved at the lowest costs by the participants themselves as it encourages these participants to adjust their abatement options and emissions trading opportunities until the marginal abatement costs throughout the scheme are equal to the international clearing price of an emission allowance.

As a result, once the EU ETS becomes operational and the cap has been fixed, policies affecting fossil fuel use by participating sectors will lead to (i) less CO_2 efficiency, i.e. raising abatement costs without enhancing overall CO_2 reductions, and (ii) less optimal market operations within the EU ETS, i.e. less demand for emission allowances and/or more supply of these allowances, resulting in a declining price of an allowance. This process may continue until the scarcity on the market for emission allowances evaporates fully and the allowance price becomes zero. Therefore, from the perspective of CO_2 efficiency, the coexistence of the EU ETS and policies affecting fossil fuel use by participating sectors is hard to justify and, hence, these policies could be considered to be redundant and ready to be abolished.

However, there are basically three reasons that may justify the coexistence of the EU ETS and other policies affecting the fossil fuel use of participating sectors. Firstly, a major reason is improving the static and dynamic efficiency of emissions trading by overcoming market failures. The findings above on the CO_2 efficiency of the EU ETS are based on the assumption of a perfect economy with no (policy) distortions or other market failures. In practice, however, there are a variety of cases in which market failures lead to a loss in energy/CO_2 efficiency, either in a static or a dynamic sense. In such cases, the EU ETS may be jointly used by other policy instruments - such as subsidies on energy savings, awareness campaigns, or support to renewables - in order to overcome these market failures. If these other policies are well designed, i.e. pass a cost-benefit test; they may result in an overall improvement in static or dynamic efficiency.

A second reason to justify the coexistence of the EU ETS and other policies affecting the fuel use and CO_2 emissions of participating sectors is that these policies may serve to meet a variety of other policy objectives besides achieving CO_2 efficiency such as (i) raising fiscal resources, (ii) serving equity purposes, (iii) preventing other environmental effects besides CO_2 emissions, or (iv) improving security of supply.

A final justification for the coexistence of the EU ETS and related policies is that using, incorporating or accounting for these other policies may improve the design and implementation of the EU ETS and, hence, may lead to an improvement of its operation or political acceptability. An example is the coexistence of the EU ETS and a carbon or energy tax in order to mitigate the price uncertainty of an EU allowance by offering the opportunity to pay a tax should the allowance price exceed the tax level.

However, policies complementary to the EU ETS may at best improve the efficiency of CO_2 abatement (in case of market failures), but not the effectiveness of CO_2 mitigation (as the amount of CO_2 reductions is fixed by the cap on CO_2 emissions). Or, to put it more bluntly, *once the EU ETS becomes operational, the effectiveness of all other policies to reduce CO_2 emissions of the participating sectors becomes zero.*

Moreover, the socio-political acceptability of meeting other objectives besides CO_2 mitigation may change once it is realised that the relatively high costs of some of these policies can no longer be justified by CO_2 objectives but only by other considerations such as less NO_x emissions, more rural employment or an improved energy supply security. Therefore, whatever these other considerations might be, it will be obvious that the evaluation of the costs and benefits of national policies affecting fossil fuel use by participating sectors will change once the EU ETS becomes operational. This may have far-reaching implications for these policies, including a major reform or, in some cases, even an abolition of these policies.

Finally, in practice, there are likely a variety of sound and less sound reasons why most of the existing policies affecting the fossil fuel use of participating sectors will be continued even after the EU ETS becomes operational, notably in the short term. As noted, some of these policies, if well designed, may lead to an improvement of the operation or political acceptability of the EU ETS, or even to an improvement of its CO_2 efficiency in cases of correcting market failures adequately. However, except for these latter cases, all other policies affecting the fossil fuel use of participating sectors will reduce the efficiency gains, or assumed cost benefits, of the EU ETS. The supposed cost benefits of emissions trading, by both policy makers and policy analysts, are usually based on studies or models that implicitly assume the absence of using joint, complementary policies. In practice, however, a variety of other, complementary policies besides emissions trading will be used, for both sound and less sound reasons. This implies, however, that actual cost benefits of emissions trading will be less as, in general, you can not have simultaneously the full (assumed) benefits of both emissions trading and other policies affecting the fossil fuel use of participating sectors.

1. INTRODUCTION

1.1 Background and objectives

Since the 1990s, the Netherlands has developed a set of policy instruments that all contribute to meeting its greenhouse gas reduction commitments for the period 2008-2012, resulting from the Kyoto Protocol and the subsequent burden sharing agreement among the EU Member States. Some major examples of these instruments include the ecotax system, the support to renewable energy, and the implementation of negotiated agreements between the government and certain economic sectors to improve their energy efficiency.

Parallel to the above-mentioned policy developments in the Netherlands, the European Commission has launched the European Climate Change Programme (ECCP), including a wide range of proposals and initiatives to reduce GHG emissions within the EU (CEC, 2001a). The centrepiece of this programme is the Directive for the establishment of an EU Emissions Trading Scheme (EU ETS). This scheme is planned to be introduced in 2005 and may cover some 40-50 percent of EU greenhouse gas emissions in 2010 (CEC, 2001b and 2003a).

Once the EU ETS becomes operational, however, it will interact with other, existing policy instruments in the Netherlands, notably those energy and climate policy instruments mentioned above. While this interaction may be complementary and mutually reinforcing, it can also be counterproductive and, hence, undermine the operation of both the EU ETS and the Dutch instruments in the field of energy and climate policies. Therefore, a better insight in the potential interactions between these instruments and the EU ETS can be helpful in developing an improved policy mix at both the EU and national level.

The main objectives of the present study are (i) to explore the potential interactions between the EU Emissions Trading Scheme (EU ETS) and some selected energy and climate policy instruments in the Netherlands, (ii) to identify ways in which potential conflicting interactions can be avoided and synergies created, and (iii) to suggest recommendations for the development of an improved policy mix between the EU ETS and Dutch instruments in the field of energy and climate policies.

1.2 Selected policy instruments

The selected energy and climate policy instruments in the Netherlands include:
- The *Benchmarking Covenant* (BC): a negotiated agreement with energy-intensive industries in order to improve their energy efficiency.
- The *Regulatory Energy Tax* (REB): an ecotax on the consumption of gas and electricity, including the partial exemption of this ecotax on renewable electricity.
- The *Environmental Quality of Electricity Production* (MEP): a feed-in subsidy system for the producers of renewable electricity.
- The system of *Tradable Green Certificates* (TGCs): a system of guarantees of origin to promote renewable electricity based on the partial exemption of the REB.

As the MEP, the TGCs and the exemption of the REB all serve the same purpose, i.e. encouraging renewable energy, they have been grouped together as ‘renewable energy support policies’ when exploring the potential interactions with the EU ETS.

1.3 Report structure

The remainder of the present report consists of five additional chapters. First of all, Chapter 2 provides a brief overview of the key elements and the major contentious issues of the EU Directive on GHG emissions trading. Subsequently, Chapter 3 presents a general framework for discussing the differences in CO_2 performance of national energy policies affecting participating versus non-participating sectors once the EU ETS becomes operational. This framework is used for the more concrete, practical exploration of the interaction between the EU ETS and the selected energy policy instruments in the Netherlands explored in the present report.

The main part of the present report consists of Chapters 4 to 6, each dealing with the potential interactions between the EU ETS and one of the above-mentioned policy instruments in the Netherlands. More specifically, Chapter 4 studies the interactions with the Benchmarking Covenant, Chapter 5 analyses the interactions with the REB on the final use of conventional electricity and gas, while Chapter 6 explores the interactions with the renewable energy support policies (including the ecotax benefit on green power, the MEP and the green certificate scheme).

Chapters 4 to 6 are structured in a similar way. After an introduction of the selected instrument, the interaction of this instrument with the EU ETS is explored according to the following dimensions:

- The *scope* of the instruments, where scope refers particularly to the target groups, economic sectors and/or emission sources affected by each instrument.
- The *objectives* of the instruments, including an assessment of the extent to which these objectives overlap, reinforce or conflict with each other.
- The *operation* of the instruments, where operation refers to the obligations, incentives, institutions and other influencing mechanisms of each instrument, including an assessment of whether the interaction between the instruments is likely to be mutually reinforcing, neutral, duplicative or conflicting when operating together.

The assessment of the potential interactions along the above-mentioned dimensions is based on the assumption that the instruments will coexist according to their present status (including future changes that have already been foreseen and fixed). This 'coexistence scenario' will subsequently be followed by an exploration and evaluation of some options to modify the EU ETS and/or the selected instrument in order to assess whether these modifications will result in an improved policy mix on the interacting instruments.

2. THE EU EMISSIONS TRADING SCHEME

2.1 Key elements and contentious issues of the Directive on emissions trading

In October 2001, the European Commission published a draft Directive on establishing a scheme for greenhouse gas emissions trading in the EU (CEC, 2001). After nearly two years of intensive discussions among stakeholders, policy makers and experts, a political agreement was reached in July 2003 on an amended version of this Directive between the European Parliament, the Commission and the Council of Environmental Ministers (CEC, 2003a). According to the agreed Directive, an EU Emissions Trading Scheme (EU ETS) will be introduced in all Member States - including the newly acceded countries of Eastern Europe - starting from the 1st of January 2005. This implies that within less than 18 months the first international and largest ETS in the world is planned to become operational.

Table 2.1 provides a summary of the key elements of the Directive on the EU ETS as agreed in July 2003. This scheme is a so-called downstream cap and trade system covering direct emissions. The major characteristics of such a scheme are (see Table 2.2 and Box 2.1):

- A cap is set on the total emissions of all participants in the scheme by allocating a certain amount of emission allowances, which is fixed ex ante for a certain period. These allowances can be freely traded among the participants.
- Participants are obliged to surrender a quantity of allowances equal to their emissions over a certain period. A surplus of allowances can be sold (or banked), while a deficit has to be covered by purchasing additional allowances (or paying a penalty).
- The obligation to surrender allowances is imposed on fossil fuel *users* (in contrast to an upstream system in which this obligation rests on the *suppliers* of fossil fuel).
- Emissions of electricity and off-site heat are attributed directly to power and heat *producers* (in contrast to an indirect system in which such emissions are imputed to *consumers* of electricity and heat).

The first phase of the proposed EU ETS is supposed to run from 2005 to 2007, followed by a second phase, which overlaps with the first commitment period of the Kyoto Protocol (2008-2012). Participants in the scheme include electricity generators, oil refineries and energy intensive installations in manufacturing sectors such as iron and steel, paper, and minerals. Overall, it is estimated that initially the EU ETS will cover some 10,000-15,000 installations, accounting for approximately 45-50 percent of total CO_2 emissions in the EU during the period 2008-2012, and of some 36-40 percent of total GHG emissions in these years. It is envisaged, however, that the scope of activities and emissions covered by the EU ETS will be gradually extended over time.

As noted above, the EU ETS has been discussed intensively since the Commission published the draft Directive in October 2001. The major contentious issues have been (Sorrell, 2002b and 2003; CEC, 2003a):

1. *Sectoral coverage (Articles 2 and 30, and Annex I).* The sectoral coverage of the ETS Directive is based on that of the Integrated Pollution Prevention and Control (IPPC) Directive, but several IPPC sectors are excluded, notably chemicals, food and drink, non-ferrous metals and waste incineration. The European Parliament and some Member States have been in favour of expanding the sectoral coverage of the scheme, but this idea has been strongly opposed by other Member States, especially Germany, who wanted to ensure that the chemical sectors remained outside the scheme.

In the Directive of July 2003 (Article 30), it has been agreed that the Commission may make a proposal to the European Parliament and the Council by 31 December 2004 to amend Annex I of the Directive to include other activities or sectors such as the chemicals, aluminium and transport sectors.

2. *Opt-in (Article 24).* Several Member States pressed for opt-in provisions in order to allow non-eligible installations to voluntarily join the scheme. Such provisions have indeed been included in the Directive of July 2003 but only for the second phase of the scheme. Opt-ins are subject to approval by the Commission, taking into account the effects on the environmental integrity and monitoring reliability of the scheme.

3. *Opt-out (Article 27).* Originally, the Commission intended the EU ETS to be mandatory for all Member States and all proposed sectors and installations, but this was opposed by Germany and the UK who were interested in avoiding major modifications of their existing policy framework (notably in protecting their existing negotiated agreements with manufacturing industry). The Directive agreed in July 2003 allows Member States to apply to the Commission for the unilateral exclusion of installations during the first phase of the scheme. Opts-outs will only be allowed if installations can show that they will limit their emissions by as much as would be the case if they were subject to the requirements of the Directive ('equivalence of efforts'). Moreover, exempted installations will also be subject to the same monitoring, reporting and verification requirements and to equivalent penalties for non-compliance as installations within the scheme. For the second phase, no opt-outs are allowed.

4. *Allocation (Articles 9-11 and Annex III).* The allocation of emission allowances to individual installations is evidently one of the most contentious issues of the proposed EU ETS. Although the Directive provides some general allocation criteria, this issue is largely delegated to the individual Member States that have to design national allocation plans to be reviewed by the Commission. These criteria, however, are not always clear and sometimes contradictory (see Chapter 4). A major point of discussion has been whether allowances should be allocated free of charge or (partly) auctioned. In the final Directive, it has been agreed that for the three-year period beginning 1 January 2005 Member States shall allocate at least 95 percent of the allowances free of charge. For the five-year period beginning 1 January 2008, Member States shall allocate at least 90 percent of the allowances free of charge.

5. *Interfaces with other emissions trading and credit schemes (Articles 25 and 30).* Many business groups are in favour of opening the EU ETS to other emission trading and credit schemes, including JI, CDM, 'hot air' trading with Eastern Europe, or International Emissions Trading (IET) with other Annex I countries (such as Japan of Canada). On the other hand, environmentalist groups and members of the European Parliament have been more restrictive on this issue as they would like to ensure an adequate amount of emissions reduction to be realised within the EU rather than buying 'hot air' or 'dubious' JI/CDM credits from abroad. According to Articles 25 and 30 of the Directive, the relationship between the EU ETS and IET with other Annex I countries during Phase 2 will be addressed in the review of the scheme scheduled for 2006. Moreover, the EU ETS will be linked to the project-based flexible instruments of the Kyoto Protocol (JI and CDM), as recently proposed by the European Commission in an additional, separate Directive (CEC, 2003c). According to this draft Directive, participants of the EU ETS may convert emission credits from JI and CDM projects into EU allowances in order to fulfil their obligations under the EU ETS. All types of JI/CDM credits are allowed for conversion, except credits from nuclear facilities, carbon sink enhancement projects and large-scale hydropower projects not meeting certain criteria. In principle, there is no quantitative restriction to the conversion of JI/CDM credits, but as soon as these credits amounting to six percent of initially allocated EU allowances have been converted, the Commission must undertake a review and decide whether a quantitative limit of for example eight percent could be introduced.

Table 2.1 Key elements of the EU Emissions Trading Scheme (EU ETS), as agreed by the European Parliament, the Council and the Commission in July 2003

Type of system	– Downstream cap & trade system covering direct emissions.
Timing	– Phase 1: 2005-2007. – Phase 2: 2008-2012 (i.e. first commitment period of the Kyoto Protocol).
Coverage of activities (sectors and/or installations)	– All combustion plants >20 MW thermal input, including power generators. – Oil refineries, coke ovens, ferrous metals, cement clinker, pulp from timber, glass & ceramics. – Based on IPPC Directive, but several IPPC sectors are excluded (e.g. chemicals, food and drink, non-ferrous metals, waste incineration). – Sites below IPPC size thresholds in eligible sectors may also be included. – Member States may apply to the Commission for installations to be temporarily excluded until 31 December 2007, at the latest (opt-out clause). – Member States may voluntarily extend the scheme to other installations, starting from Phase 2 (opt-in provision).
Coverage of greenhouse gases	– Only CO_2 in Phase 1. – Other gases may be included in Phase 2, provided adequate monitoring and reporting systems are available and provided there is no damage to the environmental integrity of the scheme or distortion to competition.
Size of market	– 10,000-15,000 installations. – About 50% of EU carbon dioxide emissions.
Allocation	– Free during Phase 1 with national allocation plans based on Annex III criteria and Commission guidelines. – Member States have the option to auction up to 5% of allowances in Phase 1 and up to 10% in Phase 2. – The Commission retains the right of veto over national allocation plans.
Operational rules	– On the 30th of April each year, participants have to surrender a quantity of allowances equal to their emissions in the preceding calendar year. – Participants are allowed to trade allowances among each other. – Participants are allowed to form an emissions pool by nominating a trustee who takes on the responsibility for surrendering and trading allowances on behalf of all members of the pool.
Banking	– Banking across years within each compliance period. – Member States can determine banking from first compliance period (2005-2007) to first Kyoto Protocol period (2008-2012).
Links with Kyoto mechanisms[1]	– Participants may convert emission credits from JI and CDM projects into EU allowances in order to fulfil their obligations under the EU ETS. – All types of JI/CDM credits are allowed for conversion, except credits from nuclear facilities and carbon sink enhancement projects. – As soon as credits amounting to 6% of initially allocated EU allowances have been converted, the Commission must undertake a review and decide whether a quantitative limit of for example 8% could be introduced.
Links with other schemes	– Agreements with third parties listed in Annex B of the Kyoto Protocol may provide for the mutual recognition of allowances between the EU ETS and other schemes.
Monitoring Reporting Verification	– Common monitoring, verification and reporting obligations to be elaborated. – Verification through third-party or government authority.
Allowance tracking	– Linked/harmonised national registries with independent transaction log. – To be based on Kyoto Protocol guidelines and US Acid Rain Programme.
Compliance	– Non-complying participants have to pay a penalty of €40 per tonne CO_2 during Phase 1 and 100 €/tCO_2 in Phase 2.

1) The links between the EU ETS and the Kyoto mechanisms have only recently been proposed by the European Commission in a separate Directive (CEC, 2003b), which has not yet been discussed and agreed by the European Parliament and Council of Environmental Ministers.

Source: CEC (2003a and 2003b) and Sijm and Van Dril (2003).

Table 2.2 *Classification of Emissions Trading Schemes (ETS)*

	Commodity traded	Point of regulation		Type of target
ETS	Allowances ('cap and trade')	Upstream		Absolute
				Relative
		Downstream	Direct	Absolute[1]
				Relative
			Indirect	Absolute
				Relative
	Credits ('baseline and credit')	Upstream		Absolute
				Relative
		Downstream	Direct	Absolute
				Relative
			Indirect	Absolute
				Relative

[1] This system, i.e. a direct downstream, absolute cap and trade system corresponds most closely to the EU ETS.

Box 2.1 *Classification of Emission Trading Schemes*

Emissions Trading Schemes (ETS) can be classified by means of the following three factors (see Table 2.2):[1]

- *The commodity traded*, i.e. an *allowance* or *credit* system. The basic distinction between emissions trading schemes is whether they are based on trading emission allowances (called 'cap and trade' systems) or on trading emission reduction credits (called 'baseline and credit' systems). In a *cap and trade system*, such as the EU ETS, allowances apply to *all* emissions of the participants covered by the system, while the cap refers to the emissions limit allocated to these participants for a certain period. During this period, the allowances can be traded throughout the system, while at the end of this period eligible participants have to surrender allowances to the regulatory authority corresponding to their emissions over that period. In a *baseline and credit system*, on the contrary, credits apply to emission reductions below an agreed baseline, i.e. a reference level of emissions during a certain period. The baseline in a credit scheme can be identical to the cap in an allowance scheme. Hence, both schemes can be used to implement an emissions limit (Sorrell and Skea, 1999). However, whereas all emissions - i.e. the corresponding allowances - can be traded in an allowance scheme, only emission reductions - i.e. the corresponding credits - can be traded in a credit scheme. These credits are generated when a source reduces its emissions below the agreed baseline. They can be sold to any eligible party interested in buying these credits, e.g. to either (i) a government that has to meet its emissions reduction commitments, (ii) a power plant which actual emissions exceed its baseline (in a credit scheme) or, when a linkage is established from a credit to an allowance scheme, to (iii) a steel factory which actual emissions exceed its balance of allowances obtained through an auction, free allocation or emissions trading on the market. Examples of baseline and credit systems are the two project-based flexible mechanisms defined in the Kyoto Protocol, i.e. Joint Implementation (JI) and the Clean Development Mechanism (CDM), or the installation-based NO_x trading scheme in the Netherlands (Jansen, 2002).

(continued next page)

[1] For a further discussion of the classification and major characteristics of different emissions trading schemes, see Sorrell and Skea (1999), Boom and Nentjes (2002), Jansen (2002), CO_2 Trading Committee (2002), Sorrell (2002b), Sorrell and Sijm (2003), and Section 4.2.3 of the present report.

- *The point of regulation*, i.e. an *upstream* or *downstream* system. The point of regulation refers primarily to the group of entities or persons who have to meet the target commitment of the ETS.[2] In a baseline and credit system, this group concerns the operators of a project or installation who are required to meet the agreed baseline, whereas in a cap and trade system it refers to those participants who are obliged to surrender allowances to a regulatory authority corresponding to their (imputed) emissions over a certain period. In an upstream cap and trade system, fossil fuel *suppliers* - including producers, importers, processors and/or transporters - have to surrender allowances, whereas in a downstream cap and trade system fossil fuel *users* are required to do so (although less usual, a similar distinction can be applied to an upstream versus a downstream baseline and credit system). Within a downstream scheme, a further distinction has to be made between a *direct* versus an *indirect* system, depending on the way in which emissions of electricity (and off-site heat) are treated. In a direct system, these emissions are attributed to electricity *generators*, while in an indirect system they are imputed to electricity *consumers* (or a subset of consumers).
- *The type of target*, i.e. an *absolute* target or a *relative* target system. For a certain period, both the baseline (in a credit scheme) and the cap (in an allowance scheme) can be expressed either in absolute terms - i.e. a fixed amount of, for instance, tonnes of carbon - or in relative terms, i.e. a Performance Standard Rate (PSR) such as a certain amount of energy/carbon per unit input or output. Under a relative system, the total amount of emissions allowed at the installation level is not fixed but variable, depending on the total input or output level. However, the PSR itself - just as an absolute cap - is fixed for a specific period, but both targets may be updated over time, depending on improvements in energy/carbon efficiencies, economic growth and the overall emission reduction commitments that have to be met under the ETS.

By combining the factors mentioned above, a variety of emissions trading systems can be distinguished (see Table 2.2). In practice, this variety may even be substantially larger and more complex due to all kinds of hybrids, mixtures and interlinkages among these systems. The EU ETS in its presently proposed form most closely corresponds to a direct downstream, absolute cap and trade system, with potential linkages to the project-based Kyoto mechanisms (JI and CDM) as well as to possible emissions trading systems of other, non-EU countries.

2.2 The way ahead

In the period up to the 1st of January 2005, Member States have to finalise their legislation process with regard to the implementation of greenhouse gas emissions trading within their jurisdiction and, if necessary, the adjustment of existing legislation regarding other, interacting instruments in the area of energy and climate policies. In addition, each Member State has to publish its national allocation plan and to notify it to the Commission and the other Member States by 31 March 2004 at the latest. Within three months of notification, the plan may be rejected by the Commission, resulting in a process of proposed amendments of the plan between the Member

2 In some parts of the literature, the point of regulation refers occasionally to the groups of entities or persons to whom the credits or allowances of an ETS are *allocated*. Although not correct, in many cases - particularly in all cases of a credit scheme and in case of auctioning under an allowance scheme - the group of persons to whom the credits or allowances are allocated are generally also the group of persons who have to meet the target commitment of the ETS. However, in case of free allocation under an allowance system, these two groups do not necessarily have to be the same, and it may be quite interesting for policy makers to allocate free allowances for the generation of electricity to a certain group of participants (e.g. the industrial end users of electricity) while the obligation to surrender these allowances may be laid on another group, notably the power producers (see also Section 4.2.3).

State and the Commission. Finally, if both the national allocation plan has been accepted and the domestic legislation process has been concluded, the actual implementation of the EU ETS starts, including the issuing of emission allowances, the setting up of a monitoring and verification system for GHG emissions and allowance trading at the level of individual installations, the establishment of a compliance system, etc.

Even if the process of all the steps mentioned above runs without major complications, it may be hard to start the scheme in 2005 as planned. Hence, one has to face the opportunity that the scheme may become operative some time - even a few years - after 2005, notably if the way ahead appears to be paved by unforeseen complications.

2.3 Major assumptions regarding the EU ETS

Despite the uncertainties and open issues outlined above, the interaction analysis of the remaining part of this report is based on the principal assumption that the EU ETS will be introduced in the Netherlands, starting from the year 2005, as outlined in the agreed Directive of July 2003 (CEC, 2003a). More specifically, as far as the Netherlands is concerned, the major assumptions regarding some key elements and contentious issues of the proposed EU ETS in the interaction analysis of Chapters 4 up to 6 include:

- *Sectoral coverage*: no opt-outs (first phase) and no opt-ins (second phase).[3]
- *Gas coverage*: only CO_2 (both first and second phase).
- *Allocation*: 100 percent of the allocated allowances free of charge (both first and second phase).
- *Interfaces:* no linkages with other emission trading and credit schemes during Phase 1; linkages during Phase 2 according to the draft Directive on the project-based Kyoto mechanisms (CEC, 2003c).

Some of these assumptions will be discussed as part of the interaction analyses in Chapters 4 to 6. Moreover, as noted, the analyses of these chapters is, first of all, based on the assumption that the instruments interacting together will coexist in their present form (i.e. the coexistence scenario). Subsequently, however, the major implications of modifying one or both instruments interacting together will be explored (i.e. the alternative policy options). Finally, some recommendations will be suggested in order to enhance the performance of the instruments interacting together.

[3] The major exception might be the glass horticulture sector which might be interested to opt-in during the second phase in order to realise cheap emission reduction opportunities and sell the surplus of emission allowances on the market.

3. INTERACTION BETWEEN THE EU ETS AND NATIONAL ENERGY POLICIES: A GENERAL FRAMEWORK

3.1 Introduction

National energy policies usually have a significant impact on the sectoral and overall CO_2 emissions of a EU Member State.[4] Once the EU ETS becomes operational, however, the CO_2 performance of these policies, i.e. their effectiveness and efficiency in reducing CO_2 emissions, will differ depending on whether they affect fossil fuel use by the participating or non-participating sectors of this scheme.[5]

The major objective of the present chapter is to provide a general framework for discussing the differences in CO_2 performance of national energy policies affecting participating versus non-participating sectors once the EU ETS becomes operational. This framework will be used for the more concrete, practical exploration of the interaction between the EU ETS and three selected energy policy instruments in the Netherlands outlined in Chapters 4-6.

As noted in the previous chapter, the sectors participating in the EU ETS include particularly the energy-intensive sectors (excluding chemicals), while the non-participating sectors comprise notably the household sector, the transport sector and small-scale industries. Although some policies may affect the fossil fuel use of both the participating and non-participating sectors, it will be assumed that they are actually two separate kinds of policies. The concept 'affect' refers to changes in the volume and mixture of fossil fuel use as well as to changes in direct and indirect use (i.e. via changes in electricity use). Unless stated otherwise, the effectiveness of a policy refers to its impact on achieving the *national* CO_2 target of a country, while the efficiency of a policy refers to its impact on the costs of achieving that target. The concept '*national* emissions' is distinguished from '*domestic* emissions' in the sense that national emissions are equal to domestic emissions corrected for emissions trading through either the EU ETS or one of the Kyoto mechanisms. For instance, if the domestic emissions in a certain year amount to 110 $MtCO_2$, while an amount of 10 $MtCO_2$ of emission allowances or credits is purchased abroad, the national emissions amount to 100 $MtCO_2$. Hence, a change in the domestic emissions accounts does not lead to a change in the national emissions accounts if the former is accompanied by a similar change in traded emission credits by the Country Concerned or in traded emission allowances by sectors participating in the EU ETS.[6]

In the sections below, it will be argued that policies affecting fossil fuel use of non-participating sectors are both necessary and effective to control the CO_2 emissions of these sectors and, hence, to meet the Kyoto commitments of a country. On the other hand, policies affecting fossil fuel use of participating sectors are relevant for setting the quota of emission allowances to these sectors but, once the EU ETS becomes operational, these policies are neither necessary nor effective to control the CO_2 emissions of these sectors. Hence, a central conclusion of this chapter is that *once the EU ETS becomes operational, the effectiveness of all other policies to reduce CO_2 emissions of the participating sectors becomes zero.*

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4 The discussion in this chapter focuses on national energy policies affecting fossil fuel use and corresponding CO_2 emissions. However, a similar line of reasoning could be followed if the discussion would be extended to national energy and climate policies affecting GHG emissions.

5 A previous version of this chapter has been accepted to be published as an article in Climate Policy (Sijm, 2003).

6 According to a recent EU Directive on the linkages between the EU ETS and the Kyoto mechanisms, participating sectors are also allowed to trade in JI and CDM credits in order to cover their domestic emissions. Such trade, however, affects the domestic emissions accounts of the participating sectors but not their national accounts (as the national accounts of these sectors are determined by their national quota of emission allowances).

Moreover, in a perfect economy with no market failures, policies affecting fossil fuel use by participating sectors will lead to less CO_2 efficiency and less optimal market operations of the EU ETS. Hence, in such a situation, this coexistence of policy instruments cannot be justified from a CO_2 efficiency point of view. It will be argued, however, that there are three categories of reasons why the joint use of the EU ETS and policies affecting the fossil fuel use of the participating sectors may be justified, i.e. (i) improving efficiency by overcoming market failures, (ii) meeting other policy objectives besides CO_2 efficiency, and (iii) compensating for deficiencies in the design of the EU ETS.

The structure of this chapter runs as follows. In the sections below, the CO_2 effectiveness and efficiency of energy policies will be discussed within the context of the EU ETS, first of all for the non-participating sectors (Section 3.2) and subsequently for the participating sectors (Section 3.3). Next, Section 3.4 will discuss the major reasons why the joint use of the EU ETS and policies affecting the fossil fuel use of participating sectors may be justified. Thereupon, Section 3.5 will give a numerical example to illustrate the ideas in this chapter. Finally, Section 3.6 will present a summary of the major findings and policy implications of this chapter.

3.2 Policies affecting fossil fuel use by non-participating sectors

In order to assess the CO_2 performance of policies affecting fossil fuel use by sectors not participating in the EU ETS, such as subsidies on insulation of houses or ecotaxes on household gas or petrol consumption, two cases can be distinguished. In the first case, the total emissions of all non-participating sectors of a Country Are fixed at a certain national target, either because the government is not allowed or willing to use the Kyoto mechanisms or because the government has fixed the amount of emissions credits that can or will be traded through these mechanisms. The latter applies to a country such as the Netherlands, which has intended to achieve 50 percent of its national abatement commitments through the Kyoto mechanisms (notably JI and CDM) and the other 50 percent through domestic abatements.[7] A part of these domestic abatements has to be achieved by sectors participating in the EU ETS (by placing a cap on their overall emissions) and the other part by non-participating sectors. Given a fixed level of national mitigation commitments, this implies that both CO_2 emissions and CO_2 reductions of all non-participating sectors are also fixed. It is assumed that the emissions cap of the participating sectors will be based on existing climate policies and the share of these sectors in total emissions in a reference year (related to the overall Kyoto target).[8]

In such a case, policies affecting fossil fuel use by non-participating sectors are effective in the sense that, *ceteris paribus*, a change in such policies actually changes the CO_2 emissions at the level of the non-participating sectors, the Country Concerned and even the world as a whole. Moreover, such policies are also necessary and, hence, justified in order to meet the abatement commitments of the Kyoto Protocol. However, whether a specific policy is also efficient and socio-politically acceptable depends on the costs of alternative policies to meet the domestic reduction target of the non-participating sectors, and to the question whether also other considerations besides CO_2 efficiency are included or not. These other considerations may include equity concerns, the need to share the mitigation burden equally among sectors, the transaction costs of policies, or the achievement of other objectives besides CO_2 reduction.

7 It should be noted that an objective of achieving 50 percent of the national reduction commitments at home becomes somewhat questionable when a major part of the domestic sectors participates in the EU ETS and is, hence, able to trade emission allowances. As a result, domestic abatements may be more or less than 50 percent of national reduction commitments, even if the non-participating sectors meet their fixed domestic target. Therefore, the EU ETS may result in undermining one of the central features of Dutch climate policy.

8 It should be emphasised that at the time of finalising the present report (September 2003), EU Member States such as the Netherlands had not yet fixed their emission cap for the participating sectors as they are still designing their national allocation plan for the first budget period. Hence, they still have some policy freedom to determine this cap.

In the second case, a country is fully free to adjust the emission target of its non-participating sectors by trading emission credits through the Kyoto mechanisms.[9] From an efficiency point of view, such a country should equalise the marginal abatement costs of its climate and energy policies to the international price of an emission credit, but other policy considerations may result in a different outcome regarding the optimal level of domestic reductions by its non-participating sectors. In this case, policies affecting the fossil fuel use by non-participating sectors are necessary and, hence, justified to meet the Kyoto commitments. Moreover, in response to a change in the international clearing price of an emission credit, or by an autonomous decision, a country may change its amount of traded emission credits accompanied by a comparable policy change affecting the CO_2 emissions by its non-participating sectors. Such a policy change, however, is only effective in the sense that it changes the emissions accounts of the non-participating sectors and the Country As a whole considered from a *domestic* point of view, but not from a *national* or *international* point of view.

3.3 Policies affecting fossil fuel use by participating sectors

3.3.1 Introduction

The proposed EU ETS is a downstream cap and trade system covering direct emissions by its participating sectors. In such a system, emissions due to fossil electricity use are attributed to electricity generators who have to obtain allowances in order to account for these emissions, based on their fossil fuel use. This implies that the set of policies affecting fossil fuel use of participating sectors covers actually three sub-sets of policies:

- Policies affecting fossil electricity use (and off-site heat) by non-participating sectors such as ecotaxes on household electricity consumption, subsidies on electricity-saving household appliances, or policies supporting the consumption of renewable electricity by small-scale end users. Although these policies are primarily targeted at reducing the fossil electricity use among non-participating sectors, they indirectly affect the fossil fuel use and, hence, the CO_2 emissions of the participating sectors (i.e. the power generators).
- Policies affecting fossil electricity use (and off-site heat) of participating sectors such as subsidies on electricity saving investments and tools. Although these policies are primarily targeted at reducing the fossil electricity use among participating sectors (for instance, the energy-intensive industries), they indirectly affect the fossil fuel use and, hence, the CO_2 emissions of the power generators.
- Additional policies affecting fossil fuel use by participating sectors such as environmental legislation and negotiated agreements.

In the sections below, the impact of the EU ETS on the effectiveness and efficiency of policies affecting fossil fuel use by the participating sectors will be discussed, assuming the absence or no change in electricity imports. Subsequently, this assumption will be lifted by considering the implications of a change in electricity imports.

3.3.2 Impact of EU ETS on CO_2 policy performance

According to economic theory, the main advantage of a cap and trade system such as the EU ETS is that the primary environmental objective of the scheme, i.e. the emissions cap, will be achieved at the lowest costs by the participants themselves as it encourages these participants to

[9] Although this second case is theoretically sound, in practice it has only a limited meaning as a country has only limited opportunities to adjust its policies flexible and in time to meet a change in the emission target of its non-participating sectors. Hence, the first case seems more realistic in which a government sets a certain amount of emission credits that will be traded by the Kyoto mechanisms and that may be adjusted at the end of the first budget period of the Kyoto Protocol, depending on whether the domestic reduction target of the non-participating sectors will be met.

adjust their abatement options and emissions trading opportunities until the marginal abatement costs throughout the scheme are equal to the international clearing price of an emission allowance. This optimal outcome is based on the assumption of full free emissions trading and no other policy interventions affecting the fossil energy use of participating sectors. It implies that, once the EU ETS is introduced, any additional policy intervention affecting the fossil energy use of participating sectors will restrict the optimal operation and CO_2 efficiency of the EU ETS while not influencing the overall emissions from either a national or international point of view.[10]

Domestic emissions of sectors participating in the EU ETS, on the contrary, will be influenced by a change in policies affecting fossil fuel use of these sectors. For instance, if a Country Abolishes the ecotaxes on household electricity use, the demand for fossil electricity by non-participating sectors will rise, leading to an increase in the domestic emissions of the participating sectors. The quota of emission allowances allocated to the participating sectors, however, does not change and, hence, the major effect of the increase in the domestic emissions of the participating sectors will be that these sectors will buy more (or sell less) emission allowances, while not changing the national or international emissions accounts.

Compared to a situation of full free emissions trading and no other policy interventions affecting energy use of participating sectors, however, such policies will result in two related effects:

- Less CO_2 efficiency of the EU ETS, either through (i) the encouragement of mitigation options that would have been implemented anyway due to the EU ETS (thereby making this encouragement ineffective, while raising costs), or through (ii) the adoption of alternative mitigation options that are more costly to the participating sectors and/or the society as a whole, while not increasing the overall amount of CO_2 reductions. In case (ii), this will have an additional effect:
- Less optimal market operations of the EU ETS, i.e. less demand for emission allowances and/or more supply of these allowances, leading to a declining price for an emission allowance. This process may continue until the scarcity on the market for emission allowances evaporates fully and the price becomes zero.

Therefore, from the perspective of CO_2 efficiency, the coexistence of the EU ETS and policies affecting fossil fuel use by participating sectors is hard to justify and, hence, these policies could be considered to be redundant and ready to be abolished.

3.3.3 The implications of changes in fossil electricity imports

In the sections above, it was assumed that a change in policies affecting fossil electricity use does not lead to a comparable change in fossil electricity imports from another country joining the EU ETS. However, if it does result in such a change of electricity imports, then the main difference in effects outlined above is that domestic CO_2 emissions of the participating sectors in the exporting country will change (rather than those of the importing Country Causing the policy change).[11] For instance, policies which reduce domestic fossil electricity use and, accordingly, fossil electricity imports lead to less domestic CO_2 emissions by the participating sectors of the exporting Country And, hence, the opportunity to buy less (or sell more) emission allowances by this country, whereas the (inter) national emissions accounts do not change.

[10] The only exception seems to be the case in which a policy change of a participating Annex I country leads to a change in fossil electricity imports from a non-Annex I country. Although the emissions of the Annex I Country Do not change in this case, they do change for the non-Annex I Country And, hence, for the international community as well.

[11] If the exporting country is not related to the EU ETS, two cases may be distinguished. First, if the exporting country is an Annex I country, the national and international emissions accounts do not change. Secondly, if the exporting country is a non-Annex I Country And, hence, has no overall cap on its national emissions, the latter will rise as electricity exports increase and decline if they decrease. The international emissions accounts will change accordingly as the national emissions of the importing Country Do not change.

3.4 Reasons for the coexistence of the EU ETS and overlapping instruments

3.4.1 Introduction

Above, it was concluded that, from the perspective of CO_2 efficiency, the coexistence of the EU ETS and policies affecting fossil fuel use by participating sectors is hard to justify and, hence, these policies could be considered to be redundant and ready to be abolished. However, there are basically three reasons that may justify the joint use of the EU ETS and other policies affecting the fossil fuel use of participating sectors. These reasons will be briefly discussed below, under the following headings:[12]

- correcting for market failures,
- meeting other policy objectives,
- improving the design of the EU ETS.

3.4.2 Correcting for market failures

The (theoretical) outcome of Section 3.3.2 with regard to the CO_2 efficiency and optimal operation of the EU ETS is based on the assumption of a perfect economy with no (policy) distortions or other market failures. It assumes, for instance, that the costs of emissions trading (i.e. the carbon allowance price) will be passed on to final energy users and that these users respond rationally and adequately to these price incentives. In practice, however, there are a variety of barriers and other market failures that reduce energy/CO_2 efficiency. Broadly, these barriers and failures can be categorised in two groups:

- Market barriers and failures that reduce *static* energy/CO_2 efficiency. For instance, many households fail to invest in highly cost-effective energy/CO_2 saving opportunities because they face high transaction costs, respond poorly to price incentives, are only bounded rational, or lack access to capital or adequate information. Moreover, the (indirect) price effects of the EU ETS may be low, notably when the price of an allowance is not or hardly passed through to end users. In such cases, the EU ETS may be used in combination with other policy instruments - such as subsidies, taxes or information campaigns - in order to overcome these market failures. If these other policies are well designed, i.e. pass a cost-benefit test, they may result in an overall improvement in static efficiency (Sorrell, et al., 2000).
- Technology market barriers and failures that reduce *dynamic* energy/CO_2 efficiency. Due to market barriers and failures in the field of technology development and diffusion (such as positive externalities, or low-probability/high-return/long-term investments), market forces will not generally provide the optimal rate and direction of energy- or abatement-related innovations. Therefore, besides emissions trading, complementary policies such as investment subsidies and support to renewable energy technologies may be necessary and justified to overcome these market failures and to encourage economies of scale and learning, thereby reducing abatement costs for the future (Johnstone, 2002).

3.4.3 Meeting other policy objectives

Another reason to justify the coexistence of the EU ETS and other policies affecting the fuel use and CO_2 emissions of participating sectors is that these policies may serve to meet a variety of other policy objectives besides achieving CO_2 efficiency.

[12] These cases are mainly derived from a more extensive, excellent overview of the use of emission allowances in coexistence with other policy instruments; see Johnstone (2002). See also Sorrell and Sijm (2003) and Sorrell, et al. (2003).

Major examples of such policies/objectives include:

- A carbon or energy tax may be used to either (i) raise fiscal resources, (ii) serve equity or distributional objectives, (iii) capture the economic rents of allocating allowances for free (in case auctioning is not politically acceptable), or (iv) mitigate the price uncertainty of a trading scheme such as the EU ETS (by offering the opportunity to pay an emission tax should the allowance price exceed the tax level).
- Direct regulation of energy and abatement technologies may be used to prevent other, local environmental effects ('hot spots') besides CO_2 emissions.
- Support to renewable energy may be motivated or justified by other objectives besides CO_2 efficiency such as improving security of supply, raising rural income opportunities, or reducing other environmental effects.

Two final remarks have to be added. Firstly, as outlined above, some policies complementary to the EU ETS - notably support to renewable energy - may be justified by different categories of reasons (i.e. improving the design of the EU ETS, correcting for market failures, and meeting other policy objectives). Secondly, whereas policies justified by the second category of reasons (i.e. correcting for market failures) may lead to an overall improvement in static/dynamic efficiency (provided that these policies pass a cost-benefit test), policies justified by the other two categories of reasons will generally lead to higher costs. As the carbon benefits have already been accounted for by the costs of the EU ETS, the costs of complementary policies have to be justified by other, non-carbon benefits.

3.4.4 Improving the design of the EU ETS

A final reason for the coexistence of the EU ETS and other policies affecting the fossil fuel use of participating sectors is that using, incorporating or accounting for these other policies may improve the design and implementation of the EU ETS and, hence, may lead to an improvement of its operation or political acceptability. A major example is to use existing direct regulations or negotiated agreements as the basis for the allocation of the emission allowances. In this case, however, the regulations or agreements would need to be removed once the EU ETS becomes operational in order to ensure optimal emissions trading. More generally, as indicated by the EU ETS Directive, renewable energy support and other, existing policies affecting CO_2 emissions of participating sectors should be accounted for when setting the national allocation plan for these sectors (CEC, 2003a). In this case, however, most of these policies will be continued after the introduction of the EU ETS, thereby affecting its operational performance. Finally, some other examples of complementary instruments that may improve the design, operation or acceptability of the EU ETS include:

- The use of an energy tax as a penalty for non-compliance with the EU ETS or as an opportunity to pay a tax should the allowance price exceed the tax level (in order to mitigate the price uncertainty of the EU ETS).
- The use of voluntary opt-in arrangements, or the development of crediting arrangements that participating companies can use for compliance, in order to expand the regulation scope of the EU ETS.

3.5 A numerical example

3.5.1 Introduction

This section provides a numerical example of the ideas outlined in the previous sections. The example is based on an imaginary country with fictive data, but has been designed in such a way that it does provide a link between the abstract, theoretical ideas of the previous sections and the more concrete, practical cases of the interaction between the EU ETS and the three selected energy policies in the Netherlands explored in Chapters 4 through 6.[13]

3.5.2 Base variant: Policy-free scenario and Kyoto Protocol

Point of departure is a country (A) in which there is no policy at all to reduce CO_2 emissions (i.e. the so-called 'policy-free scenario'). In this scenario, Country A is expected to emit 1000 $MtCO_2$ in the year 2010. Country A, however, has ratified the Kyoto Protocol, implying that it is committed to restrict its CO_2 emission to a maximum level of 800 $MtCO_2$.

In order to meet its Kyoto commitments, Country A starts to develop a climate change policy package. It decides that 50 percent of its reduction target will be met abroad by purchasing JI/CDM emission credits, while the other half will be achieved domestically. To reach the domestic abatement objective, five new policy instruments are introduced:

- An ecotax on household gas consumption, with six different levels of taxation (A1-A6).
- An ecotax on household electricity use, with six different levels of taxation (B1- B6).
- A negotiated agreement with the energy-intensive industries in order to reach a certain energy efficiency benchmark by the year 2010.
- A set of renewable electricity support policies, with six different levels of support (D1-D6).
- Emissions trading, i.e. participating in the EU ETS, with different options of domestic reductions and trading emission allowances, depending on the international clearing price of an emission allowance.

The instrument of emissions trading, however, applies only to the so-called 'participating sectors'. As these sectors account for about 50 percent of the projected emissions in the policy-free scenario (i.e. 500 $MtCO_2$ in 2010), the government of Country A decides that the participating sectors have to achieve half of the domestic reduction target (i.e. 50 $MtCO_2$) and, hence, that the quota of emission allowances allocated to these sectors will be set at 450 $MtCO_2$. This implies that the reduction target for the non-participating sectors will also be 50 $MtCO_2$, resulting in an overall emission limit of 450 $MtCO_2$ for these sectors in 2010 (see Table 3.1 for a summary of the policy choices of Country A and their policy implications for sectoral, domestic and national emission reduction commitments in order to meet the Kyoto Protocol).

Table 3.2 provides a summary of the five policy instruments of Country A to reach its Kyoto objective, including the abatement potential and costs of each instrument (depending on the level to which an instrument will be deployed).[14] For instance, Table 3.2 shows that raising the tariff of the ecotax on household gas consumption from level 4 to 5 will result in an additional emission reduction of 10 $MtCO_2$ at a marginal abatement cost of 40 €t/CO_2. As a result, the total reduction potential of this instrument rises to 50 $MtCO_2$, while the total (social) abatement costs increase to €770 million, i.e. an average abatement costs of 15.4 €/tCO_2. For the instrument emissions trading, Table 3.2 gives a similar cost pattern for different levels of reduction options.

In order to enable international emissions trading, a second country (B) is assumed to join the EU ETS with a reduction commitment for its participating sectors of only 10 $MtCO_2$.[15] Table 3.3 provides an overview of the supply and demand conditions on the market of emission allowances, assuming the participation of only two countries (A and B). The demand for emission allowances is equal to the reduction commitments for the participating sectors of each country,

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[13] The data on CO_2 emissions are fictitious, but if divided by a factor 4 they roughly approach the projected situation for the Netherlands in 2010 with regard to total GHG emissions. The data on abatement potentials and costs, on the contrary, are fully fictitious.

[14] For the simplicity of the example, it is assumed that there is no interdependence or covariance between the emission reductions of the abatement options, but this assumption does not really affect the line of reasoning.

[15] This low amount has been chosen on purpose in order to show clearly the impact of Country A on the price and volume of emissions trading.

i.e. 50 $MtCO_2$ for Country A and 10 $MtCO_2$ for Country B. The supply of emission allowances is equal to the reduction options realised by the participating sectors of each country, depending on the price of an emission allowance (as the marginal costs of these options will be equalised to this price). As shown by Table 3.3, the market of emission allowances will be in equilibrium at an international clearing price of 5 €t/CO_2.

Table 3.1 *Kyoto Protocol: stylised example of national mitigation commitments of Country A*

	[Mt/CO_2]
Policy-free scenario: total CO_2 emissions	
• Participating sectors	500
• Non-participating sectors	500
• Total	1000
Kyoto Protocol: CO_2 emissions	
• Emission quota/cap of participating sectors	450
• Emission target of non-participating sectors	450
• Total domestic emission cap	900
• Purchase of emission credits (JI and CDM)	100
• National emission cap	800
Kyoto Protocol: CO_2 reductions	
• Reduction quota of participating sectors	50
• Reduction target of non-participating sectors	50
• Total domestic reductions	100
• Purchase of emission credits (JI and CDM)	100
• National reductions	200

3.5.3 Policy variants to meet Kyoto commitments

Below, different policy variants will be discussed in order to show their performance - in terms of costs and effectiveness - in meeting the Kyoto commitments of Country A. A summary of these policy variants and their performance is provided by Table 3.4. For each variant, Table 3.4 indicates the policy instruments that will be applied to meet the Kyoto commitments, including their level of implementation, as well as the abatement potential and costs of each instrument and the policy package as a whole.

Variant 1: All instruments, excluding emissions trading

In this variant, Country A applies all available energy and climate policy instruments, except emissions trading, in order to meet its Kyoto commitments. Hence, this variant represents the case in which a country meets its Kyoto commitments by so-called ‘existing policies’. In particular, it uses the following instruments:

- The purchase of JI/CDM emission credits to the agreed target level of 100 $MtCO_2$ at an (assumed) price of 5 €/tCO_2 (or at a total cost of €500 million).
- The ecotax on household gas consumption set at level A5. At this level, the domestic reduction target of the non-participating sector is reached (50 $MtCO_2$) at a total (social) cost of €770 million. Actually, in this numerical example, the ecotax on household gas consumption is the only instrument available to reach the reduction target of the non-participating sectors.
- The ecotax on household electricity use set at level B4. At this level, households will reduce their electricity consumption, resulting in a CO_2 reduction by the power generators of 20 $MtCO_2$ at a total cost of €365 million.
- The negotiated agreement with the energy-intensive industry, leading to an emission reduction of 24 $MtCO_2$ at a total cost of €240 million.

- The support of renewable electricity at a subsidy level of D3, resulting in 6 $MtCO_2$ reductions at a total cost of €54 million.

Overall, Country A reaches its national reduction commitment (200 $MtCO_2$) in this policy variant at a total cost of almost €2 billion.

Table 3.2 *Abatement potential and costs of alternative policy instruments of Country A*

Option	Potential [$MtCO_2$]	Marginal costs [€/tCO_2]	Total potential [$MtCO_2$]	Total costs [Million €]	Average costs [€/tCO_2]
A. Ecotax on household gas consumption					
A1	10	2	10	20	2.0
A2	10	5	20	70	3.5
A3	10	10	30	170	5.7
A4	10	20	40	370	9.3
A5	10	40	50	770	15.4
A6	10	70	60	1470	24.5
B. Ecotax on household electricity consumption					
B1	5	4	5	20	4.0
B2	5	9	10	65	6.5
B3	5	20	15	165	11.0
B4	5	40	20	365	18.3
B5	5	70	25	715	28.6
B6	5	110	30	1265	42.2
C. Negotiated agreement with energy-intensive industries					
C1	24	10	24	240	24.0
D. Renewable electricity support policies					
D1	2	2	2	4	2.0
D2	2	5	4	14	3.5
D3	2	20	6	54	9.0
D4	2	50	8	154	19.3
D5	2	100	10	354	35.4
D6	2	180	12	714	59.5
E. Emissions trading (domestic abatement options)[1]					
E1	8	1	8	8	1.0
E2	8	2	16	24	1.5
E3	8	3	24	48	2.0
E4	8	4	32	80	2.5
E5	8	5	40	120	3.0
E6	8	6	48	168	3.5
E7	8	7	56	224	4.0
E8	8	8	64	288	4.5
E9	8	9	72	360	5.0

1) In addition to realising and trading the domestic abatement options, emissions trading also includes the option of buying and selling emission allowances abroad at the international equilibrium price. It should be noted that, at each cost level, the domestic abatement options under emissions trading include the abatement options of all other policy instruments mentioned in the table that affect the fossil fuel use of the participating (besides some additional options not incentivised by these instruments). For instance, category E2 includes 2 $MtCO_2$ reductions covered by D1, while E4 includes 5 $MtCO_2$ reductions covered by B1.

Table 3.3 *Emissions trading: stylised example of supply and demand on market of emission allowances*

Price of an emission allowance [€/tCO_2]	Demand (reduction commitments)			Supply (reduction options)		
	Country A	Country B	Total A+B	Country A	Country B	Total A+B
1	50	10	60	8	4	12
2	50	10	60	16	8	24
3	50	10	60	24	12	36
4	50	10	60	32	16	48
5	50	10	60	40	20	60
6	50	10	60	48	24	72
7	50	10	60	56	28	84
8	50	10	60	64	32	96
9	50	10	60	72	36	108

Variant 2: Emissions trading with a cap based on existing policies

In this variant, all instruments - including emissions trading - can be used to achieve the Kyoto commitments. The quota of emission allowances for the participating sectors is based on the target emission level of the 'existing policies' of Variant 1 (i.e. 450 $MtCO_2$). Compared to this previous variant, the present variant leads to the following differences:

- Instead of instruments B (ecotax electricity), C (negotiated agreement) and D (support renewable electricity), instrument E (emissions trading) is applied in the sense that, at an international clearing price of 5 €/tCO_2, domestic reduction options will be realised by the participating sectors amounting to 40 $MtCO_2$ (i.e. up to level E5). In addition, an amount of 10 $MtCO_2$ emission allowances will be bought from Country B in order to meet the required emission quota for these sectors.
- The domestic reductions of Country A have decreased by 10 $MtCO_2$, while those of Country B have increased by the same amount, although the (inter)national emissions accounts have not changed.
- Total abatement costs have declined from €1930 million in Variant 1 to €1440 million in Variant 2. This decline in costs results from the fact that, due to emissions trading, the most efficient reduction options are implemented by the participating sectors (both at home and abroad).

Variant 3: Optimal use of all policy instruments

In the previous variant, emissions trading resulted in the most efficient outcome with regard to achieving the reduction objective of the participating sectors. Meeting the domestic reduction target of the non-participating sectors, on the contrary, is still faced by high marginal and total abatement costs for the only instrument available for reducing CO_2 emissions by these sectors, i.e. the ecotax on household gas consumption.

One option to reduce these costs is to relax the fixed amount of JI/CDM credits that will be purchased abroad until the marginal costs of the ecotax on household gas consumption is equal to the price of a JI/CDM credit. At an (assumed) credit price of 5 €/tCO_2, this implies that the ecotax on gas will be set at level A2 and that, as a result, 20 $MtCO_2$ will be reduced by the non-participating sectors and that 130 $MtCO_2$ of JI/CDM credits will be purchased abroad.[16] This could be achieved by either (i) increasing the amount of JI/CDM credits that will be purchased by the government of Country A from 100 to 130 $MtCO_2$, or (ii) reducing the emissions cap of the participating sector from 450 to 420 $MtCO_2$ and allowing these sectors to meet their mitigation obligations by means of the project-based Kyoto mechanisms. As a result, the government

[16] It has been assumed that there will be full and free interfaces between the EU ETS and JI/CDM schemes, resulting in a similar price for an emission allowance and an emission credit (i.e. 5 €/tCO_2).

will purchase an amount of 100 $MtCO_2$ JI/CDM credits and, in an optimal situation, the participating sectors will buy an additional amount of 30 $MtCO_2$ JI/CDM credits.

Overall, this variant leads to a further reduction of total abatement costs by an amount of €550 million to the most efficient use of all instruments at a total cost of €890 million (Table 3.4). However, whereas the abatement costs of the participating sectors are not affected in case (i) mentioned above (compared to Variant 2), they increase by €150 million in case (ii). If the outcome of case (ii) is politically unacceptable, the negative impact on the abatement costs of the participating sectors can be compensated by reducing the level of income/profit taxation by €150 million and - in order to preserve fiscal neutrality - increasing the level of taxation for the non-participating sectors by the same amount.[17]

Variant 4: Negotiated agreement besides emissions trading
This variant implies that the negotiated agreement with the energy-intensive industries will be implemented besides emissions trading. Compared to Variant 2, this variant has the following results:

- An amount of 24 $MtCO_2$ reductions will be achieved by means of the negotiated agreement at a total cost of €24 million.
- The demand for emission allowances by Country A will decline to 26 $MtCO_2$, while the total demand by countries A and B will decrease to 36 $MtCO_2$. This leads to a fall in the international clearing price of an emission allowance from 5 to 3 €/tCO_2 and to a reduction in the purchase of emission allowances by Country A from Country B from 10 to 2 $MtCO_2$.[18]
- The domestic emission reductions of countries A and B change, but the (inter) national emissions accounts remain just the same.
- While the negotiated agreement has not been effective in changing the (inter) national emissions accounts, it has resulted in (i) a reduced size of the market for emissions trading, (ii) a lowering of the price of an emission allowance, and (iii) an increase of the total abatement costs of Country A from €1440 million (Variant 2) to €1564 million (Variant 4).

This variant shows that the efficiency gains (or cost benefits) of emissions trading will be less if, for one reason or another, emission reductions are achieved by complementary, less efficient existing policies - such as a negotiated agreement - that affect the fossil fuel use of participating sectors.

Variant 5: Emissions trading with an indirect adjustment of the cap
In Variant 2, it was assumed that the emissions cap of the participating sectors was fixed at a level of 450 $MtCO_2$ together with an emission target for the non-participating sectors at a same level of 450 $MtCO_2$. At these mitigation levels, however, the marginal abatement costs for the non-participating sectors (40 €/tCO_2) are far higher than those for the participating sectors (5 €/tCO_2). Therefore, besides increasing the amount of JI/CDM purchased abroad and decreasing the reduction target for the non-participating sectors accordingly (Variant 3), another option to lower overall abatement costs is to fix the purchases of JI/CDM at the originally assumed policy level of 100 $MtCO_2$ and change the distribution of the abatement commitments between the participating and non-participating sectors, notably by lowering the cap for the participating sectors and enhancing the emission target for the non-participating sectors accordingly.

Lowering the cap of the participating sectors can be achieved in two ways: (i) directly (see Variant 6 below) or (ii) indirectly, i.e. decreasing the cap by means of policies that effectively reduce the CO_2 emissions of the participating sectors.

[17] Note that the non-participating sectors still benefit in this case as the reduction of their abatement costs far exceeds the increase in taxation of these sectors.
[18] This result can easily be deducted from Table 3.3 by reducing the demand for emission allowances by Country A from 50 to 26 $MtCO_2$.

For instance, by means of renewable energy policies or the ecotax on household electricity consumption the CO_2 emissions of the participating sectors are reduced and, hence, the cap of these sectors can be decreased accordingly. More specifically, compared to Variant 2, the policy changes of the present variant includes:

- Reducing the ecotax on household gas consumption from A5 to A4, i.e. lowering emissions reductions of the non-participating sectors from 50 to 40 $MtCO_2$, while simultaneously enhancing the emission target of these sectors from 450 to 460 $MtCO_2$. As a result, the abatement costs of the non-participating sectors decrease from €770 million to €370 million.
- Increasing the ecotax on household electricity consumption from zero to B3, while simultaneously reducing the cap for the participating sectors from 450 to 440 $MtCO_2$.[19] This policy mix implies that total emissions of the participating sectors will be reduced by 60 $MtCO_2$ of which 15 $MtCO_2$ will be achieved by means of the ecotax on electricity while the remaining 45 $MtCO_2$ will be reached through emissions trading. Hence, the demand for emission allowances by Country A will be reduced from 50 to 45 $MtCO_2$ for all price levels specified in Table 3.3. However, starting from the 5 €/tCO_2 price level, the supply of emissions allowances is also reduced by 5 $MtCO_2$ as this abatement has already been covered by the ecotax on household electricity use. This implies that the equilibrium between total supply and demand of emission allowances will remain at a price level of 5 €/tCO_2.

Overall, the total abatement costs of Variant 5 amount to €1185 million (Table 3.4). This is €285 million more than Variant 3 ('optimal use of all instruments') but €265 million less than Variant 2 ('emissions trading with a cap based on existing policies'). Hence, if for one reason or another it is not possible to make an optimal use of the project-based Kyoto mechanisms (JI/CDM) it is still possible to reduce overall abatement costs by changing the distribution of the mitigation targets between the participating and non-participating sectors rather than basing this distribution on 'existing policies'.

Variant 6: Emissions trading with a direct adjustment of the cap

Rather than reducing the cap of the participating sectors indirectly, policy makers can also decide to lower this cap directly, i.e. without any additional, compensatory policies that reduce CO_2 emissions of these sectors. For instance, policy makers can decide to reduce the cap of the participating sectors from 450 to 420 $MtCO_2$ and relieve the emission target of the non-participating sectors from 450 to 480 $MtCO_2$. More specifically, this variant includes:

- Purchasing 100 $MtCO_2$ of JI/CDM credits at a total cost of €500 million.
- Setting the ecotax on household gas consumption at level B2 in order to meet the emission target of the non-participating sectors.
- Setting the cap of the participating sectors at 420 $MtCO_2$. As a result, the demand for emission allowances of Country A rises from 50 to 80 $MtCO_2$, while the total demand of countries A and B increases from 60 to 90 $MtCO_2$. From Table 3.2, it can easily be deducted that a demand for allowances of 90 $MtCO_2$ will equalise supply at a price level of 8 €/tCO_2. At this price level, Country A will reduce 64 $MtCO_2$ at home at a total cost of €288 million (Table 3.2), while 16 $MtCO_2$ of emission allowances will be bought abroad at a price level of 8 €/tCO_2.

[19] The reason for increasing the ecotax on household electricity consumption from 0 to E3 (i.e. 15 $MtCO_2$ reduction) rather than to E2 (i.e. 10 $MtCO_2$ reduction) is that the first level of the ecotax (B1) includes 5 $MtCO_2$ of cheap reduction options which are covered by emissions trading as soon as the price of an emission allowance becomes €5/tCO_2 or higher. Hence, in case of an emission cap of 450 $MtCO_2$, the emission reduction options of B1 are already covered by emissions trading. Therefore, if the reduction of the cap from 450 to 440 $MtCO_2$ has to be met by policies which effectively reduce emissions of the participating sectors by an additional 10 $MtCO_2$, the ecotax on household electricity consumption has to be set at level B3.

Table 3.4 A*batement cost of different policy variants to meet Kyoto commitments of Country A*

Policy variant	Policy instruments[1]	Reduction [tCO_2]	Costs [mln €]
1. All instruments, excluding emissions trading	– Purchase JI/CDM emission credits	100	500
	– A1-A5	50	770
	– B1-B4	20	365
	– C1	24	240
	– D1-D3	6	54
	Total	*200*	*1929*
2. Emissions trading with a cap based on existing policies	– Purchase JI/CDM emission credits	100	500
	– A1-A5	50	770
	– E1-E5	40	120
	– Purchase emission allowances	10	50
	Total	*200*	*1440*
3. Optimal use of all instruments	– Purchase JI/CDM emission credits	130	650
	– A1-A2	20	70
	– E1-E5	40	120
	– Purchase emission allowances	10	50
	Total	*200*	*890*
4. Emission trading + negotiated agreement	– Purchase JI/CDM emission credits	100	500
	– A1-A5	50	770
	– C1	24	240
	– E1-E3	24	48
	– Purchase emission allowances	2	6
	Total	*200*	*1564*
5. Emissions trading + indirect adjustment of the cap	– Purchase JI/CDM emission credits	100	500
	– A1-A4	40	370
	– B1-B3	15	165
	– E1-E5	35	100
	– Purchase emissions allowances	10	50
	Total	*200*	*1185*
6. Emissions trading + direct adjustment of the cap	– Purchase JI/CDM emission credits	100	500
	– A1-A2	20	70
	– E1-E8	64	288
	– Purchase emission allowances	16	128
	Total	*200*	*986*
7. Emissions trading + market imperfection	– Purchase JI/CDM emission credits	100	500
	– A1-A5	50	770
	– Half of E2 and E3-E6	36	152
	– Purchase emission allowances	14	84
	Total	*200*	*1506*
8. Emissions trading + other objectives besides CO_2 mitigation	– Purchase JI/CDM emission credits	100	500
	– A1-A5	50	770
	– B1-B6	30	1265
	– D1-D4	8	154
	– E1-E2	14	20
	– Sell emission allowances	-2	-4
	Total	*200*	*2705*

1) Numbers and figures such as A1 or E5 refer to policy options indicated in Table 3.2.

Overall, the total abatement costs of this variant amount to €986 million (Table 3.4). This is €96 million more than Variant 3 ('optimal use of all instruments') but €454 million less than Variant 2 ('emissions trading with a cap based on existing policies'). Hence, the performance of this variant, in which the emission cap is reduced directly, is even quite better than the previous variant in which the cap was lowered indirectly by means of additional, compensatory abatement policies.

On the other hand, the present variant may be heavily opposed by the participating sectors as it increases their mitigation burden (by both raising their amount of CO_2 reductions as well as their marginal abatement costs). In total, the abatement costs of the participating sectors increase from €170 million (in both variants 2 and 3) to €416 million in Variant 6. The participating sectors, however, can be compensated financially for this increase in abatement cost, for instance by reducing their income/profit taxation while raising income taxes of the non-participating sectors (in order to reach fiscal neutrality).[20] Therefore, compared to Variant 2, abatement costs for all sectors may be reduced significantly if the distribution of the mitigation burden is changed between the participating and non-participating sectors, notably if the cap of the participating sectors is changed directly (i.e. excluding compensatory abatement policies, but including eventually fiscal compensation of affected sectors).

Variant 7: Emissions trading under market imperfections

In the variants above, it has been illustrated that optimal emissions trading, i.e. no other policy instruments besides emissions trading to mitigate CO_2 emissions by the participating sectors, will result in the most efficient way to reduce these emissions. This outcome, however, is based on the assumption of a perfect economy with no market failures or other distortions. Suppose, on the other hand, that due to a certain market imperfection, the participating sectors of Country A are not able to realise their most cheapest reduction options, say the full potential of Option E1 (8 $MtCO_2$) and half the potential of Option E2 (4 $MtCO_2$). Compared to Variant 2, such a situation will have the following effects:

- On the market of emission allowances, the total supply of emission allowances by countries A and B will fall by 8 $MtCO_2$ at a price level of 1 €/tCO_2 and by 12 $MtCO_2$ at all other price levels indicated in Table 3.3. As a result, market equilibrium will be reached at an international clearing price of 6 €/tCO_2. At that price, Country A will realise domestic emissions reductions of 36 $MtCO_2$ (i.e. the other half of E2 and E3 up to E6). Country B, on the other hand, will reduce an amount of 24 $MtCO_2$, and sell its surplus of emission allowances (14 $MtCO_2$) to Country A (which has a corresponding deficit of emission allowances). Hence, due to the market imperfection, the price of an emission allowance rises, while the volume of traded emission allowances increases.[21]
- The total abatement costs of Country A increase from €1440 million (optimal emissions trading) to €1506 million (sup-optimal emissions trading). Hence, due to the market imperfection, total abatement costs have increased by €66 million.

The outcome of such a market imperfection might be a good reason for the government of Country A to implement compensating policy interventions in order to induce its households and industrial sectors to realise after all the cheapest reduction options, as such interventions might result in abatement cost savings of €66 million. However, it may be hard for a government to design and fine-tune policy interventions in such a way that they indeed induce its inhabitants to implement the cheapest mitigation options. Looking at Table 3.2, only instrument D1 (renewable electricity support) seems to be able to encourage households or firms to achieve

[20] It may be questioned, however, whether the participating sectors should be fiscally compensated for the full increase in abatement costs as some sectors – notably the power sector – may be able to pass these costs (partially) to the end users of their products.

[21] The latter outcome, however, results from the fact that Country A is a net demander on the international market for emission allowances. If a similar market imperfection would happen in a country that is a net supplier, it would also result in an increase of the price of an emission allowance but the volume of traded emission allowances would decrease.

a reduction potential of 2 $MtCO_2$ at a relatively low marginal cost of 2 €/tCO_2. The other, unexploited potential of cheap reduction options (10 $MtCO_2$) has to be achieved by other, new policy instruments such as subsidies on energy saving or information campaigns.

Variant 8: Emissions trading and meeting other policy objectives besides CO_2 efficiency
In the variants above, it was usually assumed that policy interventions could or should be judged only by the objective to meet the Kyoto commitments in the most efficient way. In reality, however, governments try to reach a large variety of other objectives besides CO_2 mitigation, while the choice of a specific policy option is usually motivated or justified by other considerations besides efficiency. Suppose that government A, for a variety of other considerations besides CO_2 efficiency, wants to tax the use of fossil electricity and to support the consumption of renewable electricity. More specifically, it wants to implement policy instrument B (ecotax electricity) up to level B6 and policy instrument D (renewable electricity support) up to level D4. Compared to Variant 2, the effects of these policy choices on the performance of CO_2 reduction and emissions trading are as follows:
- Due to policy instruments B (up to B6) and D (up to D4), Country A reduces its emissions by 38 $MtCO_2$.
- The price of an emission allowance drops from 5 to 2 €/tCO_2.[22] At this price level, the participating sectors of Country A reduce their domestic emissions by 52 $MtCO_2$ (i.e. 38 $MtCO_2$ through the policy interventions B1-B6 and D1-D4, and 14 $MtCO_2$ through emissions trading).[23] Country B, on the other hand, will reduce only 8 $MtCO_2$. As a result, the trading position between countries A and B changes. Country A changes from a net buyer of emission allowances in Variant 2 (10 $MtCO_2$) to a net seller in Variant 8 (2 $MtCO_2$), with a similar change from net seller to net buyer for Country B.
- The total abatement costs for Country A increase from €1440 million to €2705 million. Although the domestic emission reductions by the participating sectors of Country A increases from 40 to 52 $MtCO_2$ and that of Country B decreases by the same amount, the (inter) national emissions accounts of countries A and B have not changed as the change in domestic emission reductions has been compensated by a corresponding change in emissions trading. Therefore, the rise in total costs of Country A (i.e. €1265 million) can not be justified by CO_2 efficiency objectives but only by other policy considerations.

Overview
Figure 3.1 provides an overview of the total abatement costs of all policy variants discussed above in order to reach the Kyoto commitments of Country A. It shows that these costs vary widely, despite the fact that the central Kyoto commitment of Country A, i.e. its national emission cap, is the same in each variant (800 $MtCO_2$). These costs are lowest in Variant 3 in which all available policy instruments are used in the most optimum way, including a flexible use of the Kyoto mechanisms in order to reach the reduction target of the non-participating sectors most efficiently. However, given the policy decisions that (i) the purchase of JI/CDM credits will be fixed at a level of 100 $MtCO_2$, and (ii) the domestic reduction target of 100 $MtCO_2$ will be shared equally between the participating and non-participating sectors, policy Variant 2 (emissions trading with a cap based on 'existing policies') appears to be the most efficient option with regard to meeting the Kyoto commitments of Country A. On the other hand, as long as the cap for the participating sectors has not yet been determined, total abatement costs may be reduced significantly if the distribution of the mitigation burden is changed directly (Variant 6).

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[22] This result can easily be deducted from Table 3.3. Due to the policy interventions of Country A, the total demand for emission allowances by countries A and B declines by 38 $MtCO_2$ to a level of 22 $MtCO_2$ for each price level indicated in Table 3.3. However, starting from price level 2, the total supply of emission allowances by countries A and B is reduced by 2 $MtCO_2$ as this reduction option has already been achieved by means of policy intervention D1 and, hence, can not be included again in the supply of domestic abatement options covered by emissions trading (see Table 3.2). Hence, at a price level of 2 €/tCO_2, the total supply of emissions allowances becomes 22 $MtCO_2$, just equalising total demand.

[23] As mentioned in the previous footnote, at a price level of 2 €/tCO_2, the supply of emission allowances by Country A is reduced by 2 $MtCO_2$ to a total level of 14 $MtCO_2$.

3.6 Summary of major findings and policy implications

Within the context of the EU ETS, it is important to distinguish energy policies that affect fossil fuel use (and, hence, CO_2 emissions) by the participating sectors versus the non-participating sectors because the effectiveness and the justification of these two sets of policies change once the EU ETS becomes operational. If a country joining the EU ETS has set a certain reduction target for its non-participating sectors, then national policies affecting fossil fuel use by these sectors are both necessary, effective and justified in order to control the emissions of these sectors and, hence, to meet the Kyoto commitments. On the other hand, in the absence of market failures and once a cap is set, national policies affecting the fossil fuel use of its participating sectors are neither necessary, neither effective, nor justified to control the CO_2 emissions of these sectors in the most efficient way.

The latter statement with regard to energy policies affecting the participating sectors is based on the following two considerations:

- Policies affecting fossil fuel use of participating sectors do influence the domestic CO_2 emissions of these sectors, but not the national emissions accounts of these sectors or the Country As a whole as the national quota of emission allowances allocated to these sectors is fixed. Hence, any change in the domestic emissions by these sectors is compensated by a similar change in emissions traded by these sectors.
- The operation of the EU ETS results in a situation in which the primary environmental objective of the scheme (i.e. the emissions cap) is achieved at the lowest costs by the participants themselves as it encourages these participants to adjust their abatement options and emissions trading opportunities until the marginal abatement costs throughout the scheme are equal to the international clearing price of an emission allowance.

As a result, once the EU ETS becomes operational and the cap has been fixed, policies affecting fossil fuel use by participating sectors will lead to (i) less CO_2 efficiency, i.e. raising abatement costs without enhancing overall CO_2 reductions, and (ii) less optimal market operations within the EU ETS, i.e. less demand for emission allowances and/or more supply of these allowances, resulting in a declining price of an allowance. This process may continue until the scarcity on the market for emission allowances evaporates fully and the allowance price becomes zero. Therefore, from the perspective of CO_2 efficiency, the coexistence of the EU ETS and policies affecting fossil fuel use by participating sectors is hard to justify and, hence, these policies could be considered to be redundant and ready to be abolished.

However, there are basically three reasons that may justify the coexistence of the EU ETS and other policies affecting the fossil fuel use of participating sectors. Firstly, a major reason is improving the static and dynamic efficiency of emissions trading by overcoming market failures. The findings above on the CO_2 efficiency of the EU ETS are based on the assumption of a perfect economy with no (policy) distortions or other market failures. In practice, however, there are a variety of cases in which market failures lead to a loss in energy/CO_2 efficiency, either in a static or a dynamic sense. In such cases, the EU ETS may be jointly used by other policy instruments - such as subsidies on energy savings, awareness campaigns, or support to renewables - in order to overcome these market failures. If these other policies are well designed, i.e. pass a cost-benefit test, they may result in an overall improvement in static or dynamic efficiency.

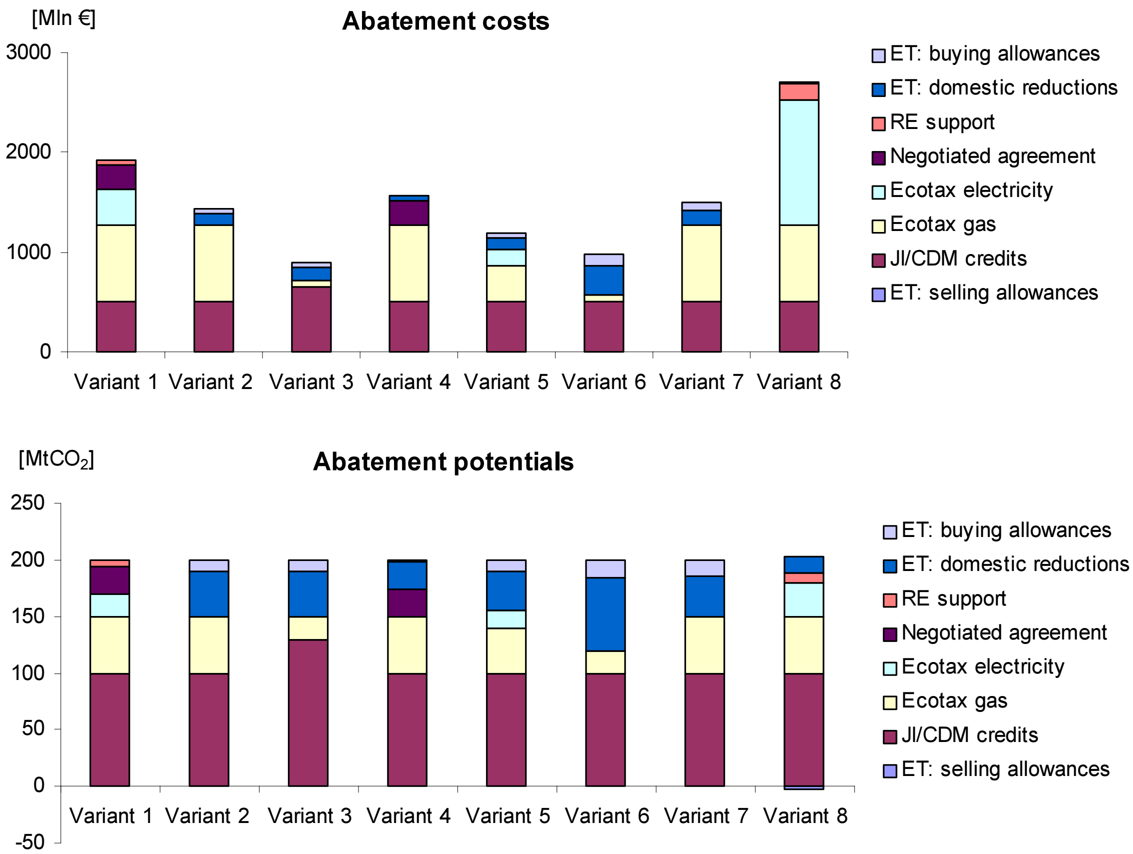

Figure 3.1 *Abatement costs and potentials of different policy variants to meet Kyoto commitments of Country A*

A second reason to justify the coexistence of the EU ETS and other policies affecting the fuel use and CO_2 emissions of participating sectors is that these policies may serve to meet a variety of other policy objectives besides achieving CO_2 efficiency such as (i) raising fiscal resources, (ii) serving equity purposes, (iii) preventing other environmental effects besides CO_2 emissions, or (iv) improving security of supply.

A final justification for the coexistence of the EU ETS and related policies is that using, incorporating or accounting for these other policies may improve the design and implementation of the EU ETS and, hence, may lead to an improvement of its operation or political acceptability. An example is the coexistence of the EU ETS and a carbon or energy tax in order to mitigate the price uncertainty of an EU allowance by offering the opportunity to pay a tax should the allowance price exceed the tax level.

However, policies complementary to the EU ETS may at best improve the efficiency of CO_2 abatement (in case of market failures), but not the effectiveness of CO_2 mitigation (as the amount of CO_2 reductions is fixed by the cap on CO_2 emissions). Or, to put it more bluntly, *once the EU ETS becomes operational, the effectiveness of all other policies to reduce CO_2 emissions of the participating sectors becomes zero.*

Moreover, the socio-political acceptability of meeting other objectives besides CO_2 mitigation may change once it is realised that the relatively high costs of some of these policies can no longer be justified by CO_2 objectives but only by other considerations such as less NO_x emissions, more rural employment or an improved energy supply security. Therefore, whatever these other considerations might be, it will be obvious that the evaluation of the costs and benefits of national policies affecting fossil fuel use by participating sectors will change once the EU ETS becomes operational. This may have far-reaching implications for these policies, including a major reform or, in some cases, even an abolition of these policies.

Finally, in practice, there are likely a variety of sound and less sound reasons why most of the existing policies affecting the fossil fuel use of participating sectors will be continued even after the EU ETS becomes operational, notably in the short term. As noted, some of these policies, if well designed, may lead to an improvement of the operation or political acceptability of the EU ETS, or even to an improvement of its CO_2 efficiency in cases of correcting market failures adequately. However, except these latter cases, all other policies affecting the fossil fuel use of participating sectors will reduce the efficiency gains, or assumed cost benefits, of the EU ETS. The supposed cost benefits of emissions trading, by both policy makers and policy analysts, are usually based on studies or models that implicitly assume the absence of using joint, complementary policies. In practice, however, a variety of other, complementary policies besides emissions trading will be used, for both sound and less sound reasons. This implies, however, that actual cost benefits of emissions trading will be less as, in general, you can not have simultaneously the full (assumed) benefits of both emissions trading and other policies affecting the fossil fuel use of participating sectors.

4. INTERACTION BETWEEN THE EU ETS AND THE BENCHMARKING COVENANT

4.1 Introduction

The Energy Efficiency Benchmarking Covenant is one of the key instruments of current climate policy in the Netherlands. The Covenant is a voluntary agreement, signed in July 1999 by the Dutch government and the energy-intensive industry, including the electricity production sector. The central goal of the Benchmarking Covenant (BC) is to reduce greenhouse gas emissions from energy-intensive industries by improving their energy efficiency without compromising the international competitiveness of these industries. According to the BC, participating industries are required to become part of the top-of-the world in terms of energy efficiency as soon as possible, but no later than 2012. In return, the government will refrain from implementing additional specific national measures aimed at further reducing energy use or CO_2 emissions by these industries.[24]

This chapter explores the potential interaction between the Benchmarking Covenant and the proposed EU Emissions Trading Scheme (EU ETS). First of all, Section 4.2 analyses the interaction between the BC and the EU ETS, assuming that these instruments operate independently along-side each other in their present form (coexistence scenario). Subsequently, Section 4.3 discusses the interaction between an unchanged EU ETS and some policy options with regard to the BC. Finally, this chapter will be concluded by a summary of the major findings and policy implications in Section 4.4.

4.2 Interaction under the coexistence scenario

4.2.1 The scope of the instruments

The *scope* of a policy instrument refers particularly to the target groups affected directly or indirectly by that instrument. A *directly* affected target group has rules and obligations imposed upon it by the policy instrument. An *indirectly* affected target group is influenced in some way by the behavioural changes made by the directly affected group (e.g. a change in market prices). When two policy instruments operate together, the scope of these instruments may partly or fully overlap, resulting in two different forms of target group interaction:[25]

- Direct target group interaction, where the target groups directly affected by two policy instruments overlap in some way.
- Indirect target group interaction, where either (i) the target group directly affected by a policy instrument overlaps with the target group indirectly affected by another instrument, or (ii) the target groups indirectly affected by two instruments overlap in some way.[26]

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24 For a detailed explanation of the Benchmarking Covenant, see Appendix A and references cited there.

25 The major concepts and methodology of the Interact project are explained by Sorrell and Smith (2001) and Sorrell (2002a).

26 Although it is acknowledged that indirect effects may permeate throughout the economy, the analysis in the present report will be focussed on direct target group interaction and the main, immediate forms of indirect target group interaction.

Target groups of the EU ETS

The direct target group of the proposed EU ETS is a set of installations that emit GHGs resulting from certain activities as listed in Annex I of the EU Directive and summarised in Table 4.1. These installations refer particularly to combustion plants (>20 MW, including power generators), oil refineries, coke ovens and energy-intensive installations in manufacturing sectors such as the ferrous metals industries (especially iron & steel) and industries producing cement, lime, glass, ceramics, pulp, paper or board.

Table 4.1 *Sectors and activities covered by the EU ETS (CO_2 only)*

Sector	Activities
Energy	Combustion plants >20 MW, excluding municipal waste incineration
	Mineral oil refineries
	Coke ovens
Ferrous metals	Metals ore roasting or sintering
	Iron & steel production (including casting) with capacity >2.5 tonnes/hr
Minerals	Cement production in kilns with capacity >500t/day
	Lime production in kilns with capacity >50t/day
	Glass & glass fibre production with melting capacity >20t/day
	Ceramic production with capacity >75t/day, or kiln capacity >4m^3
Other	Pulp from timber production
	Paper & board with capacity >20t/day

The definition of 'installation' in the EU ETS Directive is based on the EU Directive on Integrated Pollution and Prevention Control (IPPC), but the coverage of this latter Directive differs in some respects from the EU ETS Directive. Whereas the EU ETS Directive includes some installations *not* covered by the IPPC Directive (notably combustion plants of 20-50 MW thermal input), it excludes some sectors or sites that are covered by the IPPC Directive, particularly installations in the food and drink industries, the chemical sectors, the non-ferrous metals and waste incineration. It should be noted, however, that if these installations operate combustion plants exceeding 20 MW they are covered by the EU ETS even if they belong to, for instance, the non-ferrous or chemical sectors.[27]

A major group of directly affected participants in the EU ETS consists of fossil fuel electricity generators. In order to meet the obligations of the Directive, these generators will be faced by higher marginal costs of power production, because either (i) they will take measures to abate emissions, (ii) they will have to obtain allowances to cover their emissions or, in case of free allocation, (iii) they will miss the revenues from selling allowances on the market ('opportunity costs'). These higher marginal costs will be (partially) passed on to the final consumers of fossil fuel electricity in all sectors of the economy, thereby improving the competitive position of renewable electricity suppliers (see Section 4.2.3 below). Therefore, whereas the EU ETS will directly affect conventional power producers, it will indirectly affect consumers of fossil fuel electricity as well as suppliers of renewable electricity.[28]

[27] In the IPPC Directive, an installation is defined as '*a stationary technical unit in which one or more of the activities and processes listed in Annex A are carried out, and any other directly associated activities which have a technical connection with the activity carried out on that site and which could have an effect on emissions and pollution*' (Art. 2.3). For a further discussion of the definition of 'installations' and 'participants' within the EU ETS, see CEC (2001c), Sorrell (2002b) and KPMG (2002).

[28] Other indirect target groups of the EU ETS include (i) intermediaries in the carbon allowance market, (ii) sectors offering technical options for GHG mitigation to directly affected sectors, and (iii) consumers buying other products besides conventional electricity from directly affected groups. These other indirect groups, however, will not be considered in the present report because it is assumed that either (i) the size of these groups is small, or (ii) the impact of the EU ETS on these groups is small.

Target groups of the Benchmarking Covenant

On behalf of the Dutch government, the Benchmarking Covenant was signed in July 1999 by (i) the Ministry of Economic Affairs (EZ), (ii) the Ministry of Housing, Spatial Planning and the Environment (VROM) and (iii) the Inter-Provincial Consultative Forum (IPO), representing the provincial authorities responsible for issuing environmental licenses to industrial installations.[29] On the other hand, signatories on behalf of the energy-intensive industry included (iv) the Confederation of Netherlands Industries and Employers (VNO-NCW), and (v) several organisations from various industrial sectors such as the chemical industry, the electricity producers, the petroleum industry and the manufacturers of paper and cardboard.

The target groups of the Benchmarking Covenant, however, are not the signatories of the Covenant mentioned above, but rather individual installations of energy-intensive companies. The definition of an installation within the framework of the Benchmarking Covenant is based on the Environmental Management Act (EMA), which provides a legal framework for environmental regulation in the Netherlands, including the implementation of the IPPC Directive. Hence, there is a major overlap in the definition of installations between the IPPC Directive, the EU ETS Directive, the Environmental Management Act, and the Benchmarking Covenant.[30]

Companies located in the Netherlands can join the Covenant by means of a Declaration of Participation, provided they operate individual installations with a primary energy consumption of at least 0.5 PJ per year. However, the Covenant does not completely exclude the possibilities for companies with installations below the 0.5 PJ threshold to join in. These companies may participate upon approval by the Benchmarking Committee, based on a motivation of the effectiveness of joining the Covenant to achieve CO_2 emission reductions and the acceptance of all obligations pertaining to the Covenant. Alternatively, companies with installations consuming less than 0.5 PJ per year can participate in the second generation of the so-called ‘Long-Term Agreements’ (LTA-2), i.e. a set of voluntary agreements between the Dutch government and sector (branch) organisations in order to improve energy efficiency at the industry and company level.[31]

Companies that do not wish to participate in an energy efficiency agreement - either the BC or a LTA - have to comply with the Environmental Management Act (EMA), notably with the conditions specified in the environmental licence that may include specific prescriptions with regard to improving energy efficiency at the installation level (for details, see Appendix B).

Table 4.2 provides an overview of the number of companies and installations that have joined the Benchmarking Covenant by the end of January 2003. It shows that 105 companies participate in the BC, representing a total of 233 installations. Together, these companies accounted for a total energy consumption of approximately 1,100 PJ in 1999, i.e. more than one-third of the total annual energy use in the Netherlands (ECN, 2001b; Benchmarking Verification Bureau, 2003). For the energy-intensive industrial sector (with an annual energy use of some 650 PJ), the participation rate is about 85 percent, in terms of potential benchmark companies and some 94 percent in terms of energy consumption. For the electricity production sector (with an annual energy use of approximately 460 PJ), the participation rate is even 100 percent. This implies that, whereas all power generators have joined the Covenant, some energy-intensive companies - notably one oil refinery and some smaller enterprises in the chemical and food sectors - have decided not to participate in the BC.

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29 Since 1999, the Benchmarking Covenant has also been joined by several municipalities as in several cases these municipalities - rather than the provinces - are the appropriate authority to grant an environmental license to a company or installation that wants to participate in the Covenant.

30 Following the EMA, an installation can be simply defined as a stationary unit ('facility', 'plant' or 'site') where human, businesslike activities of some duration take place within a certain geographical limitation (see Appendix B for a brief explanation of the EMA).

31 For details with regard to the Long-Term Agreements on energy efficiency, see Appendix C and references cited there.

Table 4.2 *Number of companies and installations participating in the Benchmarking Covenant (as per 31 January 2003)*

	Number of companies	Number of installations
Oil refineries	4	4
Iron, steel and non-ferrous	5	6
Breweries	4	8
Cement	1	3
Chemical industry	45	88
Miscellaneous	9	56
Glass	6	8
Paper mills	22	25
Sugar	2	5
Sub-total	*98*	*203*
Electricity sector	7	30
Total	*105*	*233*

Source: Benchmarking Committee (2003).

With regard to the interaction or overlap between the direct target groups of the EU ETS and the Benchmarking Covenant (or other Long-Term Agreements on energy efficiency), the following categories can be distinguished (see Figure 4.1 and Table 4.3):

1. *Only BC.* This category of installations has joined the BC but will not be covered by the EU ETS. It includes particularly the energy-extensive installations of a few companies such as Philips (electronics) and Akzo Nobel (chemicals). Although in numbers of installations involved this category may be quite large (about 50-80 installations), in terms of total energy use (and, hence, in CO_2 emissions) it is probably relatively small.
2. *Both BC and EU ETS.* With the exception of the first category mentioned above, all other companies and installations that have joined the BC are covered by the EU ETS, notably those belonging to the energy sector (oil refineries, electricity generators), the basic metals industries (iron, steel, non-ferrous), the minerals sector (glass, cement), and some other industries (paper, major chemicals with combustion installations >20MW).
3. *Only EU ETS.* There are a few installations - notably the oil refinery of Exxon - that have not joined an energy efficiency agreement (BC or LTA), but which will be covered by the EU ETS. As noted, these installations have to comply with the environmental license conditions of the EMA.
4. *Both EU ETS and LTA.* Several installations that have joined a LTA, rather than the BC, will also be subject to the EU ETS. These installations can particularly be found in oil and gas mining, the food sector (dairy) and the minerals sector (ceramics). Although in numbers of installations involved this category may be relatively large (especially in the ceramics industry), in terms of total energy use it is likely relatively small.
5. *Only LTA.* Finally, there is a category of installations that have joined a LTA, but which will not be covered by the EU ETS. This category includes notably small/energy-extensive installations in the food sector, the basic metals industry (non-ferrous; foundries) and the textile industry.

In summary, in terms of sectoral coverage (notably of companies involved) there seems to be a high degree of overlap between the major target groups of the EU ETS and the Dutch energy efficiency Benchmarking Covenant. Nevertheless, there are a few companies (with a relatively large amount of installations) that have joined the BC but which are not covered by the EU ETS. On the other hand, there are several companies which are subject to the EU ETS but do not participate in the BC (although most of these companies have signed an alternative Long-Term Agreement on energy efficiency, or otherwise they have to comply with the environmental licence conditions of the EMA, which may include prescriptions on improving energy efficiency).

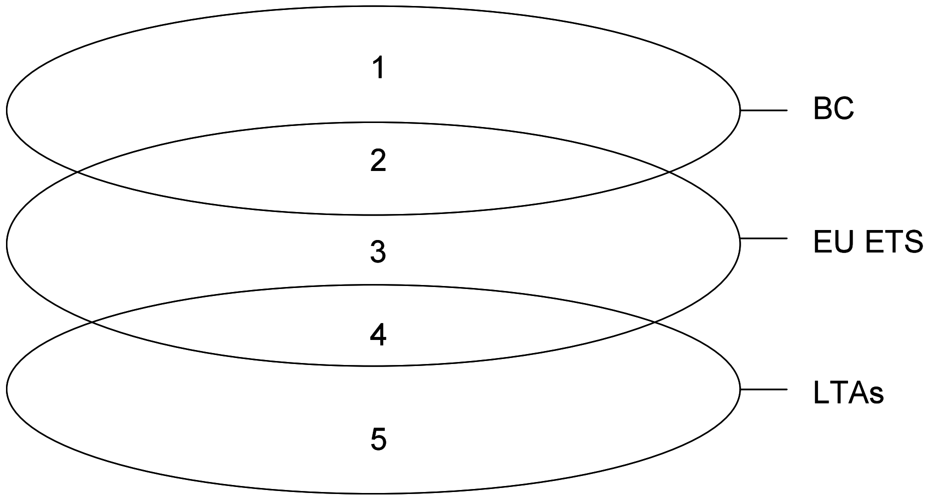

Figure 4.1 *Overlap in coverage of installations by the EU Emissions Trading Scheme (EU ETS), the energy efficiency Benchmarking Covenant (BC), and other energy efficiency Long-Term Agreements (LTAs)*

These findings with regard to the overlap between the major target groups of the EU ETS and the BC lead to the following interaction issues:

- *Double regulation.* If the EU ETS and the BC (or any other regulation on energy efficiency) will coexist next to each other, companies will be subject to double regulation on policy areas - i.e. CO_2 mitigation and energy efficiency - that highly overlap. As discussed in Chapter 3, this may lead to less flexibility and economic efficiency of emissions trading (see also Section 4.2.3 below).
- *Differential treatment and equivalence of effort.* The threshold criterion of 20 MW for combustion installations to participate in the EU ETS may lead to a division within sectors and different climate change policy regimes for otherwise comparable installations. This may result in market distortions and unfair competition within sectors. Depending on the costs involved in EU emissions trading compared to the compliance cost of other climate change policy regimes (KPMG, 2002). This can be avoided by either (i) designing climate change policy regimes with comparable cost effects (which in practise is hard to realise), or (ii) allowing entrance to the EU ETS of complete sectors rather than installations passing the 20 MW criterion (which may lead to a significant increase in the number of installations by the EU ETS).

Coverage of emissions

While the Benchmarking Covenant considers only CO_2 emissions, the EU ETS may also cover other GHGs besides CO_2, notably during the second Phase (2008-2012), provided that the reliability of monitoring these other gasses has been adequately addressed (as explained in Section 2.1). It should be noted, however, that whereas the BC is primarily focussed on reducing energy use (excluding feedstocks or non-energy uses), the EU ETS is primarily aimed at reducing GHG emissions (including both energetic and process emissions). Hence, despite a large overlap in covering CO_2 emissions, there may be some significant differences in gas coverage by these two instruments (as further discussed in Section 4.2.2 below).

Table 4.3 *Overview of installations covered by the EU ETS, the Benchmark Covenant (BC) and the second generation of Long-Term Agreements (LTAs-2)*

	EU ETS	BC	LTAs-2
Fossil fuel-based electricity generation			
– Essent (EPZ-installations)	x	x	-
– Reliant (UNA-installations)	x	x	-
– Elektrabel (EPON-installations)	x	x	-
– E.on (EZH-installations)	x	x	
– NUON (Buggenum)	x	x	-
– Other CHP electricity sector	x	-	-
Refineries			
– Exxon	x	-	-
– Others	x	x	-
Chemical industry			
– Integrated petrochemical	x	x	-
– Methanol	x	x	-
– Ammonia fertiliser	x	x	-
– Akzo Salt, chlorine	x	x	-
– Carbon Black/Cabot	x	x	-
– Air Liquide/Air Products	x	x	-
– Thermphos	x	x	-
– ESD silicon carbide	x	x	-
– Major other chemicals	x	x	-
Pulp and Paper			
– Major pulp and paper	x	x	-
Food			
– Major dairy	x	-	x
– Major starch	x	x	-
– Sugar	x	x	-
– Major edible fats	x	-	x
– Canned/frozen foods	-	-	x
– Major beer	x	x	-
– Major grass drying	x	-	-
– Non-metal minerals			
– Major glass	x	x	-
– Cement clinker	x	x	-
– Bricks and rooftiles	x	-	x
– Fine ceramics and tiles	x	-	x
– Rockwool	?	x	-
– Some single plants in other sectors	x	-	-
Basic metals			
– CORUS	x	x	-
– Nedstaal	x	x	-
– Zinc	x	x	-
– Primary aluminium	x	x	-
– Other major non-ferrous metals	-	-	x
– Foundries	-	-	x
Others			
– Oil and gas mining, incl. flares	x	-	x
– Major gas compression stations	x	-	-
– Vlisco (textile)	x	x	-
– Other textile and carpet industry	-	-	x
– Philips	?	x	-

Table 4.4 provides some estimates of the sectoral CO_2 emissions covered by the EU ETS in 2010. It shows that the amount of CO_2 emissions falling under emissions trading is estimated at some 91 Mt CO_2 in 2010, i.e. about 48 percent of the total national CO_2 emissions in that year. The rate of CO_2 coverage, however, varies significantly by sector from 0 for households, agriculture, services and transport to some 60-65 percent for the chemical and other industries, and nearly full coverage for the refineries, power generators and other energy companies.

Table 4.4 *Coverage of sectoral emissions by the EU ETS in 2010 [Mt CO_2]*

Sector	Included	Excluded	Total	% Included
Households	0.0	19.8	19.8	0.0
Chemical Industry	20.0	13.5	33.5	59.7
Other Industry	13.8	7.3	21.1	65.4
Agriculture	0.0	8.3	8.3	0.0
Construction	0.0	1.3	1.3	0.0
Services	0.0	10.7	10.7	0.0
Transport	0.0	36.4	36.4	0.0
Refineries	14.9	0.0	14.9	100.0
Electricity production[1]	35.4	1.9	37.3	94.9
Other energy companies	7.3	0.0	7.3	100.0
Total	91.4	99.2	190.6	48.0

[1] Electricity production by means of waste incineration has been excluded from the EU ETS.
Source: KPMG (2002).

Some qualifications have to be added to the estimates of the emissions covered by the EU ETS as they are faced by some significant uncertainties (KPMG, 2002):

- As the category of combustion installations with an (aggregated) thermal input of >20MW is presently not an existing category in the national emission registration, it is hard to assess the exact number of installations that will be covered by the EU ETS.[32] Moreover, detailed monitoring of emissions on installation level has been abandoned gradually since 1995 in favour of sector totals and trends. Finally, there are still some uncertainties with regard to the definition and interpretation of 'installations', notably whether in all cases all (combustion and process) emissions of participating installations will be covered by the EU ETS (Sorrell, 2002b). Hence, at present it is hard to estimate the exact number of installations and emissions covered by the EU ETS.
- In the draft EU ETS Directive, there is neither a definition of 'new entrants' nor of the way how they should be accounted for in the national allocation plan. Depending on how this issue will be solved, it may affect the cap of emissions covered by the EU ETS.
- The estimates of Table 4.4 are derived from the emission projections by Ybema, et al. (2002a). Apart from the fact that these projections are characterised by the usual uncertainties themselves (and the question whether they will be used as a basis for designing the national allocation plan), the projections do not include additional emissions reductions due to new policy measures since mid-2001 (in order to reach the overall national target for all sectors, set at 186 $MtCO_2$ in 2010). Including these additional reductions (or using adjusted projections) will change the estimates of emissions covered by the EU ETS.

[32] As part of designing the Dutch allocation plan, Novem has sent a questionnaire to some 430 installations in order to find out whether they will be covered by the EU ETS or not. It is expected that some 300-350 installations will ultimately fall under the EU ETS, of which about half will be covered by the Benchmarking Covenant and the remaining part largely by a Long-Term Agreement on energy efficiency (personal communication by Novem spokesman).

4.2.2 The objectives of the instruments

Objectives of the EU ETS

The central objective of the EU ETS is to reduce GHG emissions of the target group in the most effective way, but the Directive does not include any quantitative targets for the reduction of these emissions.

Decisions on the total quantity of allowances to be issued, as well as on the allocation of these allowances among individual installations, are left to individual Member States as part of designing their so-called 'National Allocation Plans'. Annex III of the EU Directive, however, provides a list of criteria that have to be met by these national allocation plans. These criteria include particularly:

1. The total quantity of allowances must be consistent with the Member State's climate change programme, notably with its obligations under the Kyoto Protocol and the EU Burden Sharing Agreement, taking into account national energy policies and the proportion of national emissions from installations covered by the Directive.
2. The total quantity of allowances must be consistent with assessments of actual and projected progress towards fulfilling the Member State's contribution to the GHG mitigation commitments of the EU.
3. The (total) allocation of allowances must be consistent with the (technological) potential of participating installations to reduce emissions.
4. The allocation plan must be consistent with other EU legislative and policy instruments - notably with regard to renewables - while taking into account unavoidable increases in emissions due to new legislation.
5. The plan shall not discriminate between companies or sectors in such a way as to unduly favour certain undertakings or activities.
6. The plan shall contain information on the manner in which (i) new entrants, (ii) early action, and (iii) clean technologies - including energy efficiency technologies - are taken into account.

The criteria include a mixture of top-down versus bottom-up approaches of allocating allowances, which may not necessarily lead to the same outcome with regard to the total quantity of allowances to be allocated. Moreover, some of these criteria are still unclear or very general, which may lead to different interpretations among Member States.[33] In addition, it may be hard to determine the exact quantity of allowances to be allocated due to data and definition problems at the installation level. Therefore, designing and negotiating the national allocation plan, which is acceptable to all parties concerned, is likely to be a difficult and time-consuming process.

In addition to the central objective of reducing GHG emission efficiently, the Directive mentions some other, qualitative objectives, including (CEC, 2002; and Sorrel, 2002b):

- striking a balance between simplicity, effectiveness, subsidiarity and transparency,
- compatibility with liberalised energy markets,
- transparency and public access to information,
- preserving integrity of the single market and avoiding distortion of competition.

Objectives of the Benchmarking Covenant

The official, explicit purpose of the Benchmarking Covenant is that 'as many processing plants of the participating facilities as possible realise the best international energy efficiency standards… at the earliest opportunity and no later than 2012, in order to contribute to the realisation of the Dutch CO_2 targets in relation to improved energy efficiency' (Benchmarking Committee, 1999). A related, implicit objective of the Covenant is to avoid a deterioration of the in-

[33] The European Commission is required to develop more specific guidelines on the implementation of the Annex III criteria by end-2003. Meanwhile, the Commission has provided some general guidance with regard to the development of a national allocation plan. See CEC (2003) and PWC/ECN (2003).

ternational competitiveness of the energy intensive industries (located in the Netherlands) by stipulating that CO_2 reductions will be achieved by means of relative targets on energy efficiency - which do not restrict absolute growth volumes - and that, in return for achieving these targets, the government will refrain from implementing additional specific measures aimed at further reducing energy use or CO_2 emissions by the energy intensive industries.

According to a recent monitoring report of the Benchmarking Covenant, the amount of CO_2 reduction by the benchmarking industries (excluding power producers) is projected at 5.1 $MtCO_2$ in 2010 (Benchmarking Verification Bureau, 2003).[34] Half of this amount, however, may be classified as 'unsure', as based on energy saving measures that may not or hardly be realised. Moreover, the estimate of 5.1 $MtCO_2$ reduction is based on a so-called 'frozen efficiency' scenario, which excludes autonomous trends in improving energy efficiency (as well as trends in production volumes over the years 2000-2012). Hence, the actual contribution of the Covenant to mitigating CO_2 emissions will most likely be quite modest as a predominant share of the energy efficiency measures would have been taken anyhow (Rombouts, 2002; Braathen, 2003).

Interaction between the objectives

There is a high degree of overlap and synergy between the primary objectives of the two instruments, i.e. improving energy efficiency (BC) versus mitigating CO_2 emissions cost effectively (EU ETS). As a result, a direct improvement of the one objective will indirectly benefit the other. Nevertheless, despite this overlap and synergy between the primary objectives of the two instruments - notably in the field of reducing CO_2 emissions of fossil fuel combustion - there are some major differences between the specific targets of these instruments.

Firstly, there is a difference in *absolute* versus relative *targets* of the two instruments. Whereas the EU ETS is aimed at reducing CO_2 emissions in absolute terms, the BC is focussed on improving energy efficiency in relative terms, i.e. per unit of production. Hence, as the BC is not concerned with absolute energy use or CO_2 emissions, it does not provide an incentive to reduce production levels of energy intensive activities, whereas the EU ETS addresses both CO_2 efficiency and production output levels. In general, there may even exist a positive relationship between energy/CO_2 efficiency and output growth, i.e. higher output growth may lead to a higher rate of energy/CO_2 efficiency while, on the other hand, a more efficient industry may grow faster. Therefore, energy efficiency may improve whereas CO_2 emissions may rise (or just the opposite), implying that it may be hard to realise both the relative energy efficiency target and the absolute CO_2 emission target simultaneously.

Secondly, there is another difference between the specific targets of the two instruments in the sense that at the installation level, *energy use* is not equivalent to *CO_2 emissions*. According to the Benchmarking Covenant, energy consumption is calculated by adding up several energy carriers on a primary energy basis, including purchased heat and electricity. Fuels for feedstock purposes are excluded, but process back flows from feedstocks - such as steam and waste gases - are included as energy use. Energy savings are estimated by comparing energy consumption in a target year with reference consumption assuming base year technology. From the energy saved, CO_2 reduction is derived by means of standard emission factors. CO_2 reduction according to the BC thus includes emissions from heat and electricity production off-site, but excludes several non-energy and feedstock emissions. As a result, while the BC and the EU ETS both cover direct emissions from fossil fuel combustion, the main differences in emissions/energy carriers covered by these instruments and the resulting potential divergence between the targets of these instruments refer to:

[34] Other, less recent estimates of the potential CO_2 impact of the Benchmarking Covenant have been conducted by the Benchmarking Committee (1999 and 2002); Phylipsen et al (2002); Ybema, et al (2002a and 2002b); and Van Dril and Menkveld (2003). Depending on the assumptions made, the estimates vary from 1-10 $MtCO_2$ reduction by the benchmarking industries (and an additional potential of 0.7-2.0 $MtCO_2$ reduction by the power producers).

- *Direct versus indirect emissions.* While the EU ETS covers only direct emissions of on-site fossil fuel combustion, the BC includes also indirect emissions of heat and electricity use generated off-site.
  Hence, these two instruments may have a different impact on the mix of on-site versus off-site energy use, including the use of combined heat and power (CHP) which may have different effects on CO_2 emissions and energy efficiency (see also Section 4.2.3 below). For instance, the EU ETS may encourage the replacement of fossil fuels by electricity for heating purposes, which may lead to less CO_2 emissions at the installation level but also to less energy efficiency in terms of the BC.
- *Energetic versus non-energetic/process emissions.* While the BC is only concerned with energy consumption and related direct and indirect emissions, the EU ETS also covers emissions from non-energetic use and process emissions. For instance, non-fuel CO_2 emissions - e.g. from the production of cement or limestone - have to be accounted for under the EU ETS but not under the BC. Similarly, specific fuel uses such as coal for iron ore reduction, natural gas for ammonia or the consumption of anodes in the primary aluminium industry are not covered by the BC. For these processes, however, they may be the main source of CO_2 emissions under the EU ETS. In general, these specific applications are proportional with product output. Specifically, these processes are optimised for quality, purity, yield, NO_x emissions and may other reasons. Therefore, optimisation for the energy part may increase CO_2 emissions in the non-energy part of the installations, resulting in a divergence between the targets of energy efficiency versus CO_2 reduction.
- *Changes in fuel mix.* Substitutions between fuels, e.g. gas for coal, may affect energy efficiency and CO_2 emissions differently. In general, however, no interaction conflicts between the targets of the BC and EU ETS are expected. Current trends in industry and electricity generation include implementing more efficient natural gas technologies. As natural gas has a low emission factor, energy efficiency and CO_2 reduction develop in the same direction. Increasing the use of waste gases with high carbon content instead of natural gas will also in general improve both energy efficiency and CO_2 reduction. This is because waste gases otherwise are flared.
- *Energy from waste, biomass or non-fossil sources.* In some cases, energy from waste - e.g. petroleum coke or waste plastics in the cement industry - may be excluded from the BC, whereas the resulting emissions are covered by the EU ETS. On the other hand, combustion of biomass is in some cases regarded as energy use under the BC while, according to Annex IV of the EU ETS, the corresponding emission factor is zero. Similarly, energy from non-fossil or renewable resources falls usually under the BC but the resulting emissions are generally zero or not covered by the EU ETS. In all these cases, the impact of the BC and EU ETS on their respective targets may diverge significantly.[35]

Hence, although improving energy efficiency and reducing CO_2 emissions usually converge in the same direction within the context of the interaction between the Benchmarking Covenant and the EU ETS, there are some cases in which these objectives may diverge or even conflict. In addition to a situation of growing output (in which energy efficiency per unit of production may improve while CO_2 emissions may increase), these cases refer particularly to changes in fuel mix as well as to those situations in which the coverage of the emissions/energy sources differ between the BC and the EU ETS. These differences in coverage of emissions/energy sources include especially the coverage of (i) direct versus indirect emissions, (ii) energetic versus non-energetic emissions and (iii) energy/emissions from waste, biomass or non-fossil sources. In all these cases, the objectives of improving energy efficiency (BC) and reducing CO_2 emissions (EU ETS) may not only move in different tempi but also in different directions.

[35] It should be noted, however, that in some cases the EU ETS Directive needs some elaboration on issues regarding the coverage of emissions from some sources. For instance, are non-energy CO_2 emissions included in e.g. oil refineries, basic metal plants and chemical plants? Is waste processing in these plants included? Is biomass and waste properly defined? Are the IPPC guidelines followed, e.g. for limestone use and emissions from short-life products such as solvents or fertilizers?

4.2.3 The operation of the instruments

The interaction with regard to the operation of policy instruments actually covers three aspects, namely:

- The obligations and incentives of the instruments, i.e. the rules and mechanisms that influence the behaviour of the target group of the instruments.
- The administration of the instruments, i.e. the major parties or institutions involved and their tasks to be done.
- The timing of the instruments, i.e. the phasing of the operation of the instruments over time, in relation to each other and to the commitment period of the Kyoto Protocol.

These aspects will be explored below with regard to the interaction between the EU Emissions Trading Scheme (EU ETS) and the Dutch Energy Efficiency Benchmarking Covenant (BC), assuming that the EU ETS is implemented alongside an unchanged BC. In practice, it is unlikely that the EU ETS will coexist next to an unchanged BC, but by examining interaction under the assumption that they will coexist in their presently proposed form, some relevant interaction issues and potential conflicts can be highlighted. This in turn can guide the subsequent development of policy options to improve the mix of these two instruments (as elaborated in Section 4.3).

4.2.3.1 The obligations and incentives of the instruments

Starting from 1 January 2005, each installation covered by the EU ETS must have the disposal of a *GHG emissions permit.*[36] The most important obligation included in this permit is that the operator of an installation participating in the EU ETS has to surrender a quantity of *allowances* equal to the total emissions of the installation in each calendar year within four months following the end of the year. An allowance provides its holder the right to emit a tonne of CO_2 during the period in which it is issued, i.e. either the initial three-year period (2005-2007) or one of the subsequent 5-year periods (2008-2012, and so on). *Banking* of allowances is permitted, both from one year to the next within a certain period and from one commitment period to the next.[37] Banking between periods is achieved by issuing new allowances to replace the old ones as allowances are only valid for the period of issue and cancelled four months after the beginning of the subsequent period. On the other hand, *borrowing* of allowances between the periods is not permitted. In case of non-compliance, a three-fold sanction is imposed: (i) publishing the name of the non-complying operator, (ii) paying a financial penalty for each tonne of excess emissions for which no allowance was held, and (iii) surrendering allowances equal to these excess emissions in the following calendar year.

For each period, the initial allocation of allowances is set by each Member State in its National Allocation Plan based on the methodology and criteria of the EU ETS Directive and the guidelines of the European Commission (as discussed in Section 2.1 and 4.2.2 above). After the initial allocation, allowances can be freely traded among the participants of the EU ETS (including operators of eligible installations, brokers involved in emissions trading or any other ‘natural or legal person’ that has opened an account in the national emissions trading registry). As these allowances are scarce, they are characterised by an ‘opportunity cost’ or price on the market which may be passed on to consumers of commodities, notably fossil electricity, for which al-

[36] If the installation is also regulated under IPPC, Article 8 of the EU ETS Directive requires that the conditions of, and procedures for the issue of, a GHG emissions permit are fully co-ordinated with those for IPPC. In the Netherlands, the IPPC is implemented by means of the Environmental Management Act (EMA), notably by the condition that each installation covered by the EMA should have an *environmental licence* (see Appendix B). Such a licence is issued by either the provincial or municipal authorities, whereas the Ministry of VROM (2003) has recently proposed that the GHG emissions permit will be issued by a national Emissions Authority (that has yet to be established). Hence, the issuing of both a GHG emissions permit and an environmental licence to the same installation may raise some co-ordination problems among the authorities involved, notably because most of the installations that need a GHG emissions permit already posses an environmental licence.

[37] Member States have discretion over whether to allow banking from the initial three-year period into the first commitment period. As from 2008, Member States must allow banking from one period to the next.

lowances have to be surrendered to the national authorities in order to account for the emissions resulting from the production of these commodities.

Hence, to conclude, producers operating an installation covered by the EU ETS have an incentive to select one or more of the following strategies to meet the central obligation of the EU ETS, while maximising profits: (i) reduce the emissions of their output by lowering the emissions per unit production or changing the output mix towards less emission-intensive production, (ii) buy additional allowances on the market, (iii) bank or sell redundant allowances, and (iv) meet the sanctions in case of non-compliance. On the other hand, if the costs of emissions trading are passed on to end users, they are incentivised to replace the consumption of commodities using relatively many allowances (for instance steel) by commodities requiring relatively few allowances (e.g. wood).

Obligations and incentives of the Benchmarking Covenant

The key obligation of an installation participating in the BC is to reach the world top in terms of energy efficiency as soon as possible but no later than 2012. In order to meet this obligation, a participating installation has to take the following steps (for details, see Appendix A):

1. Determining the world top in energy efficiency and the distance to achieve this benchmark.
2. Drafting and implementing an Energy Efficiency Plan (EEP), including a schedule for energy saving measures in order to reach the world top in energy efficiency.
3. Monitoring, reporting and verifying the results.

For defining the energy efficiency benchmark (Step 1), some approaches have been agreed as part of the Covenant (see Appendix A). When defining this benchmark – e.g. in the year 2000 – the anticipated autonomous energy efficiency improvements up to 2012 have to be taken into account. Moreover, the world top must be redefined every four years. Accordingly, the distance from the world top has to be re-established every four years by means of external consultants.

After defining the benchmark, a company has to design an Energy Efficiency Plan (EEP) for each participating installation in which it indicates the measures to reach the world top in energy efficiency. As a general rule, measures have to be taken as fast as reasonably achievable, taking into account the depreciation of previous investments, other investment plans, production stops, other environmental measures, and technological developments and available means. More specifically, the Covenant specifies the following phasing of investments and other measures to reach the world top in energy efficiency (Benchmarking Committee, 1999):

1. If the gap with the best international standard can be bridged through cost-effective measures, these measures shall be taken as soon as possible, but in any event by 31 December 2005. 'Cost-effective measures' are deemed to be all measures with an internal rate of return of 15 percent after tax.
2. If the available cost-effective measures are not sufficient to bridge the gap with the best international standard, less cost-effective measures must be taken as soon as possible, but no later than in the year 2008, in order to realise the best international standard. 'Less cost-effective measures' are deemed to be measures that do not meet the minimum profitability requirements of the company in question, but which do meet the expected average cost rate for borrowed capital in the sector.
3. If the best international standard cannot be realised with the measures mentioned above within eight years, the company shall take measures to realise the best international standard as soon as possible, but in any event in the year 2012, or realise a comparable energy efficiency result by other acceptable means. These can include settlement with the results of other installations or companies, or the application of flexible instruments such as Joint Implementation, the Clean Development Mechanism and Emissions Trading.

After the EEP has been approved by the environmental authorities, it becomes an integral part of the environmental license issued by these authorities to the company of the installation concerned (see Appendices A and B). Every year before the 1st of April, all companies under the

Covenant have to submit an energy efficiency report to the environmental authorities and the Benchmarking Verification Bureau for each participating installation. This report should monitor the implementation of the EEP, including any adaptations of the planning of the investments, the energy efficiency improvements over the previous year and the concomitant CO_2 reductions.

The major incentive for a company to join the Covenant and to meet its key obligation of reaching the top in energy efficiency is that, in return, the Dutch government refrains from implementing any additional specific national measures aimed at further energy savings or CO_2 reduction by the participating installations. This in any event means no specific energy tax for the companies, no compulsory ceiling on CO_2 emissions, no additional compulsory energy efficiency or CO_2 targets, no additional conservation commitments and no additional CO_2 or energy requirements.

This counter pledge only applies to government measures that are directly geared towards energy consumption by participating installations, not to the company as a whole. European measures or national generic measures relating to renewable energy and fuel consumption are not excluded by the covenant. This applies equally to generic energy taxes, such as the regulating energy tax (REB). However, when making new legislation, the government will take into account the efforts that have been made by benchmarking companies and try to spare these companies as much as possible. Furthermore, the government commits to ensuring that further regulations will be drafted in such a manner that companies are not impaired in meeting their benchmarking obligations and that they are consistent with the intention and specifications of the Covenant. Moreover, the ministers promise to make an effort to ensure that national and EU measures will not impair the implementation of the Covenant, and that these measures support the Covenant where possible.

If a company fails to comply with its benchmarking commitments, for reasons for which it can be held responsible, it can be subjected to legal sanctions and specific measures. The Covenant is an agreement under civil law in which the government is a party. As with any civil agreement, a non-compliant party can be sued by the other parties. Moreover, besides the specific benchmarking commitments, participating companies also have to comply with the more general rights and duties of the Environmental Management Act. As the Energy Efficiency Plan is incorporated in the environmental license of an installation, the environmental authorities have in principle the same enforcement instruments available for the Covenant as for normal environmental licenses, i.e. imposing fines or other sanctions such as tightening or withdrawing the environmental license.

The interaction with regard to the obligations and incentives of the BC versus the EU ETS raises some interesting issues, which will be discussed below under the following headings:
- The impact of the BC on emissions trading.
- The impact of the EU ETS on electricity prices.
- The impact of the EU ETS on generating heat/power.

4.2.3.2 The impact of the BC on emissions trading

The impact of the Benchmarking Covenant on emissions trading in general, and on the EU ETS in particular, can be viewed from two perspectives:
1. The legal perspective, i.e. the impact of legal restrictions on emissions trading resulting from the BC or related legislation such as the Environmental Management Act (EMA).[38]
2. The economic perspective, i.e. the impact of the conditions of the BC and other, related factors on the price and market conditions for emission allowances.

[38] For an extensive exploration of the legal aspects of emissions trading in the Netherlands, see METRO (2001 and 2002).

With regard to the first, legal perspective, it should be noted that the EMA - which provides a legal framework for the BC - includes some major juridical obstacles to the introduction of a system of emissions trading in the Netherlands. According to the Council of State, such a system is even 'structurally incompatible' with the fundamental character and intention of the EMA (Raad van State, 2000).[39] As outlined in Appendix B, the EMA is based on the so-called 'as low as reasonably achievable' (ALARA) principle as well as on the principle of regulating environmental effects at the level of individual, locally tied installations. These principles are thwarted by a system of tradable emissions as such a system implies that (i) an environmental target is set at an aggregated level for a group of installations rather than at the level of an individual installation, (ii) emissions are removable rather than locally tied and hence, (iii) the environmental impact of the activities of the individual installation may not be 'as low as reasonably available' or may not even meet certain minimum environmental quality demands set by the EMA. Therefore, the introduction of a system of emissions trading in the Netherlands requires some fundamental adjustments of the EMA.[40]

In addition to the general obstacles of the EMA, the Covenant includes some specific restrictions on emissions trading by the BC companies. Notably Article 8 of the Covenant does not allow emissions trading to settle the benchmarking commitments until 2008. Before that time, participating companies can be required to take energy efficiency measures with an internal rate of return equal to the average cost rate for borrowed capital in the sector (about 6-8 percent). As normal investment criteria are at least in the range of 10-15 percent, these companies may prefer to meet their commitments through emissions trading but, as said above, this is not allowed until 2008 when the third Phase of the BC begins (together with the second phase of the EU ETS and the first commitment period of the Kyoto Protocol).

Article 18 of the Covenant, however, suggests the opportunity that, based on the first evaluation of the BC in 2004 (including developments in CO_2 policies), flexible instruments such as JI, CDM or ET may already be deployed during the second phase of the Covenant (starting from 31 December 2005).[41] The Covenant, however, does not specify whether (and how) emissions trading can be fully and freely applied by participating companies or whether, even in the third phase of the Covenant, certain minimal standards of energy efficiency have to be achieved at the installation level. Hence, depending of the evaluation of the first phase of the BC and the further elaboration of the Covenant, emissions trading may be allowed to settle the benchmarking obligations of participating companies already during the second phase of the BC (starting from 31 December 2005), but even during its third phase (2008-2012) emissions trading may be restricted by specifying minimum standards of energy efficiency that have to be realised at the installation level.

As explained in Chapter 3, the restrictions and other conditions of the BC in its present, unchanged form may have some impact on emissions trading, notably on the price and volume of allowances traded as well as on the supposed benefits of emissions trading. For instance, if the condition mentioned above that participating companies can be required to take energy efficiency measures with an IRR of about 6-8 percent would be relaxed by allowing emissions trading instead, these companies may prefer to meet their benchmarking commitment through emissions trading (depending on the price of an emission allowance and the marginal abatement costs of the measures, using a normal IRR of 10-15 percent).

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39 See also Ministry of Economic Affairs (1999); Ministry of VROM (2001); IVM (2001); and METRO (2001 and 2002).

40 As part of introducing NO_x emissions trading in the Netherlands, the Dutch government has already started the cumbersome and time-consuming process of adjusting the EMA. See Ministry of VROM (2001 and 2003) as well as Jansen (2002).

41 Note that the first phase of the EU ETS is proposed to start at 1 January 2005 and, hence, that the second phase of the BC and the first phase of the EU ETS do not fully overlap.

If these companies would indeed prefer emissions trading, the demand for emission allowances would be higher (or the supply lower). In addition, the price of an allowance and the benefits from emissions trading would also be higher.

The impact of the BC on emissions trading depends not only on the conditions of the Covenant but also on other, related factors such as the initial allocation of allowances to benchmarking installations or the public support to energy efficiency measures of these installations. For instance, if allocation would be based on energy efficiency benchmarks, the demand for allowances by the benchmarking companies would probably be low (with a downward pressure on the price of an allowance). An interim report of the Covenant states that, on average, participating industries - excluding the power sector - already belong to the world top in energy efficiency, i.e. these industries have already planned measures to meet the estimated benchmark for the year 2012 (Benchmarking Committee, 2002). Most of these measures are likely 'cost-effective measures' (with an IRR>15%), implying that the marginal abatement costs of these measures are probably low - or even negative - and that, depending on the allowance price, the demand for allowances by the participating industries would also be low.[42]

It should be noted that a part of the measures mentioned above could be classified as 'cost-effective' from a company point of view owing to public support to these measures by means of subsidy schemes, tax benefits and other fiscal incentives. This implies that without this support the marginal abatement costs of these measures would be higher for the companies concerned and, hence, that the price of an emission allowance on the market would be higher due to a higher demand for, or a lower supply of allowances. From a national CO_2 efficiency point of view, such a support may be questioned, notably once the EU ETS becomes operational as it has no effect on overall emissions while it may enhance the social costs of reducing CO_2. This applies particularly when the support per tonne CO_2 is relatively high and the price of an allowance is relatively low. However, there might be other reasons besides national CO_2 efficiency to justify policies supporting CO_2 reduction by sectors participating in the EU ETS, as outlined by the general discussion in Chapter 3.

4.2.3.3 The impact of the EU ETS on electricity prices

The EU ETS may have a significant impact on the price of electricity, which, in turn, may have a significant, although opposing impact on the two major sectors covered by the Benchmarking Covenant, i.e. the power producers versus the energy-intensive industries (which are the main consumers of electricity). This issue will be discussed below. First of all, a numerical example will be presented in order to illustrate the potential impact of the EU ETS on the electricity price in the Netherlands. Subsequently, the major assumptions behind this numerical example will be explained. Finally, the impact and policy implications of higher electricity prices - due to the EU ETS - on the two major sectors of the BC will be discussed.

Table 4.5 presents a numerical example to illustrate the potential impact of emissions trading on the cost/price of electricity in the Netherlands for the year 2010 (in real prices of 2000). This example is based on projections of power supply in 2010, distinguished by the major sources of generating electricity - coal, gas, CHP, nuclear and renewables - and the attendant emissions of CO_2 (Ybema, et al., 2002a and 2002b). Overall, the domestic production of electricity in 2010 is estimated at 105 TWh and the attendant emissions at 43 $MtCO_2$, resulting in an average emission factor of 0.41 $MtCO_2$/TWh (or 0.41 kCO_2/kWh). This implies that, with a price of an emission allowance of €10/tCO_2, the total costs of generating electricity in the Netherlands will increase by some €430 million or, on average, about 0.41 ct/kWh.

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[42] As outlined in Chapter 3, if a similar situation would occur in the other sectors and countries of the EU ETS (i.e. a situation in which the quantity of total allowances would be met by existing policies), the scarcity on the market for allowance would largely evaporate and, hence, the price of the allowance would decrease to zero.

However, in order to assess the impact of emissions trading on the electricity price one does not have to base the assessment on the average emission factor but rather on the emission factor of the marginal production technology (assuming that the price of electricity is determined by the marginal production costs). If that technology is supposed to be a gas-fired power plant with an emission factor of 0.42 kCO_2/kWh (see Table 4.5), then emissions trading at an allowance price of €10/tCO_2 will lead to an increase of the electricity price in 2010 by 0.42 ct/kWh. Based on a commodity or producer cost price of 2.7 ct/kWh before emissions trading, this implies an increase of that price of some 15 percent due to the EU ETS.

Table 4.5 *Illustrative example of the potential impact of the EU ETS on the price of electricity in the Netherlands based on electricity supply projections for the year 2010*

	Electricity generation in 2010 [TWh]	Emission factor [$MtCO_2$/TWh]	Carbon emissions [$MtCO_2$]	Total cost of emissions with a €10/tCO_2 clearing price [€m/yr]	Increase in generation costs [€ct/kWh]
Coal	24.7	0.83	20.4	204	0.83
Gas	19.7	0.42	8.3	83	0.42
CHP	45.7	0.31	14.2	142	0.31
Nuclear	3.6	0.00	0.0	0	0.00
Renewables	11.5	0.00	0.0	0	0.00
Total domestic	105.1	0.41	42.9	429	0.41
Imports	19.0				
Total supply	124.1				

Source: Based on electricity supply and emissions projections by ECN/RIVM (Ybema et al., 2002a and 2002b).

As indicated by Table 4.5, emission factors of generating electricity depend on the type of technology used. For instance, while the emission factor for coal-based electricity is equal to 0.83 kCO_2/kWh, it is 0 for nuclear and renewable electricity. This implies that if the marginal cost price of electricity increases by 0.42 ct/kWh (due to the EU ETS), the competitive position of coal-based electricity deteriorates by 0.41 ct/kWh whereas it improves by 0.42 ct/kWh for nuclear and renewable electricity.

The findings mentioned above are based on some major assumptions, including:

- the price of an emission allowance is €10 per tonne CO_2,
- the increase of the cost price of electricity due to emissions trading is determined by the emission factor of the marginal production technology, i.e. a gas-fired power plant,
- the increase in the cost price of electricity due to the EU ETS is passed on fully to the end users.

These assumptions will be discussed briefly in the sections below.

Firstly, the findings on the increase in the electricity price due to emissions trading are based on an assumed price of an emission allowance of 10 €/tCO_2 in 2010. This price, however, is highly uncertain as it is influenced by the following, uncertain factors:

- The allocation plans of the EU Member States. In these plans, each Member State determines the total amount of emission allowances to be allocated during the initial phase of the EU ETS, followed by the second phase (and so on), including the banking rules within and between these periods. Therefore, these plans influence the scarcity and, hence, the price of an emission allowance. At present, however, these plans are largely unknown, as they will be published for the initial phase of the EU ETS ultimately in March 2004 and for the second phase in March 2007.

- The participation of the EU accession countries in the EU ETS, notably the availability of potential surpluses of emission allowances (‘hot air’) in the participating sectors of these countries.
- The linkages between the EU ETS and other emissions trading/credit systems, notably JI, CDM and ET with non-EU Annex I countries such as Canada, Japan and Russia. The price of an EU allowance will notably be affected by the potential availability of cheap credits from Russia (‘hot air’) and non-Annex I countries (i.e. CDM credits). The European Commission has proposed a separate draft directive on this issue, but its actual impact on EU allowance prices is still unclear (CEC, 2003c).
- The other, remaining climate and energy policies of the EU Member States affecting the participating sectors of the EU ETS. As outlined in Chapter 3, the scarcity and, hence, the price of an emission allowance is influenced by these other policies, but at present it is highly uncertain whether these policies will be maintained unaltered, reformed substantially or even abolished completely.
- The incidence of (uncertain) factors such as average weather or macroeconomic conditions, including economic growth and international energy prices, which affect the demand for emission allowances and, hence, their price.
- The mitigation targets of the UNFCCC countries after 2012. These targets, which at present are highly uncertain, affect the abatement and banking decisions of the industries participating in the EU ETS - and thus the price of an allowance - in the years preceding 2012.

Due to these uncertain factors, the expectations regarding the price of a EU allowance vary widely. According to a recent sounding among a group of market specialists, the price expectation for April 2005 varies from 2.0 to 45 €/tCO_2, with a median expectation for these periods of 5 and 7 €/tCO_2, respectively (see Table 4.6). For the years thereafter, it is expected that the price may be higher (say 10-15 €/tCO_2 in 2010-12). It will be clear that if the price of an allowance over a certain period is higher (lower) than the assumed €10/tCO_2, the potential impact of emissions trading on the electricity price will be proportionally higher (lower). For instance, if the (maximum) price of an allowance is equal to the penalty price in case of non-compliance, i.e. 100 €/tCO_2 in the second phase of the EU ETS, the price of electricity will, *ceteris paribus*, increase by 4.2 ct/kWh due to the costs of emissions trading.

Table 4.6 *Expected price of an EU emission allowance [€/tCO_2]*

	April 2005	April 2008
Low	1.5	2.0
Median	5.0	7.0
Average	10.0	10.6
High	40.0	45.0

Source: based on a sounding among market specialists (PointCarbon, 25 April 2003).

Secondly, it is assumed that the rise of the electricity price due to the EU ETS is determined by the emission factor of the marginal production technology, i.e. a gas-fired power plant, and that this factor is equal to 0.42 kCO_2/kWh. Obviously, assuming another marginal generation technology (for instance, coal or CHP) or another emission factor for gas (for instance, owing to unforeseen efficiency improvements), the impact on the electricity price will change accordingly.

Finally, it is assumed that the increase in the cost price of electricity due to the EU ETS is passed on fully to the end users, regardless of the competitiveness on the electricity market and the specific method of allocating allowances to the power sector. Although this assumption is generally in line with the (theoretical) literature on this subject, in practice the extent to which the costs of emissions trading can and will be passed on to end users will depend on the following factors (Sorrel, 2002b; Mannaerts and Mulder, 2003; Scheepers, et al., 2003; and Sijm, 2003):

- The competitiveness of the electricity market, notably whether this market is characterised by a high degree of free and full competition, or by oligopolistic or duo-polistic practices (including the opportunity to set electricity prices by a few, large power producers, the opportunity of incumbent producers to impede new entrants on the market, or the opportunity to negotiate long-term electricity price contracts between major producers/suppliers and large-scale, energy-intensive industries). Moreover, the extent to which costs will be passed on to the end users of electricity will also depend on the price elasticity of the demand for electricity. This elasticity is generally very low for small-scale consumers (notably households) but may be more significant for large-scale users such as the energy-intensive industries covered by the Benchmarking Covenant.
- The method of allocating allowances to the electricity sector, i.e. auctioning or free allocation, notably whether in case of free allocation to incumbent producers, new entrants (if any) will also receive the allowances for free or have to buy them on the market. The extent to which the costs of emissions trading can and will be passed on to end users of electricity is likely to be higher in cases of (i) auctioning allowances to both incumbents and new entrants, (ii) free but tight allocation to both incumbents and new entrants (so that additional allowances have to be bought on the market), or (iii) free allocation to incumbents only, while new entrants have to buy their allowances on the market. On the other hand, it is likely to be lower in cases of free and ample allocation to both incumbents and new entrants.

Obviously, if the extent to which the costs of emissions trading can and will be passed on to end users of electricity is lower than 100 percent (say, on average, 70 or 30 percent), the impact of these costs on the electricity price will, *ceteribus paribus*, be proportionally smaller (i.e., on average 70 or 30 percent of the 0.42 ct/kWh, in case costs are fully passed on).

If the EU ETS will indeed result in an increase of the average electricity price by 0.42 ct/kWh, it will have a significant impact on the two major sectors covered by the Benchmarking Covenant, i.e. the power producers versus the large-scale power consumers.[43] In case the allowances would be auctioned to the power producers, the Dutch government would raise total revenues of about €430 million (see Table 4.5). This revenue could be recycled to the power producers, channelled to the power consumers in order to compensate them for the higher electricity price, or used to finance general fiscal measures such as reducing taxes or enhancing public expenditures. If the auction revenue would not be recycled to the power producers (or recycled in proportion to their electricity output rather than to the attendant CO_2 emissions), the competitive position of coal-based electricity would deteriorate while it would improve for CHP, nuclear and renewable electricity.

In line with the EU ETS Directive, however, most or all allowances will be allocated for free to the power producers. This implies that the economic rent of the allowances, worth €430 million in 2010, will accrue to the power sector. Assuming that (i) the allowances will be allocated for free according to the projected emissions for the year 2010, (ii) the economic rent of the allowances will be cashed through selling electricity at the increased market price (rather than by selling allowances directly at the market), and (iii) this rent will accrue to the power producers (rather than the suppliers), it will be re-allocated among these producers according to their share in total domestic output rather than the attendant emissions (see Table 4.5).[44] This implies that the major share of the economic rent will accrue to CHP generation of electricity (about €190 million), followed by coal-based production (€100 million), gas-based generation (€80 million), the production of renewable electricity (€45 million) and, finally, the generation of nuclear power (€15 million).

[43] The impact of a higher electricity price due to the EU ETS on small-scale power consumers will be discussed in Chapter 5, whereas Chapter 6 will consider this impact more specifically for the producers and consumers of renewable electricity.

[44] However, it should be noted that, depending on the profit margin of generating electricity, it might be more attractive for power producers, notably for coal-based generators, to sell allowances on the market then to use them as part of the production process.

The impact of the EU ETS will be quite different for the large-scale industrial users of electricity. Industries that compete on global markets cannot pass on an increase in the electricity price to their customers. As a result, the supply of these industries declines when the electricity price is raised. According to a recent study, the production of the European steel, aluminium, plastic and nitrogen industries will decrease by some 2 percent in 2010 when the price of an allowance is 5 ct/tCO_2, mainly due to the resulting increase in the electricity price (Mannaerts and Mulder, 2003).

Actually, due to the interaction or coexistence of the EU ETS and the BC alongside each other in their present form, the energy-intensive industries in the Netherlands may be subject to *double regulation* (Sorrell, 2002b). On the one hand, the electricity use of these industries is regulated by the BC in the sense that this use is part of the energy efficiency benchmarking commitment of these industries. On the other hand, these industries will be faced with higher electricity prices due to the EU ETS. To some degree, these higher prices will provide an additional incentive to improve the energy efficiency of the benchmarking industries, while these efficiency improvements help to mitigate the impact of higher electricity prices on the production costs of these industries (positive interaction). For the remaining bulk of their electricity use, however, the benchmarking industries will be faced by higher electricity prices due to the EU ETS (negative interaction).

The impact of higher electricity prices on energy-intensive industries could, in theory, be relieved by auctioning allowances to the power sector and channelling a part of the auction revenues to the (large-scale) consumers of electricity in order to compensate them for the higher electricity prices due to the EU ETS. For the time being, however, this option might be hard to realise, as the present EU ETS allows only a small part of the total quantity of allowances to be auctioned during the first and second phases. Moreover, depending on the method of channelling the auction revenues to the energy-intensive industries, this option may nullify the positive impact of higher electricity prices on the energy efficiency of these industries.

Another option to compensate energy-intensive industries for the higher electricity prices is to allocate free allowances for the generation of power to these end users rather than directly to the electricity producers.[45] According to the EU ETS Directive, installations are required to surrender allowances for their direct emissions, but it does not stipulate that free allowances have to be allocated exclusively and fully to direct emitters (KPMG, 2002).[46] If this interpretation of the Directive is correct (or the Directive is amended accordingly), it implies that allowances for the generation of power delivered to the participating industries of the EU ETS can be allocated for free to these industries and, hence, that these industries can sell these allowances (to the power producers) as they do not really need them. In such a case, these industries receive compensation for higher electricity prices resulting from the EU ETS. The higher production costs due to these higher prices equalise the benefits of selling the allowances. As a result, the marginal costs of these industries increase with the increase of the electricity prices, but the average costs do not change. Therefore, this allocation option has a positive effect on the energy efficiency of these industries without having large negative effects on their competitive position (Mannaerts and Mulder, 2003).

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45 See Section 4.3.5 for a further discussion of the option to allocate allowances indirectly to electricity end users.

46 The Directive states that allowances should be given to the operator of each installation (Article 11.1). It does not require that each operator should receive allowances correspondingly to the share of its own direct emissions that is foreseen in the cap (KPMG, 2002). One may doubt, however, whether this interpretation is in line with the spirit of the Directive and the specific allocation criteria of Annex III. Additional research or explanation of the Directive, or even (over time) an amendment of the Directive on this issue might be considered.

4.2.3.4 The impact of the EU ETS on generating heat/power

An interesting interaction issue between the EU ETS and the Benchmarking Covenant concerns the treatment of energy use and concomitant emissions due to the generation of (off-site) heat and power, including combined heat and power (CHP). As noted in Chapter 2, in a direct (downstream) emissions trading system such as the EU ETS, emissions due to the generation of heat/power are attributed to heat/power producers, while in an indirect system they are imputed to heat/power consumers (or a subset of consumers). Each option has pros and cons and each has different implications for incentives and abatement options.[47] For example, electricity generators have full and direct control over the carbon intensity of power production, through investment and operational decisions such as fuel switching, but they have only indirect and partial control over total electricity demand through electricity prices. In contrast, electricity consumers have full and direct control over their electricity demand, through investment and operational decisions such as energy efficiency, but have no control over the carbon intensity of electricity generation unless some form of 'carbon labelling' of electricity is available (Sorrell and Sijm, 2003).

Overall, a direct ETS seems to be preferable because (i) it gives ownership of electricity emissions to the companies directly responsible for the control of these emissions, thereby incentivising both fuel switching and energy efficiency (including energy savings by consumers through higher electricity prices), (ii) it facilitates cross-border electricity trade in the EU, and (iii) it is simple as it does not require an international power labelling system in order to allow for corrections for imported power, power with no CO_2 emissions related, and CO_2 emissions related to power generated for non-participants, and power generated by non-participant (Sorrell, 2002b; KPMG, 2002). As these latter values change from year to year, allocation of allowances has to be calculated on an annual basis.

An advantage of an indirect system, on the contrary, is that it fits in with climate change policies which are focused on improving energy efficiency, such as the Benchmarking Covenant, and that the application of a performance standard rate, notably an energy efficiency benchmark, as a basis for allocating allowances is more feasible with indirect emissions included (CO_2 Trading Committee, 2002; KPMG, 2002; SER 2002). This advantage, however, applies only to countries with such policies or allocation preferences, e.g. the Netherlands, but not to most other Member States participating in the EU ETS. As these States will prefer a direct ETS, because of the advantages mentioned above, it is better to introduce a harmonised direct system in the EU - as indeed proposed by the EU ETS Directive - than a mixture of direct and indirect systems among EU Member States as such a mixture would lead to all kinds of problems of 'double counting' and 'double slippage' of emissions (Sorrell, 2002b).

The Benchmarking Covenant, on the contrary, is based on an indirect approach of energy use and concomitant emissions, as it covers both fossil fuel consumption and energy carriers with indirect emissions. In order to calculate the benchmark in the industrial sector, the energy content of various fuels is added, together with net consumed electricity (after weighing with a factor of 2.5, representing primary fuel consumption).[48] Net consumed heat is also added after it has been weighed with a factor between 0.25 and 0.75, depending on the generation technology (often CHP). Of course, heat from fuels converted on-site is not added to avoid double counting. In the energy sector, the main product is electricity. Separate benchmarks are developed for electricity from gas and coal. A correction for delivered heat is made.[49]

[47] See Sorrell (2002) and the discussion in the Netherlands on whether a Dutch/EU ETS should be based on direct or indirect emissions (CO_2 Trading Committee, 2002; SER 2002, and KPMG, 2002).

[48] On the other hand, on-site generated electricity which is delivered to other consumers is subtracted after weighing with a factor of 2.5 (equivalent tot a generating efficiency of 40 percent). This is common practice in refineries, chemical and paper industry. See also the Benchmarking Verification Bureau (2003) in its classification on CHP.

[49] On-site generated heat, delivered to others, is subtracted after weighing with a factor of 1.11 (equivalent to a boiler efficiency of 90 percent). This occurs mainly for (waste) heat deliveries from electricity plants.

Whereas the indirect approach of the Benchmarking Covenant encourages energy efficiency, the direct approach of the EU ETS may lead to sub-optimal shifts in energy use in cases where electricity or heat can be substituted for fuel. For industry, replacing direct fuel consumption by purchased heat or electricity might be an attractive way to retain allowances for selling on the market. This would occur particularly if electricity and heat prices do not adequately reflect emission costs, e.g. because of fierce competition and ample allocation of free allowances in the energy sector. Total CO_2 emissions could even be higher than before substitution took place because of generation and transport losses of energy. It should be noted, however, that under a fixed cap of the EU ETS, such energy/carbon inefficiencies must be compensated elsewhere in the system by less CO_2 emissions, although at higher total abatement costs and higher prices of an allowance.

Several potential cases of energy substitution due to the EU ETS can be distinguished. Firstly, substituting fuels for electricity, e.g. by improving heat recovery or implementing electric heat pumps will be more attractive because of the surplus of allowances that can be sold. On the other hand, substituting heat for electricity, e.g. by replacing electric hot water boilers with efficient gas fired boilers, may become disadvantageous.

Secondly, substituting heat for fuels, e.g. by outsourcing steam production. A paper industry, making optimal use of steam from a nearby CHP plant, may itself have no CO_2 emissions. In accordance with the EU ETS, no allowances have to be surrendered by this industry, but instead by the CHP operator. As a result, this operator is encouraged to produce steam efficiently and, based on the allocation rules of the EU ETS, receives allowances accordingly. However, if the price of an allowance is not adequately reflected in the steam price, the end user is not adequately incentivised to use steam efficiently.

Thirdly, CHP represents a number of sub-cases that have to be considered since it is a cornerstone technology for CO_2 reduction that accounts for some 40 percent of the electricity produced in the Netherlands. The following sub-cases can be distinguished:

- *Large-scale district heating: both electricity and heat are sold.* Due to the 20 MW participation threshold of the EU ETS, district heating may be replaced by private boilers as most district heating schemes will be subject to the EU ETS and could see their costs increased, while the private boilers and other small-scale installations do not (depending on alternative climate policies for these installations). Having to acquire emission allowances for district heating could pose a barrier for its implementation (COGEN Europe, 2002 and 2003). For new district heating schemes, some extra allowances could be granted since emissions outside the trading system are reduced.
- *Small scale CHP, e.g. gas engines in horticulture operated by energy companies: both heat and electricity are sold.* These sources remain outside the trading system. As far as the EU ETS causes a rise of the electricity price, small scale CHP has an advantage. This can improve its current vulnerable position as well as its competitiveness with regard to small-scale industrial CHP (>20 MW). Due to the threshold participation level of 20 MW, the EU ETS may encourage a shift in electricity production from large-scale to small-scale CHP, thereby shifting the CO_2 emissions from the participating sectors to the non-participating sectors.
- *Large scale industrial CHP, owned by heat consuming industry: electricity (partly) consumed on site*. Compared to heat generation with boilers and purchase of electricity, extra allowances are required. This imposes extra costs if CHP investments are considered. CHP is only favoured when higher costs of purchased electricity offset extra costs for CHP emission allowances. Electricity prices are supposed to rise under EU ETS, but price levels are uncertain.
- *Large scale industrial CHP, owned by heat consuming industry: electricity sold to grid.* Extra allowances are required, to cover the generation of electricity. CHP electricity gains an advantage in competing with fossil fuel based electricity.

- *Large-scale industrial CHP, owned by an energy company: heat and electricity sold.* Compared to conventional fossil-based electricity generation, the heat production requires extra allowances. The heat consuming industry faces a price increase for heat, but gains an allowance surplus because it avoids heat production by boilers.

Overall, in the coming decade CHP in the Netherlands will likely benefit from emissions trading as it mainly has to compete with conventionally generated electricity, which is likely to become more expensive due to the EU ETS (see Table 4.5 and the discussion above on the impact of the EU ETS on the price of electricity). However, the competitive position of district heating and other forms of large-scale CHP may be adversely affected by the threshold participation level of the EU ETS (i.e. 20 MW) in favour of private boilers and small-scale CHP. Depending on other, additional climate policies towards the non-participating sectors, this may lead to a shift of CO_2 emissions from the participating sectors to the non-participating sectors rather than reducing these emissions. In order to avoid these shifts in CHP production and concomitant emissions, there are basically two policy options:

1. Reducing or even abolishing the threshold participation level of 20 MW. However, such a move would significantly increase the number of installations participating in the EU ETS.
2. Designing comparable climate policies for the non-participating sectors. In practise, however, it may sometimes be hard to design and fine-tune policies that lead to an 'equivalence of efforts' between the participating and non-participating sectors (Sorrell, 2002b).

In addition, a related major conclusion of the discussion above is that, if the (opportunity) costs of emission allowances will not be adequately reflected in the heat/power prices of end users, industrial operators of installations participating in the EU ETS are incentivised to reduce their CHP production and to shift their fuel mix towards the use of heat/power that has been generated off-site rather than on-site. Such a situation, however, will hardly be sustainable as the generators of off-site power/heat will be eventually forced to incur the allowance price on their products in order to avoid running out of allowances allocated for free and, hence, being forced to buy additional allowances on the market (KPMG, 2002). Moreover, any shifts from fuel to power/heat consumption will not threaten the environmental effectiveness of emissions trading as the cap of the EU ETS will remain in force (CO_2 Trading Committee, 2002). Nevertheless, if such shifts would occur and if governments are interested in avoiding a sub-optimal use of power and/or heat due to the EU ETS, there are basically two policy options:

1. Maintaining an energy efficiency policy, such as the Benchmarking Covenant, which includes power and heat. If applied to a large scale, however, this option would imply the co-existence of two policy instruments (EU ETS and BC) that highly overlap in terms of target groups, objectives, operational functioning and administrative demands. For individual or exceptional cases, on the contrary, sub-optimal energy use may be prevented by means of imposing licensing conditions as part of the Environmental Management Act.
2. Maintaining a significant price incentive for heat and electricity, which would keep the incentives for reducing fuel, heat and power consumption in balance. This could be achieved by either granting a limited amount of free allowances to the energy sector (so that additional allowances have to be bought at an auction or market) or by allocating the allowances for generating power/heat to the industrial end users rather than the energy sector, which remains responsible for surrendering allowances according to their direct emissions (so that the energy sector has to buy these allowances from the industrial end users). The latter opportunity would also compensate these users for the higher energy prices, thereby protecting their competitive position.

4.2.3.5 The administration of the instruments

In the Netherlands, the implementation of the EU ETS is the political responsibility of the Ministry of Economic Affairs (EZ) and the Ministry of Public Housing, Spatial Planning and the Environment (VROM).

A recently proposed, semi-autonomous *Emission Authority*, however, will be responsible for the execution of several tasks related to the EU ETS, such as the issuance of the emission permit and allowances, and the monitoring and verification of emission data (Ministry of VROM, 2003).

The implementation and administration of the Benchmarking Covenant is the responsibility of the *Benchmarking Committee*, which is composed of representatives of all the participating parties, notably the Ministries of EZ and VROM, the industry and sectoral organisations, and the provincial authorities. This Committee discusses a wide range of general and practical issues, monitors the progress of the Covenant, and reports to the politically responsible ministers (who, in turn, report to the Members of Parliament). In addition, an independent authority - the Benchmarking Verification Bureau - is responsible for the verification of the implementation of the Covenant, notably the implementation of the energy efficiency plans and the energy efficiency improvements realised by the participating installations.[50]

Overall, the administration of the Covenant is quite demanding (and, hence, relatively expensive). In short, the major administrative tasks emanating from the Covenant include (i) the determination and regular updating of an international benchmark for each product installation, (ii) the drafting and regular updating of an energy efficiency plan for each installation, and (iii) the monitoring, verification and reporting process of all parties and institutions involved in the implementation of the Covenant. Although, in theory, the administration of the Covenant could coexist alongside the administration of the EU ETS, in practice it would imply that notably the major target group of the two instruments - i.e. the energy-intensive industries - would be faced by a doubling of administrative activities (licensing, reporting, monitoring, verification, etc.) in order to comply with the separate, but highly overlapping targets of these instruments. However, a major part of the BC information at the installation level could be used to design the national allocation plan of the EU ETS, based on the BC (positive interaction). On the other hand, depending on the specific method applied to allocate allowances to a large sample of individual installations, such an exercise could even increase the administrative demands of the two instruments coexisting together (negative interaction; see Section 4.3 below).

4.2.3.6 The timing of the instruments

Phase 1 of the EU ETS runs from 2005 to 2008, while Phase 2 - i.e. 2008-2012 - corresponds to the first commitment period of the Kyoto Protocol and the third, final phase of the BC to implement measures to comply with its energy efficiency commitments. As these measures include the opportunity of emissions trading, there seems to be a perfect timing between these instruments for the years 2008-2012. Depending on the specific allocation and banking rules for the first and second phases of the EU ETS, however, Phase 1 trading may create risks for Member States to comply with their Kyoto commitments (Sorrell, 2002b). Moreover, timing may be less perfect between the EU ETS and the BC for the years preceding 2008 as the second phase of implementing BC measures runs from early 2006 to late 2007, thereby only partially overlapping with the initial phase of the EU ETS. As the BC includes the opening to introduce emissions trading as one of its measures already during its second phase, it could be considered to adjust the second phase of the BC, corresponding to the first phase of the EU ETS, notably if indeed this opening is actually used.

4.2.4 The Benchmarking Covenant as a basis for allocating EU ETS allowances

According to the first criterion mentioned in Annex III of the EU ETS directive, the allocation of allowances has to be consistent with national climate policies to meet the Kyoto target. As the Benchmarking Covenant (BC) is the major national climate policy for the energy-intensive

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[50] See Benchmarking Committee (1999) as well as Appendix A of the present report for more details on the responsibilities and tasks of the major institutions involved in the implementation of the Covenant).

industry and the electricity sector, it has to be taken into account. Notably, the energy efficiency benchmarks of the BC could be translated into CO_2 efficiency Performance Standard Rates (PSRs) in order to allocate the EU ETS allowances in the Netherlands. Such an exercise, however, raises a variety of interaction issues, which will be discussed below under the following headings:

- Juridical issues: legal basis and restrictions
- Economic issues: costs and trading aspects
- Allocation issues: an absolute or a relative cap?
- Implementation issues: converting benchmarks into emission quota.

4.2.4.1 Juridical issues: legal basis and restrictions

According to the fourth criterion specified in Annex III of the EU ETS Directive, the national allocation of emission allowances shall be consistent with other EU legislative and policy instruments. From the Explanatory Memorandum of the ETS directive, it is clear that this criterion includes particularly the IPPC Directive. As noted, the IPPC directive is implemented in the Netherlands by means of the Environmental Management Act (EMA). Fulfilling the obligations of the Benchmarking Covenant suffices to meet the EMA requirements for energy efficiency and GHG emissions. Therefore, the BC can serve as a legal basis for allocation of allowances in the Netherlands.

However, as indicated in the Memorandum of the ETS directive, regulation under the IPPC directive will have to allow for emissions trading, and so under the EMA and BC as well. Emissions trading thus requires amendments to some legal restrictions of the IPPC Directive, the EMA and the BC in order to allow emitters, at least to some extent, to trade and surrender emission allowances instead of meeting specific local environmental standards.[51]

4.2.4.2 Economic issues: costs and trading aspects

Allocation of allowances based on the Benchmarking Covenant is likely to imply that the socio-economic benefits of emissions trading in the Netherlands will be relatively low. Firstly, such an allocation will probably supply the benchmarking sectors with an amount of allowances that largely covers their expected emissions over the years 2005-2012. As argued in Section 4.2.3, industries participating in the BC - excluding the power sector - have already planned measures to meet their estimated benchmark for the year 2012. Most of these measures are likely ‘cost-effective measures’ (with an IRR>15%), implying that the marginal abatement costs of these measures are probably low - or even negative - and that, depending on the allowance price, the demand for allowances by the participating industries - and the resulting trading benefits - would also be low.

Moreover, as additionally argued in Section 4.2.3, the price of an allowance may also be low to a variety of other policies, notably the public support to abatement measures of industries participating in the EU ETS. Due to this support, these measures may become ‘cost-effective measures’ from a company point of view, which may result in a supply (i.e. selling) of freely allocated allowances. Although private companies may benefit from such transactions, these emissions trading benefits may be questioned from a socio-economic point of view.

In addition, if the allocation of allowances would indeed be based on the Benchmark Covenant, the marginal abatement costs of the participating industries would be substantially lower than those of the non-participating sectors of the EU ETS. This implies that a less ample allocation for the participating industries (and, hence, a lower reduction target for the non-participating sectors) would lead to (i) a convergence of marginal abatement costs among participating and

[51] See Section 4.2.3 for a more general discussion on these legal aspects and other conditions of the Benchmarking Covenant that may restrict emissions trading in the Netherlands.

non-participating sectors, (ii) higher benefits from emissions trading and, therefore, (iii) less abatement costs for the Netherlands as a whole. Despite these potential benefits from a tighter allocation of allowances to the benchmarking industries, such an allocation may be politically hard to accept, partly because Dutch policy makers are concerned to protect the competitiveness of the energy-intensive industries, and partly because it has been agreed by the Covenant parties to prevent such additional CO_2 reduction measures for the participating industries as far as possible.

Finally, although the costs for determining benchmarks for over 300 products have already been made, the additional transaction cost of translating benchmarks into allocation quota for individual installations may still be considerable (see below). Therefore, the potential (net) benefits of emissions trading in the Netherlands may be further reduced if allocating allowances based on the Benchmarking Covenant would turn out to be more cumbersome than other allocation methods.

4.2.4.3 Allocation issues: an absolute or relative quota?

For obvious reasons, the allocation of allowances is one of the most cumbersome and contentious issues of an emissions trading scheme. Basically, there are only two allocation options, i.e. auctioning and free allocation. While auctioning normally concerns the allocation of a fixed amount of allowances to the highest bidders, the option of free allocation can be further distinguished by two sub-categories:

- Free allocation of a *fixed amount* or *absolute quota* of emissions allowances (often denoted as *grandfathering*). It should be added, however, that the term *grandfathering* originally referred only to the free allocation of a fixed amount of allowances to installations based on historic emissions, i.e. on the basis of emissions in a reference year of an average over several years in the past. Nowadays, the term is often (sometimes mistakenly) used in a much wider meaning, referring to all kinds of free allocation (even in relative terms), including allocation based on future, projected emissions or based on a (fixed) emission factor or Performance Standard Rate (PSR) multiplied by a fixed (projected) input or output level (KPMG, 2002).
- Free allocation based on a *relative quota* or *Performance Standard Rate (PSR*) such as an energy/carbon efficiency benchmark per unit input or output (often labelled as *updating*, where the term updating usually refers to the fact that the total amount of allowances allocated during a certain period is adjusted to the actual input or output level). However, as noted in Box 2.1 (Chapter 2), the PSR itself - just as an absolute quota - is usually fixed for a specific trading period, but both targets may be updated in the next trading period, depending on improvements in energy/carbon efficiencies, economic growth and the overall emission reduction commitments that have to be met.

According to the EU ETS directive, the number of allowances to be allocated for a certain trading period should be an absolute quota, of which at least 95 percent should be allocated for free in the first period - and at least 90 percent in the second period - while the remaining part may be auctioned at the discretion of individual Member States. While some scientists and politicians have stated that the share of allowances to be auctioned should be much higher, others - including the Dutch industries that join the Benchmarking Covenant - have argued that all allowances should be allocated for free and that the EU ETS should have a relative quota by basing the allocation on a PSR such as the energy efficiency benchmarks determined as part of the Covenant.

In the sections below it is assumed that the Dutch authorities will opt for a free allocation of all allowances during both the first and second phase of the EU ETS (while the option of auctioning will be considered in Section 4.3). First of all, the major arguments pro and contra the two main options of free allocation (an absolute versus a relative quota) will be briefly considered, followed by a short discussion of a hybrid option, i.e. a 'PSR under an absolute quota'.[52]

Arguments pro an absolute quota (including grandfathering)

- An absolute quota provides certainty with regard to the environmental effectiveness of an ETS.
- An absolute quota is more efficient than a relative quota, i.e. the abatement costs and the price of an allowance are lower, as an absolute quota provides an incentive to reduce production volumes.[53]
- An absolute quota has low information costs, notably in case of simple grandfathering.

Arguments contra an absolute quota (including grandfathering)

- An absolute quota creates uncertainty about abatement investments as the price of an allowance is uncertain.
- An absolute quota, notably conventional grandfathering, creates a barrier to new entrants. Although this problem can be solved by a set-aside, i.e. a reserve of allowances for new entrants, such a reserve creates environmental uncertainty.
- The impact of grandfathering depends on the choice of the reference year. Setting the reference year far back in the past credits the maximum amount of early action measures, but creates other potential problems such as the lack of data availability, or the installation of a co-generation plant *after* the reference year (which is not credited, since on-site emissions are increased). Moreover, grandfathering based on a single reference year makes allocation vulnerable to annual fluctuations due to, for instance, changes in production volume or maintenance (KPMG, 2002). More sophisticated forms of grandfathering, however, can deal with most of these problems (including early action issues), but would increase information costs.
- An absolute quota does not account for (uneven) growth patterns of different industries, which may lead to competitive distortions, notably of high-growth industries (although a stringent relative quota may distort competitiveness as well).
- An absolute quota of freely allocated allowances, based on historic emissions, may lead to windfall profits and capital transfers among firms, as well as to a bonus on reducing output or closing and relocating firms ('carbon leakage').

Arguments pro a relative quota (including updating/PSR)

- A relative quota accounts for the reduction potential of an installation, new entrants and early action measures.[54]
- A relative quota accounts for differences in production growth, although it still may distort the competitiveness among firms (Jansen, 2002; Elzenga and Oude Lohuis, 2003).
- A relative quota does not lead to allocation of excess allowances (capital transfers) or a bonus on reducing or relocating production).
- A relative quota fits better in with existing climate policies such as the Benchmarking Covenant or other measures that are based on relative targets.

[52] For a more extensive discussion of different allocation options, including auctioning, see CO_2 Trading Committee (2002), SER (2002), KPMG (2002), Koutstaal (2002), Koutstaal, et al. (2002), Van Dril (2002), Jansen (2002), Groenenberg, et al. (2002), Elzenga and Oude Lohuis (2003), and Schyns and Berends (2003).

[53] This (theoretical) argument has been put forward by Koutstaal (2002) and Koutstaal, et al. (2002), but Van Dril (2002) has contested the actual effect of the incentive on reducing production volumes. See also the arguments contra a relative cap.

[54] However, as noted above, sophisticated grandfathering may also account for new entrants and early action. Moreover, as noted by Van Dril, et al. (2003), it is questionable whether all measures that are being regarded as early action have actually been introduced because of climate change concerns. Very often these investments were chosen because of the benefits they have, based on calculating their cost-effectiveness while not taking into account the future costs of CO_2 emissions. These choices were made within a competitive market ands so it is questionable if all of them should be regarded as early action.

Arguments contra a relative quota (including updating/PSR)

- A relative quota is less efficient because it is a combination of a price on emissions and a production subsidy Consequently, production will exceed the optimal output level, and allowance price and abatement costs need to be higher in order to meet the same emission target as in an efficient system with an absolute quota (Koutstaal, et al., 2002; Koutstaal, 2002). This argument has been opposed by Van Dril (2002), who states that, in practice, the costs of emissions trading will not or hardly be passed on to end users and, hence, will not lead to a reduction in the demand and supply of production output.
- A relative quota does not provide certainty with regard to the environmental effectiveness of an ETS and may lead to an overrun of international commitments on carbon mitigation (although, to some extent, this problem may be controlled by a regular update of the PSR itself).
- A relative quota implies high information and other transaction costs, notably if a large number of PSRs has to be determined and regularly updated for a large number of firms and/or products.

A hybrid option: PSR under an absolute quota

As shown above, each allocation option has its own set of (opposing) pros and cons (although more sophisticated forms of these options largely reduces the differences and relative advantages/disadvantages among them). A relative quota would fit better with the Benchmarking Covenant, but such a quota is not allowed by the EU ETS Directive. The directive, however, does allow a so-called 'national benchmarking' approach that sets absolute quantities of allowances by multiplying input or output data with an emission factor (i.e. a PSR converted to emissions per unit input or output). These absolute quantities should be determined ex ante for a certain trading period by using the expected input or output volume of an installation, and cannot be set or adjusted ex post by using actual input or output volumes (CEC, 2003b). Hence, the quantity of allowances allocated to an installation is equal to its PSR (or emission factor) multiplied by its expected input or output volume. This fixed amount can be used as in any other absolute cap and trade system.

The Social Economic Council of the Netherlands has recommended this option of using a PSR under an absolute quota for the Dutch national allocation plan as it offers some major advantages (SER, 2002). Actually, it covers the major advantages of an absolute target system (economic efficiency, environmental effectiveness), with those of a relative target system (fitting in with national climate policies and accounting for early action, reduction potentials and unequal growth patterns among firms). However, it does not account for new entrants (a set-aside may be considered), nor does it prevent potential distortions of (international) competitiveness or the opportunity of windfall profits or bonuses due to 'carbon leakage'.

Perhaps the most important disadvantage of the hybrid PSR option is that it further enhances the transaction costs of a conventional PSR system as it requires not only the usual information to design a set of PSRs for a wide variety of products and firms, but also reliable data on the expected input or output volumes of these firms. Moreover, if the emission factor or CO_2 efficiency PSR has to be derived from an energy efficiency benchmark, the information and other transaction costs may escalate further (see below).

4.2.4.4 Implementation issues: converting benchmarks into emission quota

The conversion of energy efficiency benchmarks from a voluntary agreement to a fixed amount of emission allowances at the installation level requires that the following issues have to be addressed (see Section 4.2.2, as well as KPMG, 2002):

- *Differences in fuel mix.* Firms with similar energy efficiencies may have different CO_2 emissions, depending on their fuel mix. Hence, when converting energy efficiency benchmarks into emission quota, the specific fuel mix of an installation has to be determined, including the CO_2 emissions per unit of energy, and allocation of allowances has to be set accordingly.

- *Process and non-energy emissions*. These emissions are covered by the EU ETS but not by the Covenant. Hence, these emissions have to be determined separately, including a reduction plan, and added to the energy emissions in order to determine the quota of allowances.
- *Indirect emissions of off-site heat and electricity*. These emissions are covered by the Covenant but not by the EU ETS. A distinction has to be made between the heat producer and the linked heat consumer. E.g., a paper factory purchasing steam from a CHP joint venture would receive no allowances since it has no CO_2 emissions. It would be put in an awkward position if the joint venture would decide to close down and sell all of its allowances. Provisions would have to be made in the contract between the two companies.
- *Absolute quota of emission allowances*. As the EU ETS Directive requires that fixed amounts of emission allowances have to be allocated, CO_2 emissions per unit product have to be multiplied by estimates of expected output in the relevant trading period.
- *Differences in timing*. Energy efficiency benchmark under the Covenant are determined for the year 2012, accounting for anticipated autonomous energy efficiency improvements up to 2012, while allocation quota have to be determined for a certain trading period, say 2005-2007. These differences in timing have to be accounted for.

In principle, the issues mentioned above can be addressed as a major part of the required information has already been gathered as part of determining the benchmarks and the energy efficiency plans for the companies participating in the Covenant. However, a complication may arise because information on benchmarking *methods* is partly confidential. For the approval of a national allocation plan, the information has to be checked with the criteria of Annex III of the EU directive, including non-discrimination between companies and sectors (III, 5). This may require publication of the applied product standards and methods of determining and calculating emissions. Furthermore, according to Article 17 of the Covenant, the *results* of monitoring shall be made available to the public, but this is subject to restrictions of industrial and commercial confidentiality, including intellectual property.

Moreover, besides adequate information, the conversion of energy efficiency benchmarks into emission quota requires a negotiation process in which the industrial and energy sectors will have to participate. To warrant their fair share of allowances, companies will be inclined to:
- Carefully check or propose conversion methods from fuel use in the energy efficiency plan into CO_2 allowances.
- Carefully check or propose estimations of non-energy CO_2 emissions.
- Claim emission allowances for their outsourced heat and power production in joint ventures and energy companies, to retain control over the arrangements of their utilities.
- Set production estimates high and negotiate allowances for expansion plans.
- Apply for allowances for emissions of which the reduction is specified as ‘uncertain’ or ‘conditional’ in the energy efficiency plans.
- Compare benchmarks with allocation quotas for competitors in other Member States and point out possible unreasonable disadvantages.

Finally, another complication is that the EU ETS covers a group of companies, located in the Netherlands, which do not participate in the Benchmarking Covenant (Section 4.2.1). Most of these companies, however, have signed an alternative voluntary agreement on energy efficiency, or otherwise they have to comply with the environmental licence conditions of the EMA, which may include prescriptions on improving energy efficiency and implementing energy efficiency plans. Hence, most of these companies have energy efficiency plans or regulations, comparable to those of the benchmarking industries, which can be used to derive an allocation quota under the EU ETS.

4.2.5 Evaluation of the coexistence scenario

Based on the evaluation criteria of the Interact project (see Box 4.1), Table 4.7 presents a multi-criteria assessment of the co-existence scenario of the proposed EU ETS and an unchanged BC, while assuming that the allocation of the EU ETS allowances will be based on the BC. This multi-criteria assessment includes an ad judgement of a 'score', ranking from 1 ('bad performance') to 9 ('good performance') for each criterion. Table 4.7 shows that the total score for the coexistence scenario of the proposed EU ETS and an unchanged BC amounts to 36. This total score is derived by unweighted adding of individual scores for each criterion. The scoring process is highly subjective and in practice, different stakeholder groups may both assign different scores and give different weightings to each criterion.[55] Nevertheless, this scoring and the assessment of the coexistence scenario of the EU ETS and the BC provide a useful starting point for the evaluation of some alternative policy options discussed in the next section.

Box 4.1 *Evaluation criteria for policy proposals*

- *Environmental effectiveness:* defined as the likelihood of a policy achieving a specific environmental objective.
- *Economic efficiency:* including static versus dynamic economic efficiency. *Static economic efficiency* is defined as the potential to minimise the direct costs of meeting a policy objective in the short term by allocating available resources in the most optimal way. *Dynamic economic efficiency* is defined as the potential to minimise costs in the long run by promoting technological innovations.
- *Administrative simplicity:* defined as the administrative burden of a policy on both the target group and the implementing organisations.
- *Social equity:* defined as fairness in sharing the costs and benefits of a policy among different social groups.
- *Industrial competitiveness:* defined as the impact of a policy on the competitiveness of national industries.
- *Political acceptability:* defined as the acceptability of a policy by key groups in the society.

Source: Sorrell and Smith (2001), and Sorrell, et al. (2003).

4.3 Interaction under alternative policy options

4.3.1 Introduction

Table 4.7 shows that the co-existence of the EU ETS and an unchanged BC alongside each other scores relatively low with regard to the criteria economic efficiency, social equity and administrative simplicity, notably when the allocation of EU ETS allowances is based on the BC. This assessment provides the starting point for considering some alternative policy options that might improve the overall performance of the interaction between the EU ETS and the BC.

These options will be discussed briefly in the sections below:
1. Relieving BC restrictions on EU ETS.
2. Using alternative allocation rules.
3. Auctioning of EU ETS allowances.
4. Allocating allowances to electricity end users.
5. Tightening the EU ETS cap to participating sectors.
6. Abolishing the BC when the EU ETS is introduced.
7. Combining the previous options.

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[55] The multi-criteria assessment and the scoring process have been suggested by Sorrell and Smith (2001) and Sorrell (2002a and 2002b) as part of developing the methodology for the Interact project, although some adjustments have been made as part of the present report.

Table 4.7 *Multi-criteria assessment of the coexistence scenario of the EU ETS and an unchanged BC, assuming an allocation of EU ETS allowances based on the BC*

Criteria	Relevant issues	Score
Environmental effectiveness	– The effectiveness of the EU ETS with regard to CO_2 mitigation by the participating sectors is determined by the national emission quota or cap of this system. As a result, the BC has no impact on the environmental effectiveness of the EU ETS nor on the national CO_2 emission accounts of the participating sectors (although it does influence their domestic CO_2 emissions and, hence, emissions trading by these sectors, as well as setting their emission quota). – The EU ETS enhances the environmental effectiveness of the BC by increasing fossil energy prices (thereby encouraging energy efficiency) and creating opportunities for emissions trading (thereby facilitating CO_2 reductions).	8
Economic efficiency	– The coexistence of the two instruments has mixed effects on static efficiency. During the first phase of the EU ETS, its economic efficiency is reduced by the trade restrictions and other conditions of the BC. During the second phase, however, the costs of meeting the BC commitments may be reduced owing to the EU ETS (although remaining energy efficiency requirements of the BC may still reduce the efficiency of the EU ETS). On the other hand, the transaction costs of using the BC as a basis for EU ETS allocation are high, notably when the two instruments coexist alongside each other. Moreover, the benefits from emissions trading are low due to the expected ample allocation to the participating sectors. – The coexistence of the two instruments probably has no synergistic effects on dynamic CO_2 efficiency (and may even be reduced when the BC allows emissions trading to meet its commitments).	6
Administrative simplicity	– The administrative demands of both instruments are very high and partly overlapping, notably when they coexist together and the allocation of the EU ETS is based on the BC.	4
Social equity	– The social equity of the two instruments operating together is probably low, particularly when EU ETS allowances are allocated on the basis of the BC. Firstly, (assuming that the cost of emissions trading are passed on the electricity end users, power producers benefit from free allocation (‘windfall profits’) while industrial and household electricity users are faced by higher costs. Moreover, allocation based on BC implies that the (marginal) abatement costs of the sectors participating in the EU ETS/BC will be low, while they will be high in the non-participating sectors.	4
Industrial competitiveness	– The coexistence of the two instruments in general, and allocation based on the BC in particular, is favourable for the competitiveness of the industries participating in the EU ETS/BC. However, if the costs of emissions trading are passed on the industrial users of heat/power, their competitive position deteriorates on the world market.	7
Political acceptability	– Mixed outcomes. On the one hand, basing allocation of EU ETS allowances on the BC enhances the acceptability of the EU ETS among the participating industries. On the other hand, the acceptability of such a coexistence is questioned by policy analysts because of (i) its high administration costs, and (ii) its adverse effects on social equity.	7
Total		36

4.3.2 Option 1: relieving BC restrictions on EU ETS

Definition and rationale of Option 1

As discussed in Section 4.2, the economic efficiency of the EU ETS may be reduced by some conditions of the present BC, notably (i) specific restrictions on emissions trading to meet the BC obligations up to 2008, and (ii) specific requirements regarding energy efficiency, notably for use of heat and electricity, which may conflict with the CO_2 efficiency of the EU ETS. Option 1 includes the lifting of these conditions, starting from the initial phase of the EU ETS.

Evaluation of Option 1

This option slightly improves the (static) economic efficiency of the two instruments coexisting together alongside each other, but will hardly affect the other performance criteria mentioned in Table 4.7. It may have a small negative effect on energy efficiency, however, notably when the costs of an emission allowance are high and these costs are not passed on to end users of electricity and heat. Overall, the total score of this option (37 points) is hardly higher than the performance of the coexisting scenario (36 points; see Table 4.8).

4.3.3 Option 2: An alternative allocation rule

Definition and rationale of Option 2

The coexistence scenario of Section 4.2.4 is based on the conversion of energy efficiency benchmarks to CO_2 emission quota. Although such an approach fits in well with existing climate policies in the Netherlands and meets several allocation criteria mentioned in Annex III of the EU ETS directive, its transaction costs may be high due to its high (additional) administrative demands and the concomitant process of negotiations and political bargaining between the major parties involved. In order to reduce these costs and other drawbacks of this approach, an alternative allocation rule could be designed. Over the past 12 months, a wide variety of alternative allocation rules has already been launched, some of them based on a PSR, others on a hybrid form of grandfathering (see, for instance, KPMG, 2002; E5, 2003; Schyns and Berends, 2003b, and Van Dril, et al., 2003). Each specific rule has its own set of pros and cons, comparable to those of the general allocation options mentioned above, which will not be further discussed here. However, only as a way of illustration, a simple alternative allocation rule – based on historic emissions – will be presented in contrast to the more complicated conversion approach presented in Section 4.2.4. The allocation formula is (Van Dril, et al., 2003):

$$\text{Allocation}_{(\text{installation i})} = \text{Emissions}_{(\text{base period; i})} \times \text{Balancing factor} \times \text{Correction factor}_{(\text{i; s})}$$

The balancing factor represents a flat rate used for national governments to meet the target for the participating sectors (say a factor of 0.95 of the emissions in the base period). This factor will be applied to all domestic installations within the scheme. The correction factor can be used to allow for specific circumstances concerning either installation or sector (for instance, to account for new entrants, early action or differences in output growth between sectors).

Evaluation of Option 2

The major advantage of Option 2 is that it is quite simple and, hence, its administrative demands will be relatively low, depending on the choice of the base period and the correction factors applied. Moreover, the economic efficiency of this option will likely be higher owing to the lower transaction costs involved. As it is assumed that the cap of this option will be equal to the cap of the coexistence scenario, there will be hardly any change in the environmental effectiveness, the social equity and the industrial competitiveness of this option compared to the baseline option of the coexistence scenario. However, as Option 2 does not fit in well with existing policies in the Netherlands, its political acceptability is probably low, notably among benchmarking industries and policy makers. Overall, the score of this option amounts to 37 points (Table 4.8).

4.3.4 Option 3: Auctioning of EU ETS allowances

Definition and rationale of Option 3

In the coexisting scenario of Section 4.2, it was assumed that the total quota of allowances would be allocated for free. Although free allocation enhances the political acceptability of introducing an ETS, it may have some adverse effects, particularly in the electricity sector. Depending on the competition within the electricity sector, free allocation may have one of the following effects:

- Owing to an ample, allocation of free allowances to the electricity producers and a fierce competition among these producers, the costs of emissions trading are not passed on to the (industrial) end users. As a result, these end users may substitute electricity for fuel use, thereby reducing overall energy efficiency.
- Due to a strict allocation of free allowances to the electricity producers and/or a lack of competition among them, the costs of emissions trading are passed on to the (industrial) end users. As a result, the power producers are faced with an economic rent ('windfall profits'), while the industrial end users are confronted with higher production costs which they cannot pass on to their customers due to competition from outside.

Table 4.8 *Comparison of the performance of the coexistence scenario and some alternative policy options for the EU ETS and the BC*

	Coexistence Scenario	Alternative policy options Opt. 1	Opt. 2	Opt. 3	Opt. 4	Opt. 5	Opt. 6	Opt. 7
Environmental effectiveness	8	8	8	8	8	8	8	8
Economic efficiency	6	7	7	6	6	7	7	8
Administrative simplicity	4	4	6	3	3	5	5	6
Social equity	4	4	4	5	5	6	4	7
Industrial competitiveness	7	7	7	8	7	6	7	6
Political acceptability	7	7	5	8	6	6	8	6
Total	36	37	37	38	35	38	39	41

These adverse effects can be (partially) lifted by auctioning allowances rather than allocating them for free. According to the EU ETS Directive, a Member State is allowed to auction, at the maximum, 5 percent of its allowances in the first phase and 10 percent in the second (this share might even be raised in subsequent periods). In Option 3 this opportunity is used to auction the maximum amount of allowances during a certain trading period. More specifically, Option 3 includes that the amount of allowances to be auctioned is subtracted from the quota of free allowances allocated to the electricity producers in the co-existence scenario, while all other participants are granted the same amount of allowances (based on the BC, see Section 4.2.4).

Evaluation of Option 3

This option has some specific advantages (see also Box 4.2 for the arguments pro and contra auctioning in general). The power producers are forced to buy a major part of their allowances, either directly at the auction or indirectly at the market. As a result, they are incentivised to pass the costs of emissions trading to the end users (thereby encouraging energy efficiency), while their windfall profits are reduced (thereby improving social equity). Moreover, the auction revenues can be used to compensate industrial end users for the higher electricity prices (thereby further improving social equity and improving the competitiveness of these end users). Finally, while this option will be opposed by the power producers (and increase administrative demands), it will enhance the political acceptability of the EU ETS among industrial end users and policy makers. On the other hand, if auctioning (and recycling the revenues to the industrial end users of electricity) is implemented only in the Netherlands, it will affect the competitive position of both its power producers (i.e. negative impact) and its industrial end users of electricity (positive impact), compared to those of other EU Member States. Hence, this option is probably only acceptable if it is implemented throughout the EU ETS. Overall, the total score of this option becomes 38, i.e. two points higher than the co-existence scenario (Table 4.8)

Box 4.2 *Arguments pro and contra auctioning*

Auctioning has been advocated by many authors as the preferred option for allocating allowances, based on the following arguments (KPMG, 2002; SER, 2002, and Groenenberg and Blok, 2002):

- For an ET authority, auctioning is relatively simple to implement and involves a minimum or zero data requirement on historical emissions or emission standards as participants themselves determine how much allowances they actually need.
- All participants, including new entrants, are treated in the same, equal and fair way. Companies that have reduced their emissions in the past need to buy fewer allowances and, hence, are rewarded for this 'early action'. Moreover, an auction avoids both competitive disadvantages to new market entrants as well as windfall profits - or capital transfers - due to the (over) allocation of free allowances to (incumbent) participants.
- Auctioning is preferable from an efficiency point of view as, compared to free allocation, it provides the best reflection of the polluter-pays principle and, hence, the best incentive for technological innovations and cost-effective adjustments in existing production and consumption patterns, notably for carbon-intensive goods.
- Auctioning generates revenues for the public sector, which may be used to finance government expenditures or to reduce existing market distortions such as taxes on labour or capital.

The main disadvantage of auctioning, however, is that it raises the costs of participating industries (comparable to a carbon tax). If applied to the EU ETS only, this would deteriorate the competitiveness of EU industries, resulting in a loss of economic growth, income and employment. Although these adverse effects can to some extent be lifted by recycling the auction revenues to these industries, this opportunity raises some other practical problems (comparable to those of allocating allowances for free), thereby reducing the attractiveness of this option and, hence, of auctioning itself. Furthermore, auctioning increases uncertainty for the participants, especially in the first years of the scheme, thereby enhancing the chance of making wrong investment decisions and/or increasing overall capital costs.

4.3.5 Option 4: Allocating allowances to electricity end users

Definition and rationale of Option 4

As outlined in Chapter 2 and Section 4.2.3 above, the EU ETS is a direct downstream system in which allowances are allocated and surrendered according to the direct emissions of fossil-fuel users. In theory, however, allowances for generating electricity could be allocated in an indirect way - notably to the (industrial) end users of electricity - while they still have to be surrendered in a direct way by the power producers (who, hence, have to buy these allowances either directly or indirectly from the end users). Option 4 includes this opportunity to allocate allowances for generating electricity to the industrial end user (still based on the BC), while the power producers are obliged to surrender allowances according to their emissions.[56]

[56] As discussed in Section 4.2.3.3, however, it is not quite clear whether the draft directive allows such an opportunity. If not, an amendment accordingly could be considered.

Evaluation of Option 4

The major advantages of this option are that (i) it forces power producers to buy their allowances on the market and, hence, encourages them to pass the costs involved to their end users (thereby promoting energy efficiency), (ii) it reduces their potential windfall profits, and (iii) it compensates industrial end users for the higher electricity prices.

On the other hand, this option has some major drawbacks. Above all, it may lead to a significant increase in administrative complications and, hence, administrative demands of the EU ETS for the following reasons:

- The authority responsible for the allocation of the emission allowances has to determine ex ante the electricity use of (a relatively large group of) industrial installations participating in the EU ETS. This task may be even more complicated and administratively demanding than allocating allowances directly to power producers based on the Benchmarking Covenant.
- Power producers will claim that they generate predominantly electricity for non-participants and, hence, that they need allowances accordingly in order to account for the emissions of generating electricity for non-participants. It may be quite complicated and administratively demanding to monitor electricity deliveries of individual power installations to participants versus non-participants.
- A significant part of the electricity used by industrial installations participating in the EU ETS is produced by these installations themselves (including joint ventures). It may be quite complicated and, hence, administratively demanding to monitor the flows in electricity production, trade and consumption between all parties involved.

Secondly, if this option is implemented only in the Netherlands, it will affect the competitive position of both its power producers (i.e. negative impact) and its industrial end users of electricity (positive impact), compared to those of other EU Member States. Hence, this option is probably only acceptable if it is implemented throughout the EU ETS.

Overall, the score of this option is 35 points, i.e. one point less than the coexistence scenario (Table 4.8). Therefore, in its present form, Option 5 does not seem to be attractive from a socio-political point of view. Given the potential administrative problems of this option, it might be more attractive to extend the previous option (no. 4) in the sense that over time the share of total allowances to be auctioned may be increased from 5-10 percent – as specified in the present Directive for the first/second trading period – up to 60-80 percent (or even 100 percent for certain activities such as electricity production). The auction revenues may be (partly) recycled to both the participating and non-participating groups in order to compensate these groups for the higher costs of emissions trading (including higher electricity prices). Only if this option of increasing the share of auctioned allowances is – for one reason or another – not feasible, the option of allocating allowances to electricity end users may be reconsidered after its administrative implications have been studied carefully and, subsequently, settled in an adequate, acceptable way.

4.3.6 Option 5: Tightening the cap to participating sectors

Definition and rationale of Option 5

As explained in Section 4.2.4, basing the allocation of allowances on the Benchmarking Covenant implies that (i) the cap to the participating sectors is far from stringent, (ii) the (marginal) abatement costs of the participating sectors will be significantly lower than those of the non-participating sectors, (iii) the socio-economic benefits of emissions trading in the Netherlands will be relatively low and, hence, (iv) the total social costs of meeting the Kyoto commitments will be relatively high. Option 5 addresses this issue by tightening the cap of allowances to the participating sectors (compared to a cap based on the BC).

Evaluation of Option 5

The major advantage of Option 5 is that it improves social equity and economic efficiency (compared to the co-existence scenario). On the other hand, tightening the cap implies that the BC will no longer be used as the basis for allocation (unless a simple reduction percentage will be applied) and that both the BC and the EU ETS will loose political acceptability among their participants (and, hence, some policy makers). On the other hand, the political acceptability of climate policies may rise among other parties concerned. Overall, the total score of this option amounts to 38 (Table 4.8).

4.3.7 Option 6: Abolishing the BC when the EU ETS is introduced

Definition and rationale of Option 6

Regardless the specific method of allocating allowances, the operation of the EU ETS and the BC alongside each other implies the coexistence of two policy instruments that highly overlap in terms of target groups and objectives, including a doubling of administrative demands. Once the EU ETS is introduced, the environmental effectiveness of the BC with regard to CO_2 reduction is zero, and with regard to promoting energy efficiency it is likely to be low, notably when the costs of emissions trading are passed on to power/heat consumers. Regardless whether the allocation of the EU ETS allowances will be based on energy efficiency benchmarks or not, it could be considered to abolish the BC once the EU ETS becomes operational. Other reasons for energy efficiency policies, such as economic resilience or security of supply, may require other instruments once the EU ETS is in place.

Evaluation of Option 6

Assuming that the BC will first be used as a basis for allocating EU ETS allowances and, subsequently, that it will be abolished as a separate policy instrument implies that both the administrative simplicity, the economic efficiency and the political acceptability of the EU ETS will most likely improve. Overall, the score of this option amounts to 39 (Table 4.8)

4.3.8 Option 7: Combining the previous options

Definition and rationale of Option 7

In the previous sections, each option was discussed separately and compared to the baseline option of the coexistence scenario. Although some options are mutually exclusive (notably Options 1 and 6), other options may be combined in an alternative policy package. Option 7 includes such a mixture, notably:

- Option 2: using the alternative allocation rule mentioned in Section 4.3.3.
- Option 3: auctioning a part of EU ETS allowances to the electricity sector (over time, this part may increase form 5-10 percent of all allowances to 60-80 percent, or even 100 percent for certain activities such as power generation).
- Option 4: allocating allowances for generating electricity to industrial end users of electricity, while power producers remain responsible for surrendering these allowances.
- Option 5: tightening the cap of the participating sectors of the EU ETS.
- Option 6: abolishing the BC once the EU ETS is introduced.

Evaluation of Option 7

Compared to the baseline option of the coexistence scenario, Option 7 performs better with regard to economic efficiency, administrative simplicity and social equity. This option, however, may reduce the industrial competitiveness of the participating industries, notably the electricity generators. On average, however, the competitive position of the electricity sector is quite strong. Moreover, if a similar allocation approach is followed in other EU countries, the competitive position of the electricity sector in the EU will be hardly affected as they are hardly faced by outside competition. Hence, they will be able to pass the emissions costs of Option 7 to the end users (who are, hence, incentivised to improve their energy efficiency, while they are largely compensated for higher electricity prices). Nevertheless, the political acceptability of this option might be lower, particularly among the power producers, but it might be higher among industrial participants and policy makers, particularly once they start to realise the benefits of this alternative approach. Overall, the score of this option is 41 points compared to 36 for the baseline option of the coexistence scenario.

4.4 Summary of major findings and policy implications

The scope of the instruments
In terms of sectoral coverage (notably of companies involved) there is a high degree of overlap between the major target groups of the EU ETS and the BC. Nevertheless, there are a few companies (with a relatively large amount of installations) that have joined the BC but which are not covered by the EU ETS. On the other hand, there are several companies which are subject to the EU ETS but which do not participate in the BC (although most of these companies have signed alternative Long-Term Agreements on energy efficiency).

The objectives of the instruments
There is a high degree of overlap and synergy between the primary objectives of the two instruments, i.e. improving energy efficiency (BC) versus mitigating CO_2 emissions cost effectively (EU ETS). Although improving energy efficiency and reducing CO_2 emissions usually converge in the same direction, there are some cases in which these objectives may diverge or even conflict. In addition to a situation of growing output (in which energy efficiency per unit of production may improve while CO_2 emissions may increase), these cases refer particularly to changes in fuel mix as well as to those situations in which the coverage of the emissions/energy sources differ between the BC and the EU ETS. These differences in coverage of emissions/energy sources include especially the coverage of (i) direct versus indirect emissions, (ii) energetic versus non-energetic emissions and (iii) energy/emissions from waste, biomass or non-fossil sources. In all these cases, the objectives of improving energy efficiency (BC) and reducing CO_2 emissions (EU ETS) may not only move in different tempi but also in different directions.

The operation of the instruments
The interaction between the EU ETS and the BC raises a variety of issues, such as (i) the impact of the EU ETS on electricity prices, (ii) the impact of the EU ETS on generating heat/power, or (iii) the question whether the BC could be used as a basis for the allocation of EU ETS allowances. These issues are briefly summarised below.

The impact of the EU ETS on electricity prices
The EU ETS may have a significant impact on the price of electricity, which, in turn, may have a significant, although opposing impact on the two major sectors covered by the Benchmarking Covenant, i.e. the power producers versus the energy-intensive industries (which are the main consumers of electricity). By means of a numerical example, it is shown that emissions trading at an allowance price of €10/tCO_2 may lead to an increase of the electricity price in 2010 by 0.42 ct/kWh. Based on a commodity or producer cost price of 2.7 ct/kWh before emissions trading, this implies an increase of that price of some 15 percent due to the EU ETS.

If the EU ETS will indeed result in an increase of the average electricity price by 0.42 ct/kWh, it will have a significant impact on the two major sectors covered by the Benchmarking Covenant. In case of free allocation of allowances, a large amount of economic rent - more than €400 million - will accrue to the power sector, while industries that compete on global markets cannot pass on an increase in the electricity price to their customers. As a result, the supply of these industries declines when the electricity price is raised.

The impact of higher electricity prices on energy-intensive industries could, in theory, be relieved by auctioning allowances to the power sector and channelling a part of the auction revenues to the (large-scale) consumers of electricity. Another option to compensate energy-intensive industries for higher electricity prices is to allocate free allowances for the generation of power to these end users rather than directly to the electricity producers, while these producers remain responsible for surrendering allowances according to their emissions. Hence, this option includes the separation of the *allocation* of allowances - i.e. indirectly to (large-scale) electricity consumers - from the *compliance obligations* for emissions, i.e. direct to power producers. As a result, the end users of electricity can sell these allowances (to the power producers) as they do not really need them, thereby compensating these end users for the higher electricity prices. In addition, in both options accruing large amounts of economic rent to power producers would be avoided.

A major disadvantage of both options is that, when implemented only in one Member State such as the Netherlands, it will affect the competitive position of both its electricity producers and (industrial) end users compared to those of other Member States. Moreover, another disadvantage - notably of the option to allocate allowances indirectly to industrial end users of electricity - is that it may significantly increase the administrative complications and, hence, the administrative demands of the EU ETS. Therefore, unless these options are implemented in all EU Member States together and their administrative demands have been adequately settled, they may not be acceptable for individual Member States from a socio-political point of view.

The impact of the EU ETS on generating heat/power

An interesting interaction issue between the EU ETS and the Benchmarking Covenant concerns the treatment of energy use and concomitant emissions due to the generation of (off-site) heat and power, including combined heat and power (CHP). In a direct (downstream) emissions trading system such as the EU ETS, emissions due to the generation of heat/power are attributed to heat/power producers. The Benchmarking Covenant, on the contrary, is based on an indirect approach of energy use and concomitant emissions, in which the emissions of power/heat are attributed to the end users.

Whereas the indirect approach of the Covenant encourages energy efficiency, the direct approach of the EU ETS may lead to sub-optimal shifts in energy use in cases where electricity or heat can be substituted for fuel. For industry, replacing direct fuel consumption by purchased heat or electricity might be an attractive way to retain allowances for selling on the market. This would occur particularly if electricity and heat prices do not adequately reflect emission costs, e.g. because of fierce competition and ample allocation of free allowances in the energy sector.

The Benchmarking Covenant as a basis for allocating EU ETS allowances

A major interaction issue concerns the question whether the BC could be used as a basis for allocating EU ETS allowances. The major advantage of such an approach would be that it fits well within existing climate policies in the Netherlands, that it would meet several allocation criteria specified in Annex III of the EU ETS Directive, and that it would increase the political acceptability of the EU ETS among the participating companies of the BC.

However, allocation of allowances based on the Benchmarking Covenant is likely to imply that the socio-economic benefits of emissions trading in the Netherlands will be relatively low. Moreover, the conversion of energy efficiency benchmarks into CO_2 emission quotas raises a variety of practical implementation issues, which may lead to high information and transaction costs. Overall, in a multi-criteria assessment, the coexistence of the EU ETS and the BC, notably when the allocation of the emission allowances is based on the BC, scores relatively high in terms of industrial competitiveness and political acceptability, but relatively low in terms of economic efficiency and administrative simplicity.

Policy options

In order to improve the interaction between the BC and the EU ETS, several policy options have been considered, including:

1. relieving BC restrictions on EU ETS,
2. using alternative allocation rules,
3. auctioning of EU ETS allowances,
4. allocating allowances to electricity end users,
5. tightening the EU ETS cap to participating sectors,
6. abolishing the BC when the EU ETS is introduced,
7. mixing the previous options.

Based on a multi-criteria assessment, it turns out that each option separately - except Option 4 - scores higher than the baseline option (i.e. the coexistence scenario of the EU ETS and BC alongside each other, with allocation based on the BC). Option 7, i.e. a mixture of Options 2-6 (except Option 4), shows the best policy performance.

Policy recommendations

- The costs of emissions trading should be reflected in the price of electricity and heat. This could be achieved by either auctioning (a part of) the allowances or granting a limited amount of free allowances to the energy sector (so that additional allowances have to be bought at an auction or market). Auctioning would offer the opportunity to compensate industrial end users for the higher energy prices due to emissions trading, thereby protecting their competitive position.
- Regardless the method of allocating allowances, the Benchmarking Covenant could be considered to be abolished once the EU ETS becomes operational, since there are no convincing reasons to continue the existence of the BC alongside the EU ETS.

5. INTERACTION BETWEEN THE EU ETS AND THE REGULATORY ENERGY TAX

5.1 Introduction

This chapter explores the potential interactions between the proposed EU Emissions Trading Scheme (EU ETS) and the Regulatory Energy Tax (REB i.e. the Dutch acronym for *Reguliere Energie Belasting*). The REB was introduced in 1996, mainly as a levy on the use of gas and electricity by households and small-scale industry.[57]

Over the years 1998-2001, the REB was raised significantly and became one of the highest energy taxes in the EU (Brinkhoff, et al., 2001). The height of the REB, however, has been differentiated per user category in a strongly digressive matter, i.e. the highest rates have been charged on the lowest energy use levels (see Table 5.1). Up to late 2002, the consumption of renewable electricity and gas was exempted from the REB (the so-called 'nil-tariff' was applied) However, as part of recent reforms of the Dutch support system for renewable energy this exemption has been partially lifted (see Chapter 6 for a discussion of this system, including its recent reforms and its potential interactions with the EU ETS).

Table 5.1 *Regulatory energy tax REB per user category [ct per m^3 or per kWh]*

Annual use category	1996-98	1999	2000	2001	2002	2003
Natural gas [m^3]						
0-800	0	0	0	12.03	12.40	12.85
800-5000	4.32	7.25	9.45	12.03	12.40	12.85
5000-170000	4.32	4.74	5.19	5.62	5.79	6.00
170000-1 mln	0	0.32	0.70	1.04	1.07	1.11
>1 mln	0	0	0	0	0	0
Electricity [kWh]						
0-800	0	0	0	5.83	6.01	6.39
800-10000	1.34	2.25	3.72	5.83	6.01	6.39
10000-50000	1.34	1.47	1.61	1.94	2.00	2.07
50000-10 mln	0	0.10	0.22	0.59	0.61	0.63
>10 mln	0	0	0	0	0	0
Green electricity						
0-5000	0	0	0	0	0	3.49
>5000	0	0	0	0	0	0

Source: Ministry of Finance.

The revenues from the REB have been mainly used to reduce other taxes and social premiums imposed largely on households and small firms (i.e. the so-called 'greening of the fiscal system'). Moreover, up to late 2002, a part of the revenues was used to finance some special facilities such as a producer subsidy to promote the generation of renewable electricity or a producer subsidy to encourage the cogeneration of heat and power (CHP). Most of these facilities, however, have been abolished or changed as part of the policy reforms mentioned above (see Chapter 6).

The analysis of the present chapter will be confined to the REB levy on the consumption of gas and electricity (while the partial exemption on the final use of renewable energy will be dis-

[57] In addition, some other (minor) energy uses - such as LPG and diesel oil - have also been subject to the REB, but these will not be considered in the present report.

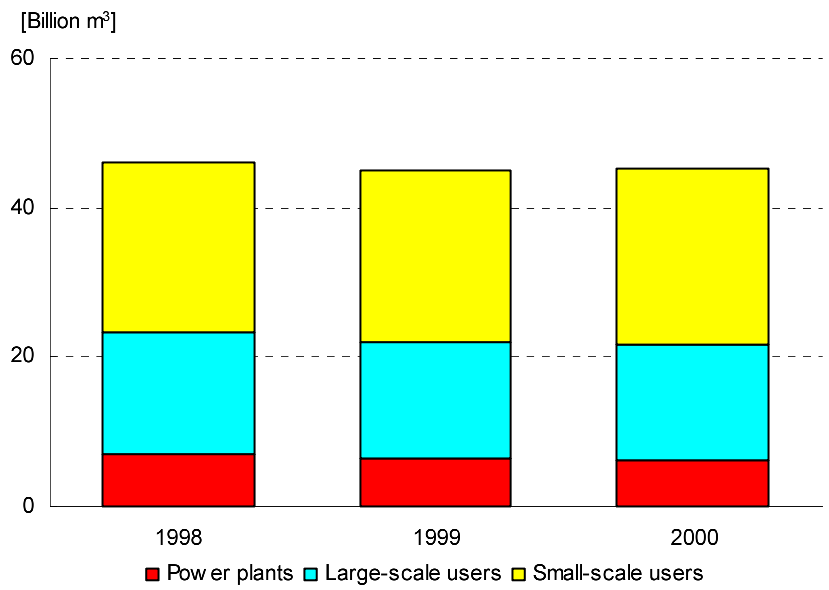
cussed in the next chapter). The contents of this chapter runs as follows. First of all, Section 5.2 analyses the potential interactions between the EU ETS and the Dutch REB, both in their present form (coexistence scenario). Section 5.3 discusses the interaction performance of some options to modify one or both of these instruments. Finally this chapter will be concluded by a summary of the major findings and policy implications in Section 5.4.

5.2 Interaction under the coexistence scenario

5.2.1 The scope of the instruments

There is hardly any overlap or interaction between the direct target groups of the EU ETS and the REB. As outlined in Section 4.2.1, the groups directly affected by the EU ETS consist exclusively of large energy users, while Table 5.1 indicates that the REB is imposed predominantly on the consumption of fossil electricity and gas by small- and medium-scale energy users (including households and firms). The major reason why the marginal REB tariffs for large-scale energy users have been (nearly) 0 is to protect their competitive position on the world market. Moreover, energy savings by large-scale energy users have been promoted by other policy instruments such as the Benchmarking Covenant or other negotiated agreements, which have sometimes explicitly stated that participants meeting the conditions of the agreement will not be subject to energy taxation.

Figures 5.1 and 5.2 show the distribution of gas and electricity consumption among different categories of energy users in the Netherlands during the late 1990s. According to Figure 5.1, about half the gas consumption in the years 1998-2000 was accounted for by small-scale users (i.e. both households and firms), while the other half was consumed by electricity generators and other large-scale users. For electricity, large-scale users (including industry) accounted even for two-thirds of total power consumption in the late 1990s, while households and other small-scale users consumed the remaining part (Figure 5.2). As the average energy consumption per household in the late 1990s amounted to some 2000 m^3 of gas and 3300 kWh of electricity (ECN, 2003), this implies that about half the total gas consumption and about one-third of the total electricity use has been subject to the highest marginal rates of the REB (see Table 5.1).



Source: ECN (2001)

Figure 5.1 *Distribution of gas use by different categories of end users (1998-2000)*

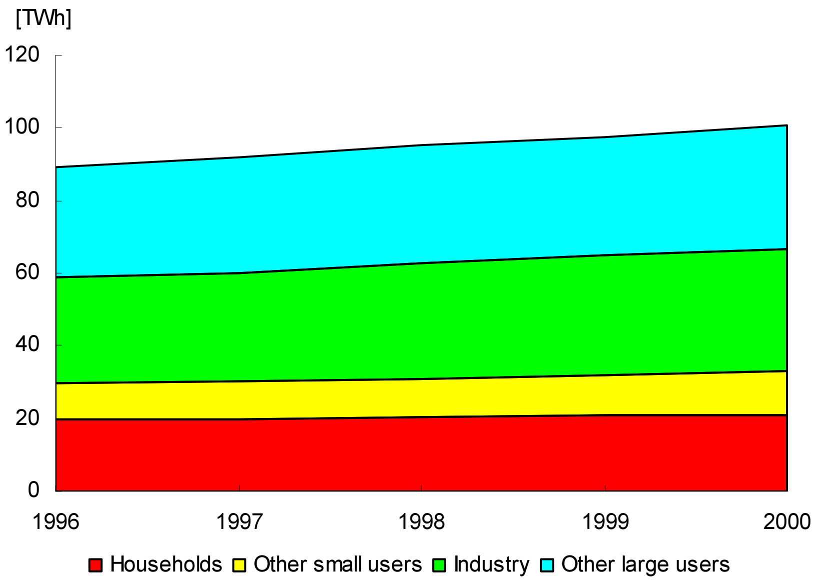


Figure 5.2 *Trends in electricity use for different categories of end users (1996-2000)*
Source: ECN (2001)

It should be acknowledged, however, that the consumption of renewable energy has been exempted from the REB, i.e. fully over the years 1998-2002 and only partially since 2003 (see Chapter 6). The number of households consuming green power amounted to only 80,000 by mid-1998 but has grown rapidly, notably since mid-2001, towards 1.4 million, and is expected to grow even to some 3 million in 2010 (Kroon, 2002; GreenPrices, 2003; Ybema, et al., 2002a).

As outlined in Section 4.2.1, the major indirect groups of the EU ETS include grey electricity consumers and green power producers/suppliers. The major groups indirectly affected by the REB comprise, on the one hand, grey electricity producers/suppliers (who suffer from less demand and lower output prices due to the REB) and, on the other hand, green electricity producers/suppliers (who benefit from more demand and higher output prices due to the REB).

While there is hardly any overlap between the direct target groups of the EU ETS and the REB, there are some major indirect target group interactions between these instruments. Firstly, the group of grey electricity producers/suppliers in the Netherlands is affected directly by the EU ETS (through restricting GHG emissions) and indirectly by the REB (through less demand and lower output prices for grey electricity).

Secondly, the group of small- and medium-scale grey energy users is affected directly by the REB (through taxation of conventional energy use) and indirectly by the EU ETS (through higher prices resulting from CO_2 abatement costs). Hence, this group will be subject to double regulation and may be charged double, depending on whether and to which extent the EU ETS will result in higher consumer prices for grey electricity (see Section 5.2.2).

Finally, the group of green power producers/suppliers is affected indirectly by both the EU ETS and the REB (through improving their competitive position towards grey electricity producers by raising the demand for green power).

Hence, these three groups are all subject to double regulation (either directly or indirectly) due to the EU ETS and the REB operating together (see Figure 5.3). For some groups, however, such double regulation may be favourable, particularly for the group of renewable electricity producers/suppliers who may benefit from both the EU ETS and the REB.

For other groups, on the contrary, double regulation may be unfavourable, notably for the group of small- and medium-scale energy users who may be charged double, depending on whether and to which extent the EU ETS will result in higher consumer prices for grey electricity.

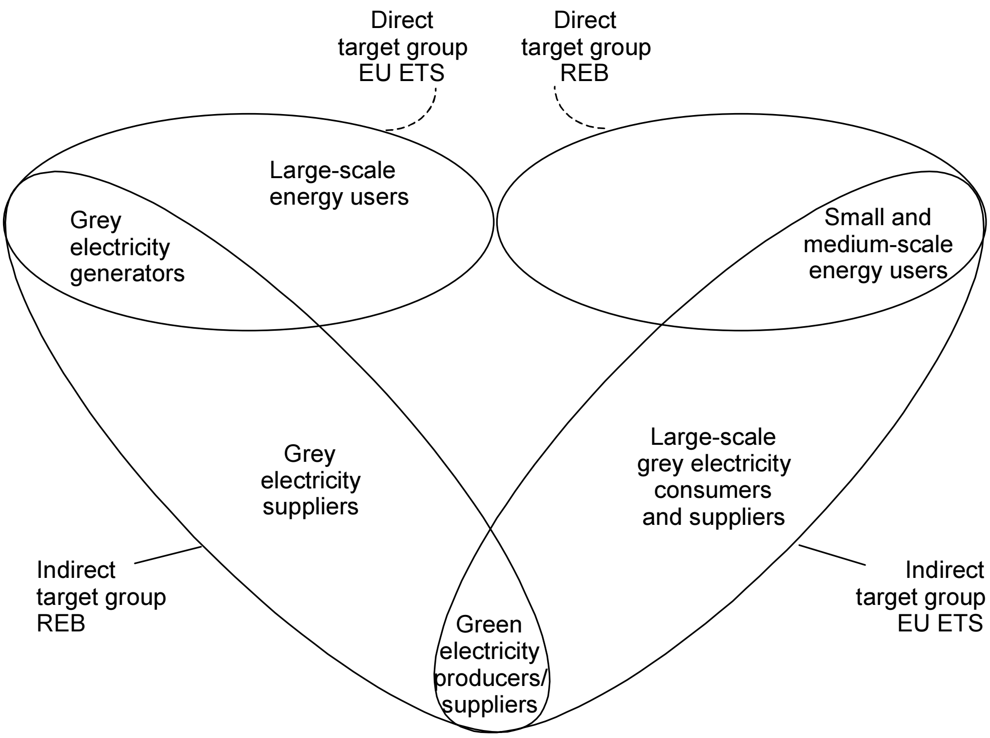


Figure 5.3 *Interaction between target groups of the EU ETS and the REB*

5.2.2 The objectives of the instruments

Although the EU ETS and the Dutch ecotax are predominantly focused on different direct target groups, there is a major overlap or synergy between the objectives of these instruments. As outlined in the previous chapters, the EU ETS is primarily aimed at reducing CO_2 emissions, thereby indirectly encouraging the saving of fossil fuel use in general and the switch to renewable energy in particular. On the other hand, the primary objective of the REB has been to promote energy saving, notably among small-scale users, while a major secondary objective has been the 'greening of the fiscal system' by shifting the burden of taxation from labour and income sources to environmentally polluting activities. Moreover, up to late 2002 the REB used to be furnished by all kinds of facilities to promote environmental-friendly sources of energy (including CHP, waste incineration, and the production of renewables), but since 2003 these additional objectives have been restricted to the promotion of the demand for renewable energy through the partial exemption of the REB on the consumption of renewable energy (see Chapter 6). Both the primary objective of the REB to encourage the saving of fossil energy use in general and its additional objective to promote the switch to renewable energy consumption in particular contribute to the objective of reducing CO_2 emissions. Hence, as noted, there is a major synergy between the objectives of the EU ETS and the Dutch ecotax system.

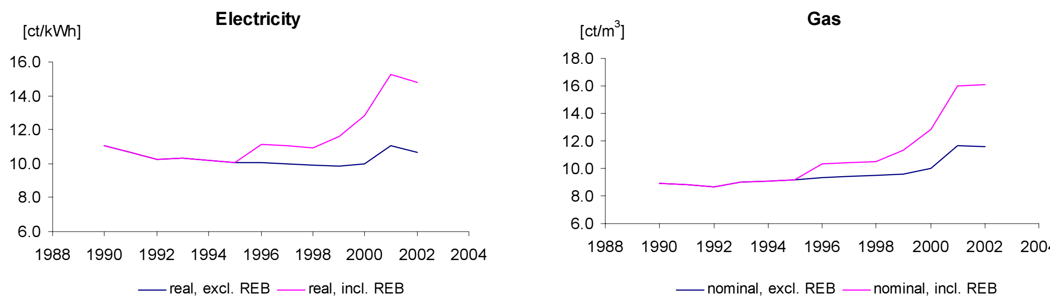
Table 5.2 *Trends in energy prices for an average household, 1990-2002 (in real prices of 2000, excluding VAT)*[1]

	Electricity [ct/kWh]			Gas [ct/m^3]		
	Excluding REB	Average REB[2]	Including REB	Excluding REB	Average REB[2]	Including REB
1990	11.1	0.0	11.1	24.3	0.0	24.3
1991	10.7	0.0	10.7	27.1	0.0	27.1
1992	10.2	0.0	10.2	26.4	0.0	26.4
1993	10.3	0.0	10.3	23.6	0.0	23.6
1994	10.2	0.0	10.2	24.1	0.0	24.1
1995	10.1	0.0	10.1	23.2	0.0	23.2
1996	10.0	1.1	11.1	20.0	3.1	23.1
1997	10.0	1.1	11.0	22.9	3.1	26.0
1998	9.9	1.0	11.0	23.5	3.0	26.5
1999	9.8	1.7	11.6	20.6	5.0	25.5
2000	10.0	2.8	12.8	21.5	6.3	27.8
2001	11.1	4.2	15.3	27.0	7.6	34.6
2002	10.7	4.1	14.8	27.8	7.6	35.4
2010[3]						
• average	10.4	4.1	14.5	31.2	7.6	38.8
• marginal	10.4	5.5	15.9	31.2	11.4	42.6
% change 1990-2002	-3.6		33.9	14.1		45.4

1 Deflated by the consumer price index.

2 Average REB for a household consuming 3200 kWh of electricity and 2400 m^3 of gas per year. Up to 2000, the annual consumption of the first 800 kWh of electricity and the first 800 m^3 of gas per household was free of REB. Since 2001, this exemption for the lowest use categories was lifted, but compensated by an equivalent reduction of the overall REB bill by an annually fixed amount. Therefore, the average REB rates have been calculated by multiplying the marginal ecotax rates for the second use categories (see Table 4.2) by a factor 0.75 for electricity and 0.67 for gas.

3 The projections for the year 2010 are based on the assumption that the real energy prices, excluding REB, will continue their average annual trend over the years 1990-2002 during the period 2002-2010, and that the average/marginal REB rates will remain at the same level as in 2002 (in real terms).



Source: ECN (2003), DNB (2003) and Table 5.1

Figure 5.4 *Trends in household energy prices, 1990-2002, excluding and including the REB (in real prices of 2000)*

The impact of the REB on CO_2 emissions of household energy consumption can be illustrated by means of Tables 5.2 and 5.3. Table 5.2 presents the trends in real energy prices for households, both with and without the REB, over the period 1990-2002. It can be observed, for instance, that the real price for electricity declined slightly (by 3.6 percent) between 1990 and 2002 when the REB is excluded, whereas it increased significantly (by 34 percent) when the REB is included.

A similar divergence can be noticed for the trends in gas prices, excluding and including the REB, albeit both trends moved upwards in real terms over this period (see also Figure 5.4).

Based on the trends in real energy prices, excluding REB, over the period 1990-2002 and the additional assumption that the REB rates will remain at the same level as in 2002, projections have been made of the household consumer prices for gas and electricity in 2010 (in real prices of 2000). Excluding the REB, these prices are estimated at 10.4 ct/kWh for electricity and 31.2 ct/m^3 for gas. Including the REB, there is a difference between the average and marginal prices of electricity and gas. In marginal terms, the price for electricity in 2010 has been projected at 15.9 ct/kWh and for gas at 42.6 ct/m^3.

Table 5.3 *The impact of the REB on CO_2 emissions of household energy consumption in 2010*[1]

	Unit	Electricity	Gas
Marginal price, in real terms of 2000:			
• excluding REB	ct/kWh	10.4	31.2
• including REB	ct/kWh	15.9	42.6
• price difference	%	53	37
Price elasticity	%	-0.20	-0.10
Total household consumption			
• excluding REB	Pj	105.1	361.4
• including REB	Pj	94.0	348.0
• volume difference	Pj	-11.1	-13.4
Emission factor	$MtCO_2$/Pj	0.11	0.056
Change in CO_2 emissions	$MtCO_2$	1.22	0.75

1 Based on the assumptions that (i) the REB rates on gas and electricity are fully abolished in 2010, (ii) the change in demand is fully met by fossil energy sources, and (iii) the demand for renewable energy sources is unaffected (the impact of the reduced REB on the demand for renewable electricity will be explored in Chapter 6).

Source: Table 4.2 and ECN (Ybema, et al., 2002a; van Dril and Menkveld, 2003).

These price projections are the basis for estimating the impact of the REB on CO_2 emissions of household consumption of gas and electricity in 2010 (see Table 5.3, including an explanation of the major assumptions made). Table 5.3 shows that, by including the REB, the (marginal) price of electricity will be 53 percent higher. Assuming a price elasticity of -0.20, this implies that total household consumption of electricity will be 10.6 percent lower, i.e. in absolute terms it will decrease by 11.1 Pj. Given an emission factor of 0.11 $MtCO_2$/Pj, this results in a decline of CO_2 emissions by an amount of 1.22 $MtCO_2$. For gas, a similar reduction of CO_2 emissions is estimated at an amount of 0.75 $MtCO_2$. Overall, the REB on household energy prices results in a total reduction of CO_2 emissions in 2010 of almost 2 $MtCO_2$.[58] This amount corresponds with approximately 1 percent of the total CO_2 emissions in 2010 (i.e. 186 $MtCO_2$), some 6 percent of total (direct and indirect) household emission in 2010 (32 $MtCO_2$), about 5 percent of the estimated national reduction commitment for that year (i.e. 40 $MtCO_2$) and 10 percent of the domestic reduction objective for the first Kyoto budget period (i.e. 20 $MtCO_2$ per year).

58 It should be emphasized that the estimated CO_2 reductions depend largely on the projections and assumptions made, notable with regard to the price elasticities used. A doubling or halving of these elasticities would result in a similar change in the estimated amount of CO_2 reductions. Adequate estimates of (long-term) price elasticities for household energy consumption are scarce and not always very reliable. The price elasticities used in Table 5.3 are based on average estimates found in the literature. For a discussion of these estimated price elastic (and other factors affecting energy demand and savings by households), see SEO (2001), Jeeninga and Boots (2001) and Jeeninga, et al. (2002).

The discussion outlined above on the relationship between energy prices, the REB and CO_2 reductions in the household sector raises some intriguing issues regarding the interaction between emissions trading and energy taxation. Firstly, the interaction between the EU ETS and the REB results in a 'double regulation' or 'double taxation' of households consuming conventional electricity, although the extent of this double taxation seems to be relatively small, depending on the extent to which the EU ETS will result in higher electricity prices for final consumers. As discussed in the previous chapter, the EU ETS may lead to an increase in the average costs of generating electricity in 2010 by 0.4 cents per kWh, assuming an allowance-clearing price of €10/tCO_2. If these costs are passed on to final consumers, electricity prices for households and other small-scale end users will rise from 15.9 to 16.3 ct/kWh, i.e. an increase of only 2.5 percent. This increase may be lower if the underlying assumptions appear to be more relaxed, for instance, a lower clearing price for an emission allowance and, hence, a lower increase in the emissions trading costs of power producers who may pass these costs only partly to end users. Nevertheless, the ecotax on electricity use is already relatively high (i.e. 5.5 ct/kWh in real 2000 prices) and even a small increase of this burden due to a 'double taxation' or 'double internalisation of external costs' may raise questions regarding its socio-political acceptability (notably among small-scale firms which already regard the present REB as 'unfair' and 'too high'). Moreover, the increase in electricity prices may also be significantly higher than 0.4 ct/kWh, notably when the market price of an allowance rises from 10 to 20 €/tCO_2 or even to the maximum prices of 40 or 100 €/tCO_2 in case of non-compliance during Phase 1 or 2, respectively). Therefore, although ultimately it is a political issue whether and to which extent a double taxation of small-scale electricity users is acceptable or not, an option might be to avoid this double taxation by compensating (significantly) rising electricity prices due to the EU ETS through a proportional lowering of the REB on small-scale electricity use.

Secondly, the opportunities to further reduce CO_2 emissions in the household sector by raising energy prices - either directly through raising ecotaxes or indirectly through EU ETS-induced price increases - seem to be limited. As noted above, the REB rates on energy consumption by households and other small-scale end users are already relatively high. Hence, the policy space for raising these tariffs or introducing additional carbon taxes seems to be limited. Moreover, the impact of a price increase on energy savings and CO_2 reductions in the household sector appears to be small. For example, by using the data of Table 5.3, it can be shown that a doubling of the real REB rates in the year 2010 would lead to an additional price increase of electricity by 35 percent and of gas by 27 percent, resulting in extra energy savings and corresponding CO_2 reductions of total 1.3 MtCO_2, based on a household price elasticity of -0.20 for electricity and -0.10 for gas. Although the amount of CO_2 reductions would be higher if the price elasticities would turn out to be higher, the example still illustrates the limits of an additional, significant increase in energy prices of small-scale end users in order to further reduce CO_2 emissions. Therefore, besides adequate price incentives, additional measures - such as switching to renewables or promoting the development and adoption of new energy saving technologies - seem to be necessary to further abate CO_2 emissions in an effective way.

Thirdly, following the discussion in Chapter 3, it can be shown that, once the EU ETS becomes operational, raising ecotaxes on household energy consumption will have different effects on the sectoral and overall CO_2 emissions of a country, depending on the question whether the tax increase is imposed on household gas consumption or on household electricity use. Raising the REB on gas will reduce household gas consumption and, hence, reduce the CO_2 emissions by the household sector (which is a non-participating sector of the EU ETS). Therefore, an increase in the REB taxes on household gas consumption will be effective in achieving the domestic reduction target of the non-participating sectors (and, hence, in meeting the Kyoto commitments). Whether such an increase is also the most efficient option in achieving the reduction target of these sectors depends on a weighing of the costs of this option against other potential options to reach this target.[59] However, apart from CO_2 efficiency considerations, there might be a variety of other policy considerations to raise the REB on household gas consumption (such as the greening of the fiscal system or improving long-term energy supply security through reducing the depletion of domestic gas resources).

On the other hand, raising the REB on fossil energy will reduce household power consumption and also the corresponding CO_2 emissions. In the EU ETS, however, emissions due to electricity use are not attributed (indirectly) to the final consumers but (directly) to the power producers (who belong to the participating sectors of the EU ETS). Therefore, raising the REB on household electricity use will reduce the emissions of the power sector rather than those of the household sector. The power sector, however, is faced by a quota of emission allowances allocated to this sector. This means that as a result of the higher REB on household electricity consumption the power sector has to buy less emission allowances or is able to sell more allowances on the (inter) national market. The latter implies, however, that other participating sectors – either at home or abroad – will increase their CO_2 emissions. Therefore, although a higher REB on household electricity use will reduce domestic emissions of the power sector, it will not change the emissions accounts from a national or international point of view. The major effect is that it replaces an efficient CO_2 reduction option by a less efficient reduction option.[60] Hence, raising REB rates on household electricity consumption cannot be justified on CO_2 efficiency grounds. On the contrary, following the same line of reasoning, it can be argued that, once the EU ETS becomes operational, the REB on household electricity use could (or should) be abolished from a CO_2 efficiency point of view as the EU ETS itself will take care that the CO_2 objective will be reached at the lowest costs.

As indicated in Chapter 3, however, there might be two reasons why the REB on household electricity use might still be justified once the EU ETS becomes operational. Firstly, in the reasoning above, it has been assumed that the costs of emissions trading will be passed on the final energy user (which, in case of the power sector, is not an unrealistic assumption). For instance, referring to the example mentioned before, it is assumed that an international clearing price of 10 €/tCO_2 will result in an increase of the power commodity costs and, finally, the household price of electricity by 0.4 ct/kWh. In addition, it is assumed that the higher prices charged to final energy users (including household electricity consumers) would result in the most efficient energy-saving/emission reduction options by these users. If it can be argued, however, that one of these assumptions is not correct (for instance, because the costs of emissions trading are not passed on to final energy users), then there is a valid reason for ecotaxes such as the REB on household electricity consumption.

Secondly, there might be a variety of other considerations besides CO_2 efficiency to justify the REB on household electricity such as (i) the incidence of other adverse environmental effects besides CO_2 emissions due to electricity use, (ii) the greening of the fiscal system, or just (iii) the need for fiscal resources. A key issue, however, is whether the actual level of the REB can be justified by these other considerations, once the CO_2 objective is covered by the EU ETS. At least there may be a ground to avoid the 'double internalisation of external costs' or 'double taxation' of household electricity consumers, in the sense that these consumers, on the one hand, pay a high REB tariff (including some carbon taxation) and, on the other hand, pay higher electricity prices due to the EU ETS (including some internalised costs of carbon reduction). This applies particularly to a situation in which the CO_2 objective becomes stringent and the price of an emission allowance, i.e. the internalised costs of carbon abatement, becomes high.

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[59] This statement is based on the assumption that the domestic reduction target of the non-participating sector is fixed at a certain amount of CO_2 reductions. If this assumption is lifted, a broader scope of policy options becomes available to meet the Kyoto commitments in the most efficient way, i.e. adjusting the domestic reduction target by either the quota of emission allowances allocated to the participating sectors, or adjusting the amount of emission credits traded through one of the Kyoto mechanisms.

[60] Other (secondary) effects are that it reduces the scarcity on the market for emissions allowances and, hence, reduces the international clearing price of these allowances (see Chapter 3).

Finally, it is sometimes suggested that an additional argument to motivate or justify a specific energy saving policy instrument such as the REB could be to support one of the sectors participating in the EU ETS. As far as this argument is valid, it does not apply, however, to the REB on household electricity consumption. It is true that due to this instrument the power sector will buy less (sell more) emission allowances. However, this does not affect the profits of this sector, assuming that the (opportunity) costs of the emission allowances are passed on the final consumer. But even if this assumption is lifted, it is highly unlikely that the loss of sectoral profits due to the REB-induced losses of sectoral turnover will be more than compensated by the revenues from buying less (selling more) emission allowances (notably when the price of the allowance is low). Therefore, maintaining or raising present REB rates on household electricity consumption can not be motivated by the argument that it will support the power sector by reducing their need for emission allowances.[61]

5.2.3 The operation of the instruments

The interaction with regard to the operation of policy instruments actually covers three aspects, namely:

- the obligations and incentives of the instruments, i.e. the rules and mechanisms that influence the behaviour of the target groups of the instruments,
- the implementation of the instruments, i.e. the major parties or institutions involved and their tasks to be done,
- the timing of the instruments, i.e. the phasing of the operation of the instruments over time, in relation to each other and to the commitment period of the Kyoto Protocol.

These aspects will be briefly explored below with regard to the interaction between the EU ETS and the REB.

5.2.3.1 The obligations and incentives of the instruments

The most important obligation to operators of installations covered by the EU ETS is that they have to surrender allowances equal to their emissions over a certain period (or pay a penalty in case of non-compliance). As these allowances are scarce, they are characterised by an 'opportunity cost' or price on the market, which may be passed on to consumers of commodities using allowances during their production process. As a result, producers - i.e. operators of installations covered by the EU ETS - have an incentive to select one or more of the following strategies to meet the central obligation of the EU ETS while maximising profits: (i) reduce their production output without changing emissions per unit output, (ii) reduce the emissions per unit output, (iii) buy additional allowances on the market or (iv) sell redundant allowances on the market. On the other hand, if the costs of emissions trading are passed on to end users, they are incentivised to replace the consumption of commodities using relatively much allowances by commodities requiring relatively few allowances.

The most important obligation of the law on the REB is that (small-scale) end users of gas and electricity have to pay an ecotax levy on their energy consumption, which has to be collected by their energy suppliers and transferred to the tax authorities. As a result, the end user prices of gas and electricity rise, which incentivises consumers to reduce their energy use and/or to substitute their fossil energy consumption by the use of renewable energy.[62]

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[61] On the contrary, fossil electricity producers will most likely gain if the REB on household electricity is abolished. The costs of additional emissions allowances will be passed on to the final consumers, and even if these costs can not be (fully) passed on they will most likely be more than compensated by higher profits due to a higher turnover.

[62] It should be noted that, depending on the supply and demand elasticities of gas and electricity, a part of the ecotax levy may actually roll backwards to energy suppliers/producers in the sense that their selling prices may be pushed downwards. Hence, due to the REB, energy suppliers may not only be faced by lower trade volumes but also by lower selling prices (excluding the ecotax).

The interaction between the operation of the EU ETS and REB concerns particularly the consumption of one commodity, i.e. electricity generated from fossil resources. As indicated in the previous section, due to this interaction small-scale electricity consumers are subject to 'double regulation' or 'double charging' in the sense that they, on the one hand, have to pay a relatively high REB tariff (including some carbon taxation) and, on the other hand, pay higher electricity prices due to the EU ETS (including some internalised costs of carbon reduction).[63]

This kind of interaction may be classified as a form of positive synergy, i.e. the coexistence of the two instruments mutually reinforces the price incentive or impact of each instrument on improving energy efficiency and reducing CO_2 emissions. However, whether such a double regulation will be socio-politically acceptable depends on a variety of factors, notably:

- Costs of emissions trading, i.e. the price of an allowance in the EU ETS, and the extent to which these costs will be passed on to end users of electricity. If the allowance price is very high, double regulation could lead to substantial impacts for affected groups and, hence, create pressure to reduce the REB on electricity. Conversely, if the allowance price is very low, the consequences of the double regulation could be relatively small and, therefore, acceptable. However, forecasts of future allowance prices are highly speculative and vary from very low (less than €5/tCO_2) to the maximum (penalty) price in case of non-compliance (i.e. €100/tCO_2 during the second phase of the EU ETS). As a result, the impact of the EU ETS on electricity prices may vary from almost zero to more than 4 ct/kWh.
- The trade-off between different policy objectives such as encouraging energy savings, reducing CO_2 emissions, promoting efficiency or pursuing equity. On the one hand, policy makers may welcome the double regulation of electricity consumers because they may give priority to, for instance, encouraging energy savings and CO_2 reductions, notably in case of major market failures and other barriers to energy efficiency among households and other small-scale users of electricity.[64] On the other hand, policy makers may oppose double regulation of electricity consumers because they may prefer to avoid (further) inefficiencies in CO_2 reduction, or because of equity concerns for poor households and small firms that are unable to pass on higher energy costs of their products and services to final consumers.
- The expected trend in future electricity prices. Apart from the costs of emissions trading and the REB, future household electricity prices may be affected by a variety of other factors. Table 5.2 has shown that the electricity price for an average household (excluding REB) has declined slightly in real terms over the period 1990-2002. Due to the upcoming liberalisation and internationalisation of retail power markets (or other developments), electricity prices may either continue or even accelerate their declining trend, or change this trend and slope upwards. Depending on the future trend of household electricity prices, policy makers may either welcome or oppose double regulation of electricity consumers. Therefore, depending on these factors, policy makers may opt for an adjustment of the REB in order to compensate small-scale electricity users for (major) increases in electricity prices due to the EU ETS (see Section 5.3 below).

5.2.3.2 The administration of the instruments

With regard to the implementation of the EU ETS and the REB, there is hardly any overlap or interaction between the major parties or institutions involved. The major exception is the group of electricity suppliers who, on the one hand, are responsible for collecting the REB from the

63 In line with the qualifications in the previous note, it may be argued that electricity suppliers/producers may also be subject to 'double regulation' or 'double charging' in the sense that, due to the coexistence of the EU ETS and the REB, electricity suppliers/producers may be faced twice by (i) a lower trade volume, and (ii) a lower trade margin.

64 It should be acknowledged, however, that other measures - e.g. information campaigns - may be necessary and even more effective than price measures to overcome market failures and other barriers to energy efficiency among households (Sorrell, et al., 2000).

energy consumers and transferring the revenues to the tax authorities while, on the other hand, they may transfer the costs of emissions trading from the electricity producers to the consumers.

Even at the government or administrative level, there is hardly any institutional overlap between the two instruments. The Ministry of Finance is primarily responsible for the REB, while the implementation of the EU ETS falls primarily under the Ministry of Economic Affairs (EZ) and the Ministry of Public Housing, Spatial Planning and the Environment (VROM). In practice, the administration of the REB is the responsibility of the tax authority, while a newly created Emission Authority will be responsible for the execution of several tasks related to the EU ETS, such as the issuing of the emission permit and allowances, the registration of emissions trading and banking of allowances, and the monitoring and verification of emission data (Ministry of VROM, 2003). This separation of tasks and responsibilities with regard to the EU ETS and the REB is most likely the most adequate, efficient way of administrating these instruments.

5.2.3.3 The timing of the instruments

Although there might be some timing problems between the implementation and operation of the EU ETS and the Kyoto Protocol (see Sorrell, 2002b), such problems do not apply with regard to the interaction of the EU ETS and the REB. It is expected that the REB will not be changed significantly over the coming years, apart from annual adjustments of the ecotax levies to the rate of inflation. On the other hand, it is assumed that the EU ETS will be implemented according to the timetable agreed by the Environmental Council in December 2002 (see Chapter 2 and the qualifications made there).

5.2.4 Evaluation of the coexistence scenario

Based on the evaluation criteria specified for the Interact project (see Box 4.1 of Section 4.2.5), an assessment has been made of the interaction between the EU ETS and the REB (see Table 5.4). This multi-criteria assessment includes an ad judgement of a 'score', ranking from 1 ('bad performance') to 9 ('good performance') for each criterion. Table 5.4 shows that the total score for the coexistence scenario of the proposed EU ETS and an unchanged REB amounts to 38. As explained in Section 4.2.5, this total score is derived simply by summing the individual scores of each criterion. The scoring process is highly subjective and in practice, different stakeholder groups may both assign different scores and give different weightings to each criterion. Nevertheless, this scoring and the assessment of the coexistence scenario of the EU ETS and the REB provides a useful starting point for the evaluation of some alternative policy options discussed in the next section.

5.3 Interaction under alternative policy options

5.3.1 Introduction

Table 5.4 shows that the assessment of the coexistence of the EU ETS and an unchanged REB scores relatively low with regard to the criteria economic efficiency, social equity and political acceptability (particularly when the price of an emission allowance becomes high). This assessment provides the starting point for considering two alternative policy options that might improve the overall performance of the interaction between the EU ETS and the REB. These options include:

1. Reducing the double regulation of the EU ETS and the REB on electricity use.
2. Improving the social equity of the REB by expanding its sectoral coverage.

These options will be discussed briefly in the sections below.

Table 5.4 *Multi-criteria assessment of the coexistence scenario of the EU ETS and an unchanged REB*

Criteria	Relevant issues	Score
Environmental effectiveness	– The effectiveness of the EU ETS with regard to CO_2 mitigation by the participating sectors is primarily determined by the national emission quota of this scheme. As a result, the REB on electricity use has no impact on the environmental effectiveness of the EU ETS nor on the national CO_2 emissions accounts of the participating sectors (although it does influence their domestic CO_2 emissions and, hence, emissions trading by these sectors, as well as setting their emission quota). – The coexistence of the two instruments may have a positive, mutually reinforcing effect on household energy efficiency (although this effect may be nullified through emissions trading by causing less energy efficiency elsewhere in the EU ETS).	8
Economic efficiency	– The coexistence of the EU ETS and the REB on electricity reduces the static CO_2 efficiency of the EU ETS. – The dynamic CO_2 efficiency of the two instruments operating together is probably low as the price incentive of these instruments on generating cost-saving technologies is likely to be low.	5
Administrative simplicity	– From an administrative point of view, the REB is quite simple, while the EU ETS is more demanding. The coexistence of both instruments, however, does not really complicate or enhance these administrative demands.	7
Social equity	– The coexistence of the EU ETS and the REB on electricity has a negative (although probably small) impact on equity as it further raises electricity prices to (poor) households and small-scale firms (that may be less able to pass the higher electricity costs to their clients).	5
Industrial competitiveness	– The coexistence of both instruments hardly affects the competitive position of the participating installations (as they hardly pay any REB). However, the competitiveness of the non-participating installations, notably small-scale firms, may deteriorate slightly due to the 'double regulation' or 'double charging' resulting from the EU ETS and REB operating together (particularly when the allowance price is high).	7
Political acceptability	– The political acceptability of the EU ETS and/or the REB may be reduced due to the double regulation of non-participating sectors, especially when the costs of emissions trading - i.e. the allowance price - is high and passed on to the small-scale end users of electricity.	6
Total		38

5.3.2 Option 1: reducing the double regulation

Definition and rationale of Option 1

As noted, the coexistence of the EU ETS and the REB on electricity use implies a double regulation, notably of small-scale power consumers, which may lead to (i) a significant double charging of these consumers when the allowance price is high, and (ii) economics inefficiencies in reducing CO_2. These effects may be abolished or reduced by:

- abolishing the REB on electricity (Option 1a),
- reducing the REB on electricity (Option 1b).

Evaluating Option 1a: abolishing the REB on electricity

Table 5.5 provides a multi-criteria assessment of Option 1a, abolishing the REB on electricity, in terms of the *difference* between this option and the coexistence scenario of Table 5.4. The major advantage of this option is that it improves the (static) economic efficiency of CO_2 reduction, although it may deteriorate household electricity efficiency as well as long-term, dynamic economic efficiency of CO_2 reduction because the price incentive to generate cost-saving technologies becomes even lower in this option than in the coexistence scenario.

Table 5.5 *Multi-criteria assessment of Option 1a, i.e. abolishing the REB: changes compared to coexistence scenario*

Criteria	Relevant issues	Score
Environmental effectiveness	– *Largely unchanged*, as CO_2 emissions of the participating sectors are set by the national quota. Household electricity efficiency, however, may decrease slightly.	8
Economic efficiency	– *Better*: static efficiency of CO_2 reduction is improved, but household electricity efficiency may deteriorate as well as long-term, dynamic efficiency of CO_2 reduction and household electricity use as the price incentive to generate cost-saving technologies becomes even lower.	7
Administrative simplicity	– *Largely unchanged*, as the administrative demands for the EU ETS and the REB (on gas consumption) remain largely the same.	7
Social equity	– *Better*, although the impact on equity depends largely on how the loss of REB revenues will be compensated by other fiscal measures.	6
Industrial competitiveness	– *Slightly better*, notably for non-participating energy-extensive sectors, but unchanged for participating, energy-intensive industries.	8
Political acceptability	– *Worse*: although avoiding double regulation may be applauded by policy makers, the abolition of the REB on electricity is probably unacceptable due to the loss of revenues and other considerations ('degreening of the fiscal system'; loss of support to renewable electricity).	2
Total		37

Another advantage of this option is that it improves social equity by avoiding the double taxation of (poor) households and small-scale firms. However, the impact of this option on social equity depends largely on how the loss of REB revenues will be compensated by other fiscal measures, such as raising other (household) taxes or cutting (social) expenditures by the government.

The major disadvantage of this option is that it is probably unacceptable to policy makers due to the loss of REB revenues, and other policy considerations, such as the 'degreening of the fiscal system' or the (implicit) loss of the ecotax benefit to renewable electricity.[65]

The political acceptability of this option, however, will depend on the allowance price and, more generally, on the trend in real electricity prices for small-scale end users, as the social pressure by households and small firms to reduce the REB will become harder if this trend moves significantly upwards. But even then, policy makers would most likely prefer to reduce the REB on electricity rather than abolishing it completely (see Option 1b below).

65 Renewable electricity, however, would benefit from the rise of fossil electricity prices on the spot market due to the EU ETS (see Chapter 6).

Overall, it can be noticed from Table 5.5 that the total score of the option to abolish the REB on electricity amounts to 37 points, i.e. slightly less than the performance of the coexistence scenario (38 points). Hence, this option seems overall less attractive than the coexistence scenario.

Evaluating Option 1b: reducing the REB on electricity

This option includes reduction of the REB on electricity for small-scale end users, for instance in line with the price of an emission allowance and the resulting increase in electricity prices on the spot market. A major advantage of this option is that, compared to the coexistence scenario, it reduces some adverse effects on economic efficiency and social equity. Moreover, compared to the previous option, 1a, the major advantage of this option is that it improves the political acceptability among both policy makers and small-scale electricity users with regard to the EU ETS and the REB operating together, notably when the operation of the EU ETS is accompanied by a significant, structural rise in electricity prices.

The major disadvantage of this option, compared to the coexistence scenario, is that it still implies a loss of REB revenues to the fiscal authorities (although less compared to the previous option, 1a). In principle, however, this problem can be solved by auctioning the emission allowances to the power generators (rather than allocating them for free), and using the auction revenues to reduce the REB on electricity by the same amount.[66] The power producers/suppliers will pass the costs of the auctioned allowances to the electricity consumers who are compensated for the increase in the commodity price per kWh by a similar decline in the REB per kWh. Therefore, this option is fiscally neutral, while still improving economic efficiency and reducing double regulation.

A major problem of the solution suggested above, however, is that the present draft of the Directive on the EU ETS proposes that Member States have the option to auction only up to 5 percent of their allowances in Phase 1 and up to 10% of their allowances during Phase 2. In addition, the draft Directive does not stipulate anything on whether the allocation method can be differentiated between power generators and other participants of the EU ETS. Moreover, another problem is that the suggestion to auction allowances to the power producers should be implemented by all countries participating in the EU ETS in order not to distort the competitive relations among power producers of different countries. Hence, these issues have to be addressed in the final draft or in an updated version of the EU ETS Directive. It is unreal, however, to expect that these issues will be addressed in the short term and, therefore, the offered solution may become only realistic in the medium or long term if policy makers become interested in dealing with significant problems of double regulation and double charging of electricity consumers due to the coexistence of the EU ETS and carbon taxes.

Table 5.6 offers a multi-criteria assessment of Option 1b in terms of the *difference* between this option and the coexistence scenario of Table 5.4. According to Table 5.6, the total score of this option amounts to 41 points compared to 38 points for the coexistence scenario. Hence, Option 1b seems to be more attractive that the coexistence scenario. However, it should be emphasised once again that (i) the scoring process is highly subjective and in practice different stakeholder groups may both assign different scores and give different weightings to each criterion, (ii) the relevance of the option depends highly on the allowance price and the trend in real electricity prices within the EU ETS, and (iii) the attractiveness of the option depends on the question whether an acceptable solution can be found for the loss of REB revenues. Moreover, it should be noted that rather than offering a simple, short-term solution, this option intends mainly to encourage the discussion of issues of double regulation due to the interaction of the EU ETS and other policy instruments, including the question whether and how policy makers should address such issues.

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[66] With regard to the energy-intensive industries participating in the EU ETS, the emission allowances can either be allocated for free (as proposed by the Directive for the first phase) or auctioned while recycling the auction revenues to these industries (in order to maintain their competitive position on the world market).

Table 5.6 *Multi-criteria assessment of Option 1b, i.e. reducing the REB on electricity: changes compared to coexistence scenario*

Criteria	Relevant issues	Score
Environmental effectiveness	– *Largely unchanged*, as CO_2 emissions of the participating sectors are set by the national quota. Household electricity efficiency, however, may decrease slightly.	7
Economic efficiency	– *Slightly better*: static efficiency of CO_2 reduction is slightly improved, but household electricity efficiency may slightly deteriorate as well as dynamic efficiency of CO_2 reduction and household electricity use as the price incentive to generate cost-saving technologies becomes even lower.	6
Administrative simplicity	– *Largely unchanged*, as the administrative demands for the EU ETS and the REB remain largely the same.	7
Social equity	– *Better*, although the impact on equity depends largely on how the loss of REB revenues will be compensated by other fiscal measures.	6
Industrial competitiveness	– *Slightly better*, notably for non-participating energy-extensive sectors, but unchanged for participating, energy-intensive industries.	8
Political acceptability	– *Slightly better*: depending on the allowance price and the way in which the loss of REB revenues will be compensated.	7
Total		41

5.3.3 Option 2: Expanding the sectoral coverage of the REB

Definition and rationale of the option

As explained in Section 5.1, the REB is a highly regressive tax scheme as it imposes high marginal tariffs on the energy consumption of households and other, small-scale end users, while the marginal tariffs on electricity and gas consumption by large-scale end users are (nearly) zero. As a result, since its inception in 1996, the REB has been criticised for its regressive character, its presumed inequity effects and its presumed distortive effects on the competitive relationship between large- and small-scale firms. In response, some official studies have explored the option to expand the sectoral coverage of the REB by significantly raising the marginal tariffs on the energy consumption by large-scale end users (Brinkhoff, et al., 2001; Lijesen, et al., 2001). Moreover, at the EU level, a variety of proposals have been launched over the past decade to introduce a carbon or energy tax, covering both small- and large-scale energy uses. Hence, as part of the present study it may be useful to evaluate the option of expanding the sectoral coverage of an energy tax such as the REB, i.e. including the participating sectors, within the context of the EU ETS.

Evaluating Option 2: expanding the sectoral coverage of the REB

The impact of expanding the sectoral coverage of the REB, i.e. raising the marginal ecotax tariffs of energy-intensive sectors participating in the EU ETS, depends partly on the question whether the REB revenues will be recycled to these sectors or not. In line with official studies such as Brinkhoff, et al. (2001), it is assumed that the REB revenues will indeed be recycled to the sectors concerned. Based on this assumption, the option of expanding the sectoral coverage of the REB within the context of the EU ETS will overall be negative. Firstly, if the ecotax levy is relatively low (i.e. compared to the price of an emission allowance), the effectiveness of this levy on (national) CO_2 emission levels by the participating sectors will be zero as these levels are fixed by the national emission quota (although it may affect the domestic emissions and, hence, the emissions trading by these sectors). Only if the tax levy is relatively high, it will be effective in reducing actual CO_2 emission levels of *all* participating sectors below the quota of the EU ETS *as a whole*, but then this scheme has become ineffective and useless, as the scarcity on the market for emission allowances has been fully evaporated.[67]

Secondly, expanding the sectoral coverage of the REB within the context of the EU ETS will most likely have a negative impact on overall economic efficiency as it will result in a double regulation or 'double charging' of the participating sectors.

Thirdly, assuming a recycling of REB revenues to the sectors concerned, expanding the sectoral coverage of the REB will hardly have any impact on overall social equity or industrial competitiveness (although, depending on the way of recycling ecotaxes, some industries may improve their competitive position, while for other industries this position may deteriorate).[68]

Finally, the option of expanding the sectoral coverage of the REB may be applauded by the present REB target groups of small energy users, notably by small-scale firms, although they may be less enthusiastic if this option is accompanied by a simultaneous recycling of revenues to the sectors concerned. These sectors, however, will most likely oppose such an expansion, even in case of full recycling, because of the economic inefficiencies involved and their distrust to political promises of full recycling in the long run. Overall, the socio-political acceptability of this option will probably be low, notably when policy makers start to realise that within the context of the EU ETS the environmental effectiveness of this option will be low whereas its economic inefficiency may be significant.

As already indicated, the discussion above on expanding the sectoral coverage of the REB in the Netherlands is also relevant to the dragging discussion on implementing a carbon or energy tax throughout the EU. Although the ultimate judgement over such an ecotax depends on its specific purposes and characteristics (including its sectoral coverage), based on the discussion above it can already be concluded that such a tax cannot be recommended on grounds of cost-effectiveness if it is mainly aimed at reducing CO_2 emissions by sectors participating in the EU ETS. If one is interested in raising revenues from these sectors, it is more efficient to auction emission allowances to these sectors, rather than allocating them for free and imposing carbon taxes simultaneously. But, if it is indeed hard and politically almost impossible to auction emission allowances to the participating sectors, why would it be less hard and less politically impossible to impose a tax measure on these sectors that is less efficient than emissions trading with auctioning?

On March 20, 2003, the European Council of Finance ministers reached a political agreement on a proposed common framework for energy taxation, six years after the plan was put forward by the European Commission (ENDS, 2003). One of the purposes of the plan is to harmonise minimum tax rates throughout the EU in order to reduce distortions of competition between EU states and between energy producers. Other purposes are to increase energy efficiency and to reduce CO_2 emissions. According to EU internal market commissioner Bolkestein, the tax agreement would have 'immeasurable' benefits for the environment and transport. With regard to CO_2 emissions by the sectors participating in the EU ETS, the benefits will indeed be 'immeasurable' because, as explained, the effectiveness of an energy tax on CO_2 emissions by the participating sectors is zero.

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[67] It will be clear that a single policy change, such as expanding the sectoral coverage of the REB, by a small country such as the Netherlands will never be able to push CO_2 emission levels of all participating sectors below the quota of the EU ETS as a whole. Therefore, this outcome assumes similar policies in other, major countries of the EU ETS.

[68] On the other hand, if it is assumed that REB revenues will not be recycled, the option of expanding the sectoral coverage of the REB might have a positive impact on social equity (depending on whether the ecotax will be passed on forwards or backwards), while it will have a negative impact on the industrial competitiveness of some energy-intensive sectors (Lijesen, et al., 2001).

Table 5.7 presents a summary of a multi-criteria assessment of Option 2, i.e. expanding the sectoral coverage of the REB, in terms of the *difference* between this option and the coexistence scenario of Table 5.4. According to Table 5.7, the total score of this option is 34 points compared to 38 points for the coexistence scenario. Therefore, Option 2 seems to be less attractive than the coexistence scenario.

Table 5.7 *Multi-criteria assessment of Option 2, i.e. expanding sectoral coverage of the REB: changes compared to coexistence scenario*

Criteria	Relevant issues	Score
Environmental effectiveness	– *Unchanged*: the environmental effectiveness with regard to CO_2 mitigation by the sectors participating in the EU ETS is determined by the national emission quota of this scheme. Hence, expanding the coverage of the REB to the participating sectors has no impact of the national emissions accounts of these sectors (although it may influence their domestic CO_2 emissions and, hence, emissions trading by these sectors).	8
Economic efficiency	– *Worse*: raising energy taxes of the participating sectors results in inefficiencies due to double regulation of these sectors.	3
Administrative simplicity	– *Largely unchanged*: the administrative demands of expanding the sectoral coverage of the REB are relatively low.	7
Social equity	– *Largely unchanged*, if it is assumed that the additional REB revenues will be recycled to the participating sectors.	5
Industrial competitiveness	– *Largely unchanged*, if it is assumed that the additional REB revenues will be recycled to the participating sectors. Depending on the way of recycling, however, some industries may improve their competitive position while for other industries this position may deteriorate.	7
Political acceptability	– *Worse*: expanding the sectoral coverage of the REB may improve the acceptability of this instrument among small-scale energy users (who believe the present arrangement to be unfair), but will definitively be opposed by the energy-intensive sectors participating in the EU ETS (which may find support among national policy makers).	4
Total		34

5.4 Summary of major findings and policy implications

The scope of the instruments

There is hardly any overlap or interaction between the direct target groups of the EU ETS and the REB. The groups directly affected by the EU ETS consist exclusively of large energy users, while the REB is imposed predominantly on the consumption of fossil electricity and gas by small- and medium-scale energy users (including households and firms). However, there are some major interactions between the indirect target groups of these instruments. For instance, the group of small- and medium-scale fossil energy users is affected directly by the REB (through taxation of conventional energy use) and indirectly by the EU ETS (through higher prices resulting from CO_2 abatement costs). Hence, this group will be subject to double regulation and may be charged double, depending on whether and to which extent the EU ETS will result in higher consumer prices for fossil electricity.

The objectives of the instruments
Although the EU ETS and the Dutch ecotax are predominantly focused on different direct target groups, there is a major overlap or synergy between the objectives of these instruments. The EU ETS is primarily aimed at reducing CO_2 emissions, thereby indirectly encouraging the saving of fossil fuel use in general and the switch to renewable energy in particular. On the other hand, both the primary objective of the REB to encourage the saving of fossil energy use in general and its additional objective to promote the switch to renewable energy consumption in particular contribute to the objective of reducing CO_2 emissions.

The operation of the instruments
The interaction between the operation of the EU ETS and REB concerns particularly the consumption of one commodity, i.e. electricity generated from fossil resources. Due to this interaction small-scale electricity consumers are subject to 'double regulation' or 'double charging' in the sense that, on the one hand, they have to pay a relatively high REB tariff (including some carbon taxation) and, on the other hand, they pay higher electricity prices due to the EU ETS (including some internalised costs of carbon reduction).

Policy options
A multi-criteria assessment of the coexistence of the EU ETS and an unchanged REB scores relatively low with regard to the criteria economic efficiency, social equity and political acceptability (particularly when the price of an emission allowance becomes high). This assessment provides the starting point for considering two alternative policy options that might improve the overall performance of the interaction between the EU ETS and the REB. These options include:
1. reducing the double regulation of the EU ETS and the REB on electricity use, either by reducing the REB on electricity (Option 1a) or by abolishing it completely (Option 1b),
2. improving the social equity of the REB by expanding its sectoral coverage.

Whereas the overall performance of Option 1a is higher than the baseline option of the coexistence scenario, it is lower for both Options 1b and 2. Notably the performance of Option 2 is quite poor. The major reason for this poor performance is that the effectiveness of an energy or carbon tax on reducing CO_2 emission levels by the participating sectors will be zero as these levels are fixed by the emission cap (although it may affect the replacement and, hence, the trading of emissions among these sectors). This finding is also relevant to the dragging discussion on implementing a carbon or energy tax throughout the EU. Although the ultimate judgement over such an ecotax depends on its specific purposes and characteristics (including its sectoral coverage), such a tax cannot be recommended on grounds of cost-effectiveness if it is mainly aimed at reducing CO_2 emissions by sectors participating in the EU ETS.

Policy recommendations
- If the EU ETS results in higher electricity prices, it could be considered to reduce the REB on electricity consumption by small-scale end users proportionally in order to avoid double taxation of these end users.
- Energy users should pay for carbon emissions, whether through taxation or emissions trading. For each target group, only a single instrument should be used for carbon pricing. Therefore, sectors participating in the EU ETS should not be subject to national or EU carbon/energy taxation.

6. INTERACTION BETWEEN THE EU ETS AND RENEWABLE ENERGY SUPPORT POLICIES

6.1 Introduction

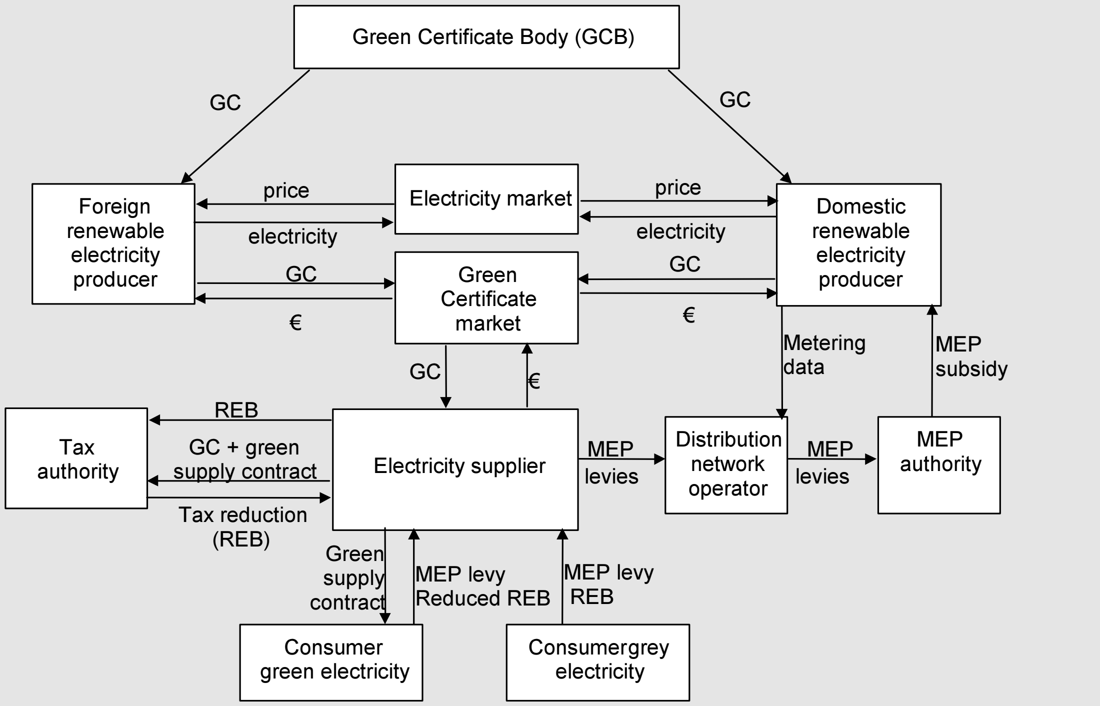
This chapter explores the potential interaction between the proposed EU Emissions Trading Scheme (EU ETS) and the Dutch system of supporting renewable electricity. Recently, this system has been drastically reformed.[69] Starting from mid-2003, the major elements of the new system of supporting renewable electricity includes:

- *The MEP feed-in subsidy.* The heart of the new system for supporting renewable electricity is an amendment to the Electricity Law of 1998 called 'Environmental Quality of Electricity Production' (or 'MEP', after its Dutch abbreviation). The essence of the MEP is to stimulate the environmental quality of generating electricity, notably by granting a subsidy to domestic producers of renewable electricity for each kWh fed into the grid. The height of this feed-in subsidy varies per category of renewable energy technology, depending on the so-called 'unprofitable top' or 'financial gap' between the cost of renewable electricity per technology option and the value of the electricity on the wholesale market. For the year 2003, the proposed feed-in subsidies vary between 0 ct/kWh for renewable electricity from landfill gas and digestion to 6.8 ct/kWh for wave and tidal, offshore wind and hydropower (see first column of Table 6.1).
- *The ecotax benefit.* Starting from mid-2003, the REB tariff on renewable electricity will be set at 3.49 cent per kWh, compared to 6.39 ct/kWh for grey electricity, implying that the support due to the differentiation of REB rates on grey versus green electricity will amount to 2.9 ct/kWh. This ecotax benefit will apply to the same renewable electricity options as for the MEP feed-in subsidies, with the exception of hydropower and mixed biomass streams (which are not eligible to any REB reduction at all). However, in contrast to the MEP subsidies - which apply only to domestic production of renewable electricity - the ecotax benefit applies also to imports of renewable electricity that meet certain eligibility conditions (see Appendix D and second column of Table 6.1).
- *The green certificate system.*[70] In the Netherlands, the green certificate system serves to facilitate the operation of a renewable electricity market based primarily on the promotion of a voluntary demand for green power (in contrast to other countries where it usually serves to facilitate the operation of a renewable electricity market based on an obligation to meet a certain amount of total electricity use by means of renewable resources). As indicated above, the demand for green power in the Netherlands is encouraged through the ecotax reduction on renewable electricity. This tax reduction, however, can only be claimed by the energy supplier if he surrenders to the tax authority both a supply contract with the renewable electricity consumer and an amount of green certificates corresponding to the amount of renewable electricity delivered to this consumer. Hence, in the Dutch system, there is a close link between the green certificate scheme and the ecotax incentive for renewable electricity (see also Box 6.1 for an explanation of the linkages between the REB, the MEP and the green certificate system in the Netherlands). A green certificate is granted to each category of renewable electricity regardless whether it is eligible to the ecotax reduction or not (i.e. including renewable electricity from mixed biomass streams and hydropower).

[69] See Appendix D for a discussion of the old versus the new system of supporting renewable electricity in the Netherlands.

[70] In line with the EU Directive on renewable electricity (CEC, 2001c), a system of 'guarantees of origin' will be introduced in the Netherlands (and other EU Member States) by the end of 2003 which will replace the existing system of green certificates (Ministry of Economic Affairs, 2003). In the present report, however, the word 'green certificate' will be used rather than the new concept 'guarantee of origin'

Box 6.1 *The Dutch system of supporting renewable electricity*



REB – ecotax
GC – green certificate
MEP – ecolevy/subsidy to promote environmental quality of electricity production

Figure 6.1 *The Dutch system of supporting renewable electricity (since mid-2003)*

Figure 6.1 explains the Dutch support system for renewable electricity, notably the relationship between the ecotax (REB), the feed-in producer subsidies (MEP) and the green certificate scheme. In this system, both grey and green electricity consumers connected to the grid have to pay the same fixed amount of a MEP levy (regardless the amount of electricity consumed). In addition, the grey power consumer pays the full REB rate per kWh, while the renewable consumer pays the reduced ecotax rate (and, occasionally, a premium in order to cover the additional costs/benefits of renewable electricity).

The energy supplier collects (i) the ecotax from the grey electricity consumer, (ii) the reduced REB from the green power consumer, and (iii) the MEP levy from both grey and green electricity consumers. The energy supplier transfers the total amount of REB to the tax authority and the total amount of MEP levies to the MEP authority (via the distribution network operators). The reduction of the ecotax on green electricity, however, can only be claimed if the energy supplier surrenders to the tax authority both a supply contract with the renewable electricity consumer and an amount of green certificates corresponding to the amount of renewable electricity delivered to this customer.

The energy supplier buys these green certificates (via the market) from either a foreign or domestic renewable energy producer who has received these certificates from the Green Certificate Body (GCB), after it has been verified that indeed a corresponding amount of green power has been fed into the Dutch grid. In addition to the revenue of the green certificate (€) and the revenue from selling electricity on the (spot) market, the domestic renewable energy producer receives a subsidy from the MEP authority in order to cover the extra costs/benefits of each kWh of green electricity fed into the grid.

Table 6.1 *Support of renewable electricity per technology option in the second half of 2003 [ct/kWh]*

Options	Feed-in subsidy (MEP)	Ecotax benefit (REB)	Total support
Landfill gas and digestion	0.0	2.9	2.9
Pure biomass[1]	4.8	2.9	7.7
Mixed biomass streams[2]	2.9	0.0	2.9
Onshore wind[3]	4.9	2.9	7.8
Offshore wind	6.8	2.9	9.7
Stand-alone bio-energy (installations <50 MW)	4.9	2.9	7.8
Solar PV	4.9	2.9	7.8
Wave and tidal	6.8	2.9	9.7
Hydropower	6.8	0.0	6.8
Imports of renewable electricity[4]	0.0	2.9	2.9

1 For the application of pure biomass in large-scale installations, the MEP subsidy will not be fixed for 10 years at the level of the first year that the subsidy was requested but only for the first three years after the MEP has come into force. It is expected that within three years a further subdivision within the category of pure biomass in large-scale installations will be operational.
2 The MEP subsidy is granted in proportion to the degree of biologically degradable material.
3 The MEP subsidy applies to a maximum of 18.000 full load hours in 10 years.
4 Imports of renewable electricity generated from hydropower or mixed biomass streams are excluded from the ecotax benefit. See also Appendix D for a discussion of the conditions under which different options of renewable electricity are eligible to receiving the ecotax benefit.
Source: Ministry of Economic Affairs (2002d and 2003).

As noted, this chapter explores the interaction between the EU ETS and the above-mentioned elements of the Dutch system of supporting renewable electricity. First of all, Section 6.2 analyses the potential interaction between the EU ETS and this support system, both in their presently proposed forms (coexistence scenario). Subsequently, Section 6.3 discusses the interaction performance of some options to modify one (or more) of the elements of the Dutch system to support renewable electricity. Finally, this chapter will be concluded by a summary of the major findings and policy implications in Section 6.4.

6.2 Interaction under the coexistence scenario

6.2.1 The scope of the instruments

There is no overlap or interaction between the *direct* target groups of the EU ETS and the Dutch renewable support system. The EU ETS directly targets large fossil fuel users, including electricity generators, while the direct target groups of the Dutch renewable support system comprise, on the one hand, renewable electricity producers (through both the MEP and TGCs) and, on the other hand, renewable electricity consumers (through the ecotax benefit). In the Dutch electricity market, some companies are generators of both grey and green electricity. Hence, such companies are part of the direct target groups of both the EU ETS and the Dutch renewable support system, but not simultaneously for the same installation or the same activity. Therefore, in the present report, fossil electricity generators and green power producers will be treated as separate target groups. Moreover, some generators of (grey/green) electricity are also suppliers of energy, but, for similar reasons, electricity generators and electricity suppliers will be treated as separate target groups.

The *indirect* interactions between the target groups of the EU ETS and the Dutch renewable support system are manifold, significant and complex. Table 6.2 presents an overview of the major interacting groups who are directly or indirectly affected by these instruments, including an indication of the impact (either positive or negative) of these instruments on these groups.

The table shows whether groups are affected directly or indirectly by a specific instrument, and whether this impact is negative or positive.

Table 6.2 *Overview of major interacting groups affected directly or indirectly by EU ETS and the Dutch renewable support system*[1]

Target groups	EU ETS	Renewable support system		
		MEP	REB	TGCs
Grey electricity market				
• producers	direct (-)	indirect (-)	indirect (-)	indirect (-)
• suppliers	indirect (-)	indirect (-)	indirect (-)	indirect (-)
• consumers	indirect (-)	indirect (-)	indirect (-)	indirect (-)
Green electricity market				
• producers	indirect (+)	direct (+)	indirect (+)	direct (+)
• suppliers	indirect (+)	indirect (+)	indirect (+)	indirect (+)
• consumers	indirect (+)	indirect (+)	direct (+)	indirect (+)

1 The sign between brackets indicates whether the impact of the policy instrument on the target group is positive (+) or negative (-).

For instance, the ecotax benefit on renewable electricity (REB) has a direct positive impact on green electricity producers, an indirect positive impact on producers and suppliers of green electricity, and an indirect negative impact on both producers, suppliers and consumers of grey electricity. Similarly, the EU ETS has a direct negative impact on grey electricity producers, an indirect negative impact on suppliers and consumers of grey electricity, and an indirect positive impact on producers, suppliers and consumers of renewable electricity. It should be noted, however, that the magnitude of the ultimate impact of an instrument on a specific group depends not only on whether a group is affected directly or indirectly by the instrument but rather on the market conditions and competitive relations between the groups as the impact of an instrument on a direct target group may be fully or partially passed on, either forwards or backwards, to an indirect target group. For instance, while the ecotax benefit on renewable energy is targeted directly to the consumers of renewable electricity and the system of TGCs to the producer of renewable electricity, it may well be that, owing to specific market conditions, the suppliers of renewable electricity benefit most from the linked combination of these instruments (i.e. buying and surrendering green certificates in order to obtain the REB benefit from the tax authority).

Horizontally, Table 6.2 shows the interaction between specific target groups of the EU ETS and the Dutch renewable support system. It can be observed, for instance, that the EU ETS will have a direct negative impact on fossil fuel-based electricity generators (by raising mitigation costs), while the Dutch renewable support system will have an indirect negative effect on this group (by improving the competitive position of renewable electricity). On the other hand, the EU ETS will have an indirect positive impact on green power producers (through higher wholesale prices on the grey electricity market), while the Dutch renewable support system will have a positive effect (directly through the revenues from the MEP and the TGC, and indirectly through the REB by means of a higher demand for renewable electricity). Hence, although there is no overlap or interaction between the direct target groups of the EU ETS and the Dutch renewable support system, indirectly these instruments operate in the same direction: they push electricity generators out of the fossil fuel sector and pull them into the renewable sector. More generally, Table 6.2 shows that both the EU ETS and the Dutch renewable support system have a positive impact on the development of the green electricity market (including producers, suppliers and consumers), and a negative effect on the development of the grey electricity market.

6.2.2 The objectives of the instruments

Although the EU ETS and the Dutch support system for renewable electricity are focused on different target groups, there is a major overlap or synergy between the objectives of these instruments. As indicated in the previous chapters, the EU ETS is primarily aimed at reducing CO_2 emissions, thereby indirectly encouraging the saving of fossil fuel use in general and the switch to renewable energy in particular. On the other hand, the Dutch support system for renewable electricity is primarily aimed at promoting the use of renewable electricity in the Netherlands. The promotion of renewable electricity use, however, is not an aim in itself but serves to achieve a variety of underlying policy objectives. One of the major reasons to support renewable electricity is to contribute to the reduction of CO_2 emissions and, hence, to meeting the Kyoto commitments. Besides CO_2 reduction, however, the promotion of renewable electricity is motivated by several other objectives, including (CEC, 2001c; Jensen and Skytte, 2003):

- Improving security of supply by increasing the diversity and domestic (or regional) deployment of renewable technologies.
- Mitigating other environmental effects of fossil electricity production such as reducing acid depositions and other forms of air pollution.
- Promoting socio-economic benefits of renewable electricity production and technology development such as generating jobs, contributing to rural development, nurturing an industry with export potential, and encouraging economies of scale and learning effects that should improve the competitiveness of renewable technologies and reduce the costs of CO_2 mitigation in the long run (Sorrell, 2003).

Although policies supporting renewably generated electricity may not provide the least cost option for CO_2 abatement in the short term, the above-mentioned other objectives besides static CO_2 efficiency may provide a justification for maintaining or intensifying these policies, even when the EU ETS becomes operational (see discussion below).

Within the overall aim of promoting the use of renewable electricity, each instrument of the Dutch system to support renewable electricity has its own specific goal. For instance, the MEP feed-in subsidy system is particularly aimed at a 'forceful, cost-effective stimulation of the environmental quality of electricity production' in the Netherlands (Ministry of Economic Affairs, 2002d). The ecotax benefit on renewable electricity use, on the other hand, is especially focused on encouraging the domestic demand for renewable electricity and, hence, to replace the consumption of fossil electricity by renewable electricity. Finally, the green certificate system is primarily aimed at facilitating and promoting the liberalised market for renewable electricity by matching demand and supply, including trade of renewable electricity. Together, these three instruments fit into the overarching, long-term objective of Dutch energy policies aimed at a cost effective and sustainable energy system within a liberalised energy market (Ministry of Economic Affairs, 2002a).

The Dutch government has translated the objectives of its renewable energy policies in some specific targets. In the mid-1990s, the government set the long-term target for the share of renewable energy at 10 percent of final energy use in 2020, which comes down to some 17 percent of total electricity consumption by that time. In response to the Kyoto commitments of the first budget period, the government determined an intermediate target of 5 percent of total energy consumption in 2010, corresponding to almost 8.5 percent of total electricity use in that year. This percentage is only slightly lower than the target of 9 percent of total electricity use in 2010 as indicated by the EU Directive on renewable electricity and, subsequently, accepted by the Dutch government (CEC, 2001c; Ministry of Economic Affairs, 2002a).

According to recent projections, the consumption of renewable electricity in 2010 is estimated at 14 TWh, i.e. about 11 percent of total electricity use in that year (Ybema, et al., 2002a and 2002b). This implies that the target of the EU Directive (9 percent) will be amply met.[71] The major part of the total consumption of renewable electricity in 2010 is projected to be covered by domestic production (11.5 TWh), while the remaining part is accounted for by imports of renewable electricity (2.5 TWh). The domestic production of renewable electricity corresponds to a CO_2 reduction of 5.5 Mt (based on an average emission factor of 0.476 $MtCO_2$/TWh).[72]

As some 20 percent of the domestic production of renewable electricity is estimated to be due to autonomous factors, it can be concluded that about 4.4 $MtCO_2$ of CO_2 reductions in 2010 can be ascribed to renewable electricity policies. The average social costs of these policies are estimated at some €60/tCO_2, varying from €0-10/tCO_2 for renewable electricity generated from waste incineration, €50-70/tCO_2 for onshore/offshore wind power, up to some €500/tCO_2 for renewable electricity from solar PV.[73]

As noted, in order to improve the competitive position of renewable electricity, the Dutch government supports the production and consumption of renewable electricity by means of the MEP feed-in subsidies and the ecotax benefit to small-scale end users of renewable electricity (REB). Table 6.3 provides some estimates of the MEP and REB support to different renewable electricity technologies, both per tonne CO_2 reduction and in total amounts for the year 2010. These estimates are based on the support level per kWh for the year 2003 (see Table 6.1) and supply projections of renewable electricity in 2010 (Menkveld, 2002b).

Table 6.3 shows that the sum of the REB and MEP support per tonne CO_2 reduction varies from €37-61 for renewable electricity from waste/biomass, €143 for hydropower, €164 for onshore wind power, to €204 for renewable electricity from offshore wind and solar PV. Overall, the total support to the domestic production of renewable electricity in 2010 is estimated at €612 million, i.e. on average some €111 per tonne CO_2 reduction. Two qualifications, however, should be added to these support figures. Firstly, in addition to the REB and MEP, renewable electricity is also supported by other measures such as research and development programmes, the CO_2 reduction plan, subsidy schemes to housing programmes, and fiscal facilities for investments in renewable energy projects (Ministry of Economic Affairs, 2003). Secondly, the public support per tonne CO_2 reduction of renewable electricity should be distinguished from the earlier mentioned social costs per tonne CO_2 reduction by renewable electricity, as a major part of the support to renewable electricity is just a matter of income transfers among social groups and economic sectors (levies, subsidies, etc.) in order to improve the competitive position of renewable electricity and to internalise its social costs and benefits.

Nevertheless, the above-mentioned figures on social costs and support per tonne CO_2 reduction of renewable electricity raise some intriguing issues on the interaction between emissions trading and renewable energy policies once the EU ETS becomes operational. Firstly, the impact of renewable energy policies on the domestic emissions of electricity generators has to be accounted for when setting the national quota of emission allowances allocated to the sectors participating in the EU ETS, as stipulated by the EU Directive (CEC, 2001b).[74] Secondly, once the

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71 The share of renewable energy (i.e. electricity and heat) in total energy use, however, is estimated at 3.8 percent in 2010, i.e. far below the target of 5 percent for that year (Ybema, et al., 2002a and 2002b).

72 This emission factor of 0.476 $MtCO_2$/TWh is equal to the weighted average of the emission factors used in Table 4.5 for the generation of electricity by coal, gas and CHP.

73 The data on abatement potentials and costs of renewable electricity options have been derived from a spreadsheet provided by Menkveld (2002b and 2002c). See also Menkveld (2002a), and Van Dril and Menkveld (2003). It should be noted that the average social costs of CO_2 reductions by renewable heat options (€95/tCO_2) are about 50 percent higher that for renewable electricity options (€60/tCO_2). The average social costs of CO_2 reductions by all renewable energy options for the year 2010 is estimated at €72/tCO_2 (Menkveld, 2002b).

74 The interaction between the goals of emissions trading and renewable energy policies within the context of a liberalised power market has recently been studied in some interesting, theoretical papers by Jensen (2002), Jensen and Skytte (2002 and 2003) and Morthorst (2003).

EU ETS becomes operational, however, renewable energy policies could, in principle, be abolished from a static CO_2 efficiency point of view as the EU ETS will realise the CO_2 target of the participating sectors at the lowest costs (see Chapter 3). Due to the abolition of renewable energy policies, the domestic emissions of electricity generators will rise. From a national point of view, however, the emissions accounts of the electricity generators do not change as they are facing a quota of emission allowances. Hence, in response to a rise in their domestic emissions, they will buy more (sell less) emission allowances, say at a price of €10/tCO_2 (far below the levels of social costs and support per tonne CO_2 reduction mentioned above). The fossil electricity generators will pass the costs of emissions trading to the final consumers and/or will benefit from the additional profits owing to a higher turnover. On the other hand, if renewable energy policies are intensified once the EU ETS is operational, domestic emissions by the power generators will decline, but national emission accounts will not change as these generators will sell more (buy less) allowances, leading to more emissions elsewhere within the EU ETS. However, whereas the total amount of emissions does not change, abatement costs will rise significantly as cheap reduction options will be replaced by more expensive renewable energy options. Therefore, once the EU ETS become operational, renewable energy policies in the Netherlands (and other Member States) cannot be justified from a static CO_2 efficiency point of view.

Table 6.3 *Estimates of REB and MEP support to renewable electricity, per tCO_2 reduction and in total amounts for the year 2010*

	Production in 2010 [TWh]	Support [mln €][1]			CO_2 reduction [MtCO_2][2]	Support per tCO_2 reduction [€]
		REB	MEP	Total		
Onshore wind	2.6	75	126	201	1.2	164
Offshore wind	2.3	65	153	218	1.1	204
Hydropower	0.2	0	13	13	0.1	143
Solar PV	0.1	4	10	14	0.1	204
Waste	1.8	0	26	26	0.9	30
Biomass[3]	3.5	0	63	63	1.7	37
Decentral	0.7	20	48	68	0.3	204
Landfill gas and digestion	0.3	9	0	9	0.1	61
Domestic production	11.5	173	439	612	5.5	111
Imports	2.5	73	0	73	1.2[4]	61[4]
Total	14.0	246	439	685	6.7[4]	102[4]

[1] Based on the support level per kWh in 2003 (see Table 6.1).
[2] Based on an emission factor of 0.476 MtCO_2/TWh.
[3] Based on different streams of mixed/pure biomass with an average support of 1.8 cents per kWh.
[4] Based on the assumption that imports of renewable electricity replace domestic generation of renewable electricity. If it is assumed, on the other hand, that imports of renewable electricity replace imports of fossil electricity (or that it is more cost-effective to import fossil rather than renewable electricity), the CO_2 reduction due to imports of renewable electricity becomes 0, resulting in an increase of the average total support from €102 to €125 per tCO_2.
Source: Ybema et al. (2002a) and Menkveld (2002b).

As argued in Chapter 3, however, there are other reasons to justify renewable energy policies within the context of the EU ETS. A formal reason is that the Dutch government has accepted the indicative EU target of 9 percent of total electricity consumption in 2010 to be generated from renewable resources. This argument, however, does not justify the additional or marginal costs of renewable electricity policies that, at present projections, lead to a surpassing of the target in 2010 from 9 to 11 percent.

A more substantive reason to justify renewable energy policies within the context of the EU ETS is that these policies serve a variety of other objectives and considerations besides static CO_2 efficiency (as outlined in the beginning of the present section). Perhaps the most important argument for supporting renewable technologies within the context of CO_2 mitigation is that a widespread diffusion of these technologies may result in a substantial fall in the costs of renewable energy and, hence, in meeting major cutbacks in CO_2 emissions at affordable costs (i.e. the so-called dynamic CO_2 efficiency argument).[75]

Two qualifications, however, should be added to the above-mentioned reasons for justifying renewable energy policies within the context of the EU ETS. Firstly, within this context, only a small part of the social costs and support to renewable electricity can be attributed to static CO_2 reduction, notably when the price of an allowance (i.e. CO_2) is low, implying that a major part of the costs and support has to be accounted for by other objectives and considerations (including the dynamic CO_2 efficiency argument). For example, it was indicated above that the average social costs of generating renewable electricity in the Netherlands is presently about €60tCO_2 while the average support to the projected domestic production of renewable electricity in 2010 is estimated at some €111/tCO_2 (Table 6.3). Assuming a price for an emission allowance of €10/tCO_2 and an emission factor of 0.476kCO_2/kWh, this implies that per kWh of renewable electricity the average social costs are 2.9 cents, the average support 5.5 cents and the price of an emission allowance less than 0.5 cents. This means that of the social costs and support to renewable electricity, only a small part (0.5 cents) can be ascribed to static CO_2 reduction costs while the other, major part has to be accounted for by other objectives besides CO_2 reduction in the short run. Or, to put it at a more aggregated level, Table 6.3 indicates that the domestic production of renewable electricity in 2010 is estimated to reduce CO_2 emissions by some 5.5 Mt at a total MEP and REB support level of €630 million (while the social costs are estimated at €330 million). Again, assuming an allowance price of €10/tCO_2, this implies that €55 million of the total support can be ascribed to CO_2 reduction, while the remaining €575 million has to be accounted for by other objectives and considerations besides CO_2 reduction in the short/medium term.[76] As a result, the introduction of the EU ETS (notably when CO_2 prices are low) may lead to a re-evaluation of the costs and benefits of renewable energy policies, which may have major consequences for the nature and intensity of these policies.

Secondly, in recent documents, in which the Dutch government has outset the recent reforms of renewable electricity policies, the ecotax benefit of 2.9 ct/kWh has been motivated only by CO_2 considerations, i.e. it is based solely on 'current norms with regard to the costs of reducing CO_2' (Ministry of Finance, 2002; Ministry of Economic Affairs, 2002a and 2002d).[77] However, if the EU ETS results in an average price of an emission allowance of €10/tCO_2, then policies based solely on CO_2 abatement justify only a support level of about 0.5 ct/kWh.[78] Hence, in the light of the upcoming EU ETS and the resulting low carbon price expectations, policy makers undermine their own renewable energy support policies when they justify these policies by referring solely to short term CO_2 costs considerations.

Finally, despite some qualifications, there seem to be sound arguments for maintaining - or even expanding - policies that support renewable energy within the context of the EU ETS (notably from a dynamic CO_2 efficiency point of view).

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75 See Lako (2002), who shows that the costs of renewable technologies falls significantly if the cumulative installed capacity of these technologies is expanded substantially over time.

76 It should be emphasized that the data used in the present section are rough estimates and predominantly serve to give an indication of the order of magnitude and to illustrate the line of reasoning.

77 See Appendix D. The ecotax benefit of 2.9 ct/kWh has been derived by setting the 'current norms with regard to the costs of reducing CO_2' at €45/tonne and applying an (implicit) emission factor of 0.644 kCO_2/kWh. As noted, in the main text of the present report, a lower emission factor has been used (0.476kCO_2/kWh), which corresponds to an REB support of €61/tonne CO_2 reduction, based on an ecotax benefit of 2.9 ct/kWh.

78 It will be clear that this support level rises slightly to 0.6 ct/kWh when a higher emission factor is used - see previous note - but this does not really change the line of reasoning in the main text.

Compared to abolishing these policies, however, such a coexistence of two instruments with overlapping CO_2 reduction objectives implies that, as argued in Chapter 3, both the scarcity on the market for emission allowances, the price of these allowances, and the cost benefits of emission trading will be lower.

6.2.3 The operation of the instruments

6.2.3.1 The obligations and incentives of the instruments

As part of its policy to promote renewable electricity, the Dutch government does not rely so much on obligations but rather on voluntary measures and price incentives to influence the behaviour of producers, suppliers and consumers of renewable electricity. Through the MEP, a feed-in subsidy is offered to producers in order to induce them to enhance the generation of electricity from renewable resources. In addition, these producers are offered a green certificate for each kWh of green power fed into the grid.

For producers, however, the revenue of this certificate is determined by the supply and demand conditions on the Dutch market for green certificates. The demand for green certificates is set by the electricity suppliers as they need to surrender these certificates - together with retail selling contracts - to the tax authority in order to qualify for the REB reduction on electricity use. Therefore, in the absence of foreign demand for Dutch green certificates, the maximum value of a green certificate in the Netherlands is equal to this ecotax benefit (i.e. 2.9 cents in 2003). However, under certain conditions, green certificates offered to foreign producers of renewable electricity imported into the Netherlands are also eligible for the ecotax benefit (see Appendix D). Hence, domestic producers have to compete with foreign producers on the Dutch green certificate market. If the total supply on this market is very large (as was the case in 2002), the price offered to producers will be low, while the difference between the ecotax benefit and the producer price will be used by the suppliers of renewable electricity to cover their marketing costs, to raise their profits or to pass it through to green power consumers.

Owing to the ecotax benefit - and the producer subsidy - suppliers are able to provide renewable electricity to consumers at competitive prices while still realising an attractive marketing margin. Together with the liberalisation of the retail market for renewable electricity, this offered a major incentive to these suppliers to launch intensive marketing campaigns in order to attract new clients buying green power. For these clients, on the other hand, the main incentive to consume renewable electricity is that it offers them an easy way to appease their environmental consciousness, while still not paying too much.

Operational interaction of the instruments

The introductory text to the Directive on the EU ETS acknowledges that promoting renewable electricity is one way for complying with the emission quota limits under this scheme. In addition, it states that Member States should take account of their renewable energy targets when deciding on these quota limits. However, it also says, 'so as not to create confusion, renewable certificates should not be integrated with the greenhouse gas allowances needed for compliance with the obligations of this Directive' (CEC, 2001c). Hence, although renewable energy policies should be accounted for when setting national quota under the EU ETS, the Directive opts for a formal separation between the markets for green certificates and emission allowances, i.e. green certificates cannot be converted to emission allowances (or vice versa) and, subsequently, traded among each other.

Nevertheless, despite this formal separation between the markets for green certificates and emission allowances, in practice there will be all kinds of linkages and interactions between these markets, running through the power market.[79] For the Dutch situation, in which the green certificate system is based on a voluntary approach of meeting a specified renewable energy use, the operational linkages and interactions between emissions trading and renewable electricity policies can be explored by distinguishing the following cases:

1. setting and changing the emission (CO_2) target,
2. setting and changing the renewable energy (RE_L) target.

The latter case can be further distinguished according to the instruments used to achieve a changed RE_L target, i.e. changing either the REB benefit on renewable electricity or the MEP feed-in subsidies to renewable power producers. Moreover, within each (sub) case, a distinction will be made according to the impact of a policy measure on 'existing' versus 'new' MEP producers of renewable electricity (where 'existing' MEP producers refer to generators of renewable electricity who have already successfully applied for a MEP subsidy contract, while 'new' MEP producers refer to generators who apply for a new, additional contract).

Case 1: Setting and changing the emission (CO_2) target

For the three-year period of the first phase of the EU ETS (2005-2007), each Member State has to set its emission target or total quantity of allowances to be allocated to the participating sectors and installations. As this period expires, each Member State has to set a similar quota of emission allowances for the five-year period of the second phase of the EU ETS (2008-2012), and so on for each subsequent five-year period (CEC, 2001c, Article 11). It is likely, that the annual average of these quotas will become more restrictive over these periods, either in an absolute sense or related to the output of the participating sectors (including new entrants and opt-ins). Due to the quota setting, emission allowances will be scarce, which will be reflected in the price of an emission allowance on the market. This price will rise, *ceteribus paribus*, if the annual average of the quotas becomes more restrictive. With regard to the power sector, it is assumed that the (opportunity) costs of emissions trading, i.e. the price of an allowance, will be passed through to the end user, notably when a major share of the emission allowances needed by the power sector has to be bought on the market or obtained through an auction. As a result, the electricity price on the spot market will rise. In general, this will improve the competitive position of renewable electricity, leading to a higher production/consumption level of renewable electricity. However, within the context of the specific Dutch policies to support renewable electricity, a distinction has to be made between:

- *Existing MEP producers of renewable electricity (Case 1a).* In the present policy context, these producers will benefit from rising electricity prices on the spot market. For, as outlined in Appendix D, at the present status of the MEP, an existing (eligible) producer receives a fixed total amount of support, i.e. including both REB and MEP feed-in subsidies, during a period of ten years, based on the implicit assumption of a fixed wholesale price on the electricity market of 2.7 cents per kWh.[80] Due to the EU ETS, however, this price may rise. As discussed in Chapter 4, the price increase will most likely be relatively low (i.e. 0.4 ct/kWh or less) if the allowance price will be low (10€/tCO_2), but may become more significant (i.e. 1.6 or even 4.0 ct/kWh) if the allowance price rises to its maximum level of

79 In the recent literature, the linkages and interactions between emissions trading and renewable energy policies in general (and between markets for power, green certificates and emission allowances in particular) have been amply studied. See, for instance, Morthorst (2000, 2001, and 2003), Calder and Hough (2001), Baron and Serret (2001), Boots (2001), Schaeffer (2001), DHV (2002), Smith (2002), Walz and Betz (2002), Jensen (2002), and Jensen and Skytte (2002 and 2003). Most of these studies, however, have a general, theoretical character and/or refer to a situation in which the green certificate system is based on a mandatory quota of renewable electricity to be met by producers, suppliers or consumers. The analysis in the present and following sections is based on insights gathered from these studies, but translated and adapted to the Dutch situation which refers to a voluntary approach of meeting a specified renewable electricity target and to a green certificate system based on the granting of an ecotax benefit on renewable electricity consumption.

80 As remarked in Section 6.1.2, for electricity from wind or solar energy, the long-term wholesale price is assumed to be slightly lower, i.e. 2.1 ct/kWh, due to the balancing costs of these kinds of renewable electricity.

40 €/tCO_2 during Phase 1 of the EU ETS or even to 100 ct/tCO_2 during Phase 2, (corresponding to the penalty prices in case of non-compliance during these phases). These potential price increases are particularly substantial compared to the assumed fixed wholesale price of 2.7 ct/kWh (and to the total support granted per kWh, depending on the category of renewable electricity). In terms of the terminology of the Interact project, this situation represents a case of 'double regulation' or, more precisely, of 'double (or over-) stimulation', i.e. owing to the EU ETS existing producers of renewable electricity benefit from rising prices on the wholesale electricity market, while receiving the same fixed amount of support over 10 years due to the present state of Dutch renewable electricity policies (MEP and REB). Whether such a double stimulation will be acceptable is ultimately a political issue and will depend on a variety of factors, notably the allowance price and the resulting rise in wholesale electricity prices, but also on other factors such as the overall fiscal situation of the public sector – and the availability of resources to support renewable electricity in particular – or the extent to which renewable production and/or consumption targets are expected to be met. However, depending on the actual use of existing capacities, the double stimulation may lead to some additional output by existing, eligible producers and, hence, to some additional need for public resources to pay the support involved, as well as to some additional supply of green certificates on the Dutch market. Assuming that the demand for green certificates on this market does not change, this will lead to some fall in the price of a green certificate (resulting in a contrary adjustment of renewable electricity output by all eligible producers, including new MEP producers and foreign producers of renewable electricity receiving green certificates eligible to the ecotax benefit).[81] It is highly unlikely, however, that the fall in the price of a green certificate will surpass the initial increase in the wholesale electricity price, and, hence, existing MEP producers of renewable electricity will, on balance, benefit from the interaction between the EU ETS and Dutch policies to support renewable electricity.[82]

- *New MEP producers of renewable electricity (Case 1b).* In the present policy context, these producers will not benefit from rising electricity prices on the spot market (while they may even suffer from a fall in the price of a green certificate, as indicated above). For, as outlined in Appendix D, according to the rules of the presently proposed MEP, the level of the feed-in subsidy will be annually adjusted for new applicants, depending on new developments in the production costs of renewable technology and the wholesale price of renewable electricity. Hence, rising wholesale electricity prices will be compensated by a lower level of MEP subsidies. In this case, the major party benefiting from a rise in wholesale electricity prices due to the EU ETS is the Dutch government, which has to pay less support per kWh to new producers, thereby enabling it to control its total MEP expenditures and/or to stimulate a larger amount of renewable electricity.

In the two sub-cases above, it was assumed that the costs of emissions trading will lead to a higher wholesale electricity price offered to producers of renewable energy. As a result, emissions trading will lead to a rise in the consumer price of both fossil electricity and renewable electricity. Hence, from a consumer point of view, it will neither result in a change in the competitive position of renewable electricity, nor in the demand for green certificates. If it is assumed, however, that the costs of emissions trading lead to higher wholesale prices for fossil electricity but not for renewable electricity, the competitive position of renewable electricity will improve from a consumer point of view. As a result, the demand for renewable electricity

[81] The assumption of an unchanged demand for green certificates is based on the consideration that the costs of emissions trading, i.e. the price of an emission allowance, will lead to a rise in the consumer price of both fossil electricity and renewable electricity (as it is assumed that the costs of emissions trading will lead to a higher wholesale price offered to producers). Hence, from a consumer point of view, the competitive position of renewable electricity does not change and, therefore, neither the demand for renewable electricity nor the demand for green certificates changes.

[82] It will be clear that estimating the exact price changes on the wholesale electricity market and the Dutch green certificate market is a matter of econometric modelling (and the underlying assumptions made), but this is beyond the scope of the present study.

and, hence, for green certificates will rise, leading to a higher price for a green certificate (up to the maximum value of the ecotax benefit). This will benefit all eligible producers of renewable electricity, including new and foreign producers, while the Dutch government will be faced by rising demands for REB resources (although the ecotax benefit per kWh will remain the same). If the renewable electricity target will be surpassed, the government can respond to these rising demands by lowering the ecotax benefit per kWh, while simultaneously raising the MEP subsidies for domestic, both existing and new MEP producers by the same amount. The final result will be that (i) domestic production of renewable electricity will be extra stimulated, (ii) domestic consumption of renewable electricity will rise less, (iii) imports of renewable electricity from foreign producers will rise less, and (iv) the demand for total REB and MEP support will rise less (compared to the initial improvement of the competitive position of renewable electricity for consumers).

Case 2: Setting and changing the renewable energy (RE_L) target

As noted, the Dutch government has set the renewable electricity (RE_L) target for the year 2010 at 9 percent of total electricity use, and for the year 2020 at 17 percent. For subsequent decades, this target may even be raised to higher levels. Given a certain level of total electricity use, setting or raising a RE_L target implies that the production of fossil electricity and, hence, CO_2 emission will decline. Given a certain quota of emission allowances, this means that the scarcity on the market for emission trading will diminish and, as a result, the price of an allowance will decrease.

A higher RE_L target has to be reached by improving the competitive position of renewable electricity. This may result from declining costs of generating renewable electricity (owing to technological breakthroughs) or from rising costs of producing fossil electricity (for instance, due to a more restrictive CO_2 quota). If not, the higher RE_L target has to be achieved by means of a higher level of support. Within the existing Dutch policy context, a higher level of support can be mainly reached by the following two options:

- *Raising the MEP feed-in subsidies on renewable electricity (Case 2a).* As the subsidy level to existing MEP producers is contractually fixed during the eligible period of ten years, this implies that only new domestic producers will be incentivised to respond to such a measure by increasing their generation of renewable electricity fed into the grid. As a result, the price of a green certificate will fall, but this fall will most likely not surpass the increase in the MEP subsidy. The final outcome will be that the overall revenue from generating a kWh of renewable electricity will increase for new producers, but decrease for existing producers, with a corresponding adjustment of their output, respectively.
- *Raising the ecotax benefit of renewable electricity (Case 2b).* Due to a higher ecotax benefit, the demand for green certificates will increase, leading to a higher certificate price. Depending on the supply and demand conditions on the green certificate market, however, the increase in the ecotax benefit may not be translated into a proportional increase in the price of a green certificate offered to eligible producers of renewable electricity. In this respect, a distinction has to be made between 'existing producers' and 'new producers' (where, in this case, 'existing producers' refers to generators who have already successfully applied for a MEP subsidy contract, whereas 'new producers' refers to all other generators of renewable electricity - both at home and abroad - who are eligible for receiving a green certificate, irrespective whether they are eligible for obtaining a MEP subsidy). For existing producers, the total level of REB and MEP support is contractually fixed. Hence, raising the ecotax benefit implies that the feed-in subsidy will be decreased proportionally. However, as the increase in the ecotax benefit may not be translated in a proportional increase in the price of a green certificate (or create more uncertainty on future price levels), existing producers may respond by reducing their output (depending on the flexibility and cost structure of their existing installations). On the other hand, new producers - both at home and abroad - will respond to the higher certificate price by increasing their output, regardless whether they are eligible for obtaining a MEP subsidy or not.

To conclude, as outlined above, the operational linkages and interactions between emissions trading and renewable energy policies in general, and between the markets for power, green certificates and emission allowances in particular, are quite intricate and sometimes complicated. Overall, however, there seem to be no major problems or conflicts between the operation of the EU ETS and the Dutch support policies for renewable electricity. On the contrary, the operation of the instruments seems to be mutually reinforcing in the sense that obtaining the operational target of one instrument enforces the achievement of the target of the other. The only problem might be the double or over-stimulation of existing MEP producers due to the interaction of the EU ETS and the Dutch system for supporting renewable electricity. Moreover, this (proposed) system has yet not been implemented and is still subject to both political discussion at home and the need to harmonise it with ongoing developments of similar policies elsewhere in the EU. Therefore, although quite new, the Dutch system for supporting renewable electricity may show some adjustments in the short and medium term. Hence, in Section 6.3 some policy options will be discussed, including the option to lift the formal separation between the markets for green certificates and emission allowances, notably with regard to the question whether these options result in an improved interaction between the EU ETS and the Dutch system of supporting renewable electricity.

6.2.3.2 The administration of the instruments

In general, there seem to be no major interaction issues with regard to the implementation and administration of the two instruments operating together. The overall responsibility and policy co-ordination of the two instruments rests primarily at the Ministry of Economic Affairs, whereas the practical implementation and administration is delegated to separate agencies such as the tax authority, the Green Certificate Body, the MEP authority and the Emission authority. Although the administrative demands of these agencies are significant, there seems to be no major overlap, redundancy or other problems in meeting these demands.

6.2.3.3 The timing of the instruments

The granting of MEP feed-in subsidies to an individual producer will be contractually fixed for a period of ten years which, depending on the initial year of granting the subsidy, may extend far beyond the second phase of the EU ETS and the first commitment period of the Kyoto Protocol. In general, this does not seem to be a problem for the MEP system, notably when it is assumed that the EU will continue to restrict its CO_2 emission beyond 2012. If not, the (allowance) price of these emissions will drop, resulting in a fall of fossil electricity prices on the wholesale market and, hence, fewer revenues per kWh of renewable electricity for producers with a fixed subsidy contract.

6.2.4 Evaluation of the coexistence scenario

Based on the evaluation criteria specified for the Interact project (see Box 4.1 Section 4.2.5), an assessment has been made of the interaction between the EU ETS and the Dutch system of supporting renewable electricity (see Table 6.4). This multi-criteria assessment includes an ad judgement of a ‘score’, ranking from 1 (‘bad performance’) to 9 (‘good performance’) for each criterion. Table 6.4 shows that the total score for the coexistence scenario of the proposed EU ETS and an unchanged renewables support system amounts to 40 points. As explained in Section 4.2.5, this total score is derived simply by summing the individual scores of each criterion. The scoring process is highly subjective and in practice, different stakeholder groups may both assign different scores and give different weightings to each criterion. Nevertheless, this scoring and the assessment of the coexistence scenario of the EU ETS and the renewables support system provides a useful starting point for the evaluation of some alternative policy options discussed in the next section.

6.3 Interaction under alternative policy options

6.3.1 Introduction

This section will discuss some alternative policy options with regard to the question whether these options result in an improved interaction between the EU ETS and the Dutch policies of supporting renewable electricity. These options include:

1. Reducing the double regulation of existing MEP producers.
2. Abolishing the REB support while raising the MEP support proportionally.
3. Introducing an obligatory quota system for renewable electricity.
4. Encouraging one-way trading between green certificates and emission allowances.

Table 6.4 *Multi-criteria assessment of the coexistence scenario of the EU ETS and an unchanged MEP and REB system of supporting renewable electricity*

Criteria	Relevant issues	Score
Environmental effectiveness	– The effectiveness of the EU ETS with regard to CO_2 mitigation by the participating sectors is primarily determined by the national emission quota of this scheme. As a result, the renewable electricity support system has no impact on the environmental effectiveness of the EU ETS nor on the national CO_2 emission accounts of the participating sectors (although it does influence their domestic CO_2 emissions and, hence, emissions trading by these sectors, as well as setting their emission quota). – The effectiveness with regard to the RE_L target will be improved due to the EU ETS, but still it remains uncertain whether the target will be met.	8
Economic efficiency	– The coexistence of the two instruments has an adverse effect on static CO_2 efficiency as the abatement costs of renewable electricity options are, in general, substantially higher than other options covered by the EU ETS. Moreover, this efficiency is further reduced by the double regulation (or over-stimulation) of existing MEP producers due to the coexistence of the two instruments. – The dynamic CO_2 efficiency of the two instruments operating together is probably high, notably owing to the renewable energy policies, as they encourage the development of sustainable, cost-saving technologies in the long term.	6
Administrative simplicity	– The administrative demands of both instruments are significant. Their coexistence, however, does not really complicate or enhance these demands.	6
Social equity	– The interaction of both instruments does not seem to have a significant impact on overall social equity, although it may be adversely affected by the double regulation (i.e. over-stimulation) of existing MEP producers due to the coexistence of the instruments.	6
Industrial competitiveness	– The interaction of the instruments has a mutually reinforcing impact on improving the competitive position of renewable electricity producers compared to fossil electricity producers.	7
Political acceptability	– Despite the static economic inefficiencies, the political acceptability of the two instruments operating together is high owing to the dynamic efficiency effects of renewable electricity (i.e. reducing abatement cost in the long run) and its beneficial effects on other policy objectives besides CO_2 mitigation.	7
Total		40

6.3.2 Option 1: Reducing the double regulation of existing MEP producers

Definition and rationale of Option 1

As outlined in Section 6.2.3, the interaction between the EU ETS and the Dutch policies of supporting renewable electricity leads to a situation of 'double regulation' of existing MEP producers, i.e. producers of renewable electricity who have already successfully applied for a feed-in subsidy contract. This double regulation may lead to a significant over-stimulation of these producers, notably when the price of an emission allowance is high and results in a significant increase in the wholesale electricity price offered to these producers.[83]

As remarked before, the price of an emission allowance will most likely be low during the first phase of the EU ETS, but may rise to more significant levels during the second phase, depending on actual supply and demand conditions on the market of emission allowances by that time. Policy makers may consider the issue of double regulation as hardly significant or politically acceptable. However, when the allowance price and the resulting wholesale electricity price will be significantly higher than expected, policy makers may become more interested in avoiding the double regulation and over-stimulation of existing MEP producers, in avoiding the economic inefficiencies involved, and in saving public resources to support these producers.

A 'simple' option to reduce the double regulation of existing MEP producers is to pay more explicit attention to including the impact of the EU ETS on wholesale electricity prices when determining the level of MEP subsidies to new applicants. Although it will not be possible to predict this impact exactly, it may result in a better performance with regard to the issue of double regulation of existing MEP producers rather than completely ignoring this potential impact.

A more 'complicated' option to reduce the double regulation of existing MEP producers is to adjust the MEP subsidy retrospectively to the average wholesale electricity price actually received over the eligible subsidy period of ten years. This can be achieved, for instance, by including a clause in the MEP contract that a part of the MEP subsidy has to be reimbursed if the average wholesale electricity price surpasses a certain threshold level (or that an additional subsidy will be paid if the average wholesale electricity price drops below a certain threshold level). This threshold level is related to the assumed wholesale electricity price used to calculate the MEP-subsidy level laid down in the contract, say 0.3 ct/kWh above (or below) the assumed wholesale price of 2.7 ct/kWh. If the average wholesale electricity price turns out to be higher than the threshold level of 3.0 ct/kWh (or lower than 2.4 ct/kWh), then the difference between this price and the threshold level has to be reimbursed (will be paid additionally) at the end of the subsidy period.

Evaluation of Option 1

The major disadvantage of the more 'complicated' option discussed above is that it enhances, to some extent, the administrative demands of the MEP subsidy system and that this system becomes indeed (slightly) more complicated. On the other hand, this option may result in avoiding significant economic inefficiencies and budget savings if the average wholesale electricity price becomes substantially higher than assumed when calculating the MEP subsidy levels. Moreover, although producers will disfavour the possible reimbursement of MEP subsidies, they still benefit to some extent, i.e. 0.3 ct/kWh, from higher average wholesale prices than assumed, while they also benefit from more certainty and additional subsidies in case the average wholesale price drops below the minimum threshold level.

[83] As noted, if restrictive CO_2 policies are lifted beyond 2012, the reserve situation may occur in which the price of an emission allowance drops to zero, resulting in a significant (unexpected) fall of the wholesale electricity price offered to existing MEP producers. However, as this case seems less likely than the case of rising wholesale electricity prices up to 2012, the latter case is discussed in the main text of the present section.

Table 6.5 provides a multi-criteria assessment of this (i.e. the more complicated) option in terms of the *difference* between this option and the coexistence scenario (Table 6.4). It can be observed that the total score of this option is 41 points, i.e. slightly better than the performance of the coexistence scenario. It should be reiterated, however, that this assessment and scoring is to some extent subjective, and that the discussion of the coexistence scenario and the alternative policy options is primarily intended to encourage the exploration of the interactions between the EU ETS and existing national energy and climate policies as well as to stimulate the thinking whether, and how, these interactions should or could be improved.

Table 6.5 *Multi-criteria assessment of Option 1, i.e. reducing the double regulation of existing MEP producers: changes compared to coexistence scenario*

Criteria	Relevant issues[1]	Score
Environmental effectiveness	– *No change*: CO_2 and RE_L target remain the same	8
Economic efficiency	– *Improves*: no over-stimulation of existing MEP producers.	7
Administrative simplicity	– *Worse*: enhancement of administrative demands.	6
Social equity	– *Possibly slightly better*, due to removing over-stimulation of existing MEP producers.	6
Industrial competitiveness	– *Some mixed changes*: the competitive position of existing MEP producers deteriorates, while the position of other renewable electricity producers improves.	7
Political acceptability	– *Better*, notably when the increase in wholesale electricity prices due to the EU ETS is high, as this option leads to (i) a better economic efficiency, (ii) a slight improvement of social equity, and (iii) less public resources to support existing producers.	7
Total		41

1 Based on the assumption that the actual wholesale price offered to existing MEP producers will, on average, be higher than the supposed wholesale price used to calculate the MEP subsidies to these producers. If the actual price is, on average, lower the reversed changes in effects will occur.

6.3.3 Option 2: Abolishing the REB support while raising the MEP support

Definition and rationale of Option 2

During the discussion of the MEP in the Lower House (December 2002), a majority of Parliament supported the idea of abolishing the ecotax benefit on renewable electricity, notably for biomass, while increasing the MEP subsidy proportionally. The major motivation behind this idea is to further encourage the domestic production of renewable electricity and to stop the outflow of fiscal resources to old, foreign installations for generating renewable electricity. Although the government has expressed some reservations to this idea, the Lower House has accepted a motion in which the government is requested to investigate this issue and make proposals before the 1st of July 2003. Below, this issue is briefly evaluated within the context of the interaction between the EU ETS and the Dutch system of supporting renewable electricity. It is assumed that abolishing the REB support will be compensated by raising the MEP support per kWh proportionally.[84]

[84] In September 2003, the Dutch government has indeed proposed to abolish the REB support to renewable electricity and raise the MEP subsidies accordingly, although in a phased manner over a certain period. At the time of finalising this report (September 2003), this proposal has not yet been discussed and accepted by Parliament.

Evaluation of Option 2

The major advantages of this option are that (i) it improves administrative simplicity, (ii) it stops the outflow of REB resources to foreign installations, and (iii) it encourages domestic production of renewable electricity as it offers producers more certainty with regard to the total level of support they receive directly. On the other hand, the major disadvantages of this option are that:

- It may have an adverse effect on the competition and development of the liberalised, voluntary retail market for renewable electricity in the Netherlands. The ecotax benefit on renewable electricity used to offer an attractive marketing margin to new entrants (suppliers) on this market, resulting in fierce competition, intensive marketing campaigns and, hence, in a strong development of a rapidly growing, competitive market. Abolishing the ecotax benefit may reduce the number of (new) suppliers, with an adverse effect on the development of the market for renewable electricity.
- It will increase economic inefficiencies as it encourages domestic production that, in general, is less efficient and, hence, demands higher levels of support per kWh than the imports of renewable electricity. Therefore, depending on the extent to which imports are replaced by domestic production, the demand for total support budgets may increase.
- It will be harder or more uncertain to achieve the RE_L target. In the short and medium term, it may be hard to replace imports fully by additional domestic production. Moreover, in the medium to long run, highly subsidised domestic production of renewable electricity may even flow abroad if, depending on the harmonisation and liberalisation of EU renewable electricity policies, Dutch producers may be able to sell their green certificates abroad at an attractive price. In order to avoid such outflows and, hence, to meet the RE_L (consumption) target, it may even be necessary to raise the ecotax benefit rather than abolishing it.

Table 6.6 presents a multi-criteria assessment of this option, i.e. to abolish the REB support and to raise the MEP support proportionally, in terms of the *difference* between this option and the coexistence scenario (Table 6.4). The total score of this option is 38 compared to 40 for the coexistence scenario. Hence, from an interaction point of view, this option seems to be less attractive than the coexistence scenario.

Table 6.6 *Multi-criteria assessment of Option 2, i.e. abolishing the REB support while raising the MEP support proportionally: changes compared to coexistence scenario*

Criteria	Relevant issues	Score
Environmental effectiveness	– *Worse*: CO_2 quota remains the same, but it will be harder and more uncertain to achieve the RE_L target.	7
Economic efficiency	– *Worse*: relatively efficient options of importing renewable electricity will be replaced by less efficient options of domestic production.	5
Administrative simplicity	– *Better*: the administration of one support level is removed.	7
Social equity	– Probably *no significant change*, but effects are hard to assess.	6
Industrial competitiveness	– *Mixed effects*: the competitive position of domestic producers of renewable electricity improves, but the number of (new) suppliers of renewable electricity may decline with adverse effects on competition and market development.	7
Political acceptability	– *Mixed effects*: policy makers will favour (i) the stop of support resources flowing abroad, and (ii) the encouragement of domestic production, but they will disfavour (a) the increasing economic efficiencies, (b) the potential higher demands for total support budgets, (c) the fact that it may be harder and more uncertain to reach the RE_L target, and (d) the risk that Dutch green certificates (i.e. highly subsidised, domestic production of renewable electricity) may flow abroad if EU renewable electricity policies become more harmonised and liberalised.	6
Total		38

6.3.4 Option 3: Introducing an obligatory quota system

Definition and rationale of Option 3

As outlined in Section 6.1 and Appendix D, Dutch policies to promote renewable electricity include a combination of providing feed-in subsidies to stimulate domestic production and a voluntary approach to encourage domestic consumption, based on granting an ecotax benefit, with a facilitating role for a system of tradable green certificates. The current trend in other EU countries, however, seems to be to rely either on a system of feed-in tariffs or on an obligatory quota system for consumers or suppliers, facilitated by a scheme of (domestically) tradable green certificates (van Sambeek, et al., 2003). Whereas the previous policy option resembles the feed-in approach, the present option considers the performance of introducing such an obligatory quota system in the Netherlands within the context of the EU ETS.

In an obligatory quota system, all consumers or - preferably - their suppliers are obliged to buy a certain share of electricity generated from renewable sources. They can meet this periodical obligation by buying an amount of green certificates from producers of renewable electricity corresponding to the quota and surrendering this amount to the authorities concerned.[85]

Evaluation of Option 3

A major advantage of an obligatory quota system is that it may be a very effective instrument to reach a specified RE_L target, depending on factors such as (i) the realistic character or feasibility of the target, (ii) the certainty or continuity of the system, and (iii) the penalty or compliance conditions of the system. Moreover, the opportunity to meet the obligation by trading green certificates enhances the efficiency of the system as the resulting competition among producers of renewable electricity will lead to substantial cost reductions (van Sambeek, et al., 2003).

A potential problem of a green certificate system is that it may encourage only mature, least-cost renewable technologies. This problem can be solved by differentiating the quota for different types of technology, but this will reduce the efficiency of the system. Another problem is that the price of a green certificate is uncertain and may fluctuate significantly, which may have an adverse effect on investments by producers of renewable electricity. To some extent, this problem can be alleviated by long-term electricity supply contracts and mechanisms for banking and borrowing, floor and ceiling prices, and futures (Meyer, 2003).

In the present Dutch policy context, the major obstacle to introducing an obligatory quota system is that it lacks political acceptability. Present policy makers prefer voluntary measures above regulations and obligations. Moreover, an obligatory quota system is primarily aimed at enlarging the demand for renewable energy, while nowadays the major obstacles to expanding renewable electricity refer to the supply side, notably to spatial planning and other procedural constraints (Ministry of Economic Affairs, 2002d). In addition, Dutch policy makers have only recently decided to introduce a new system of supporting renewable electricity that is primarily based on granting feed-in subsidies. Hence, it is unlikely that these policy makers will opt for an obligatory quota system in the short run.

In the medium to long term, however, Dutch policy makers may become more supportive of an obligatory quota system when it is facilitated by a standardised scheme of tradable green certificates throughout the EU. The upcoming implementation by the end of 2003 of a system of ‘guarantees of origin’ for renewable electricity is a major step in this direction (van Sambeek, et al., 2003). Compared to a voluntary demand system, an obligatory quota system does not only seem to fit better in such a harmonised EU approach, but is also most likely more effective and less costly.

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[85] See Schaeffer, et al. (1999) for a more extensive discussion of a green certificate system based on an obligatory quota for consumers, suppliers and producers of renewable electricity.

Table 6.7 provides a multi-criteria assessment of Option 3, i.e. introducing an obligatory system of renewable electricity, in terms of the *difference* between this option and the coexistence scenario (Table 6.4). It shows that the overall score of this option amounts to 39, i.e. slightly below the performance of the coexistence scenario. Two qualifications, however, should be added. Firstly, the performance of this option is hard to determine as it depends highly on some critical design variables of a mandatory quota/green certificate system such as the differentiation of the quota per generation technology or the opportunity of free international certificate trading. Secondly, the total score of Option 3 is based on an assessment of the political acceptability of this option in the short term (which is worse than under the coexistence scenario). However, as explained above, the political acceptability and, hence, the total scoring of this option may become better than the coexistence scenario when it is facilitated by a harmonised scheme of tradable green certificates throughout the EU.

Table 6.7 *Multi-criteria assessment of Option 3, i.e. introducing an obligatory quota system for consumers/suppliers of renewable electricity: changes compared to coexistence scenario*

Criteria	Relevant issues	Score
Environmental effectiveness	– *May improve*: CO_2 quota remains the same, but reaching the RE_L target may become more certain if the RE_L quota is set at a realistic level.	8
Economic efficiency	– *May improve*: depending on the differentiation of the quota per generation technology and the opportunity of free international certificate trading, inefficient renewable electricity options may be replaced by more efficient options.	7
Administration simplicity	– *Better*: administrative demands are most likely less for an obligatory quota system than the present MEP/REB system.	7
Social equity	– Probably *no significant change*, but effects are hard to assess.	6
Industrial competitiveness	– *May deteriorate*: the competitive position of domestic producers of renewable electricity may deteriorate, depending on the differentiation of the quota per generation technology and the opportunity of free international certificate trading.	6
Political acceptability	– *Worse*: in the short run, policy makers will prefer the present voluntary system (but probably, *better* in the medium or long term when an obligatory quota system is facilitated by a harmonised scheme of tradable green certificates throughout the EU).	5
Total		39

6.3.5 Option 4: Encouraging one-way trading between green certificates and emissions allowances

Definition and rationale of Option 4

As indicated in Section 6.2.3, the Directive on the EU ETS has opted for a formal separation between the markets for green certificates and emission allowances, i.e. green certificates cannot be converted into emission allowances, and subsequently, traded on the market for emission allowances (or vice versa). Hence, in such a situation, each policy instrument serves to achieve a separate policy target in the most cost-effective way, i.e. tradable green certificates are used to reach a certain renewable energy target most efficiently, while tradable emission allowances are used to achieve a certain emission target at the lowest social costs.

It is sometimes suggested that the flexibility of complying with both the renewable energy target and the emission target could be improved by allowing direct, two-way trading between green certificates and emissions allowances. Such a full fungibility between these commodities, however, is usually rejected as it ignores the non-CO_2 benefits of deploying renewable energy options. Given the fact that CO_2 mitigation through renewables deployment is generally more costly that alternative options, the outcome would be limited investments in renewables and, hence, an undermining of the non-CO_2 objectives of the renewable energy policy (Smith, 2002; Sorrell, 2003).

An alternative approach would be to allow one-way fungibility, i.e. converting green certificates into allowances and trading them on the ETS market (while sales in the other direction, i.e. from emission allowances into green certificates, are not permitted). This approach finds some supporters in the UK where it is currently allowed to convert 'renewable obligation certificates' (ROCs) into carbon allowances and trade these allowances on the recently introduced UK ETS market (Calder and Hough, 2001; Smith, 2002; Sorrell, 2003).[86] Hence, it may be useful to evaluate this option of one-way trading between green certificates and emission allowances within the context of the proposed EU ETS and the existing system of green certificates in the Netherlands.

Evaluation of Option 4
The primary motivation for this option provided by its supporters is to encourage over-compliance with the renewable energy target as it would create an additional source of banking and income opportunities for renewable energy producers/suppliers (Smith, 2002; Sorrell, 2003). This motivation, however, is hardly convincing, while a variety of counter-arguments to this option could be forwarded.

Firstly, encouraging over-compliance with the renewable energy target is a curious, unreal motivation for allowing one-way trading between green certificates and emission allowance. It is strange to first set an official target and, subsequently, to encourage over-compliance by introducing a dubious instrument. Over-compliance could better be addressed by other, more sensible means, notably (i) by increasing the target itself (and the buyout or maximum price of a green certificate), (ii) by allowing more adequate banking rules within the green certificate system itself, or (iii) by promoting linkages between green certificate systems of different countries. Moreover, ex ante, it seems highly unlikely that a renewable energy producer/supplier will be encouraged to over-comply by allowing one-way trading as, in general, the marginal costs of generating additional green certificates will be high while the revenues from selling emission allowances will be low. Ex post, over-compliance may occur unintentionally, leading to falling, non-remunerative prices for green certificates, but this problem could be addressed most sensibly by adequate banking rules.

Secondly, allowing one way trading raises *fungibility problems* as it overlooks the fact that certificates and allowances are different commodities, representing different attributes and different social values. A green certificate is a unique proof that a specific amount of renewable electricity has been generated under the conditions specified by the standard information on the certificate (Jansen, 2003).[87] An emission allowance, on the other hand, grants a prescribed installation a use right to emit a tonne of a specified pollutant into the atmosphere. These definitions already indicate that certificates and allowances are different commodities, which are not entirely fungible (Smith, 2002). Moreover, once separate markets have been created for these commodities, they represent different attributes and different social values. The price of a CO_2 allowance represents the social value of a certain amount of CO_2 mitigation, while the price of a green certificate represents the social value of the bundle of additional attributes besides CO_2 mitigation associated with a certain quantity of renewable electricity.

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86 It is not clear, however, whether such one-way trading from the UK ROC market into the UK ETS market has indeed occurred since the beginning of the UK ETS in early 2002.

87 In line with this definition, the EU Directive on renewable electricity (CEC, 2001b) speaks rightly of 'guarantees of origin', i.e. certificates in order to ensure that the origin of electricity produced from renewable energy sources can be guaranteed as such. These 'guarantees of origin' have to be introduced in every Member State by the end of 2003, including those Member States that do not yet have a comparable system of green certificates.

This implies that once a separated market is operational for carbon trading the value of CO_2 mitigation is not included in the price of a green certificate (Schaeffer, 2001; Boots, 2001).[88]

Thirdly, one-way trading raises *conversion problems* as the commodities are expressed in different units of measurement. An emission allowance is usually denominated in metric tonnes of CO_2 equivalent, while a green certificate is generally expressed in MWhs of generated electricity. It is, therefore, necessary to apply a conversion rate. The problem is that this conversion rate is determined by the emission factor of power production that is displaced by the generation of renewable electricity. Hence, this rate varies widely, depending on time, location and type of technology replaced. This means that the conversion rate will either have to be calculated separately for each project, or be defined as a fixed average rate (Natsource, 2002). The use of a fixed rate may create problems of discrepancy between the actual and claimed emission reductions. Moreover, a fixed rate will become increasingly inaccurate over time, unless it is regularly updated (Sorrell, 2003). Finally, allowing one-way trading between (national) green certificates systems and the EU ETS raises the question whether one uniform conversion factor has to be used for all Member States or that it has to be differentiated by country of origin.[89]

Fourthly, one-way fungibility between certificates and allowances raises *emissions trading problems* such as confusion and disputes on the ownership of emission rights, double counting or double crediting, thereby undermining the environmental effectiveness and integrity of the EU ETS.[90] In the case of a downstream trading scheme covering direct emissions, such as the EU ETS, the ownership of the allowances is allocated to those organisations that have direct control over emissions (i.e. power generators and other, direct users of fossil fuel). Allowing one-way fungibility would lead to confusion and disputes on the ownership of emission rights as it would allocate emission allowances to generators of renewable electricity who do not have direct control over emissions. It would also lead to problems of double counting and double crediting in the sense that a single abatement action would free up two sets of carbon allowances or, to put it slightly different, that the avoided emissions of such an action would be counted and credited twice within two different schemes, i.e. the EU ETS and the green certificate scheme. For instance, if a power producer invests in a renewable electricity project, it would free up emission allowances in the EU ETS, while simultaneously it would generate green certificates that could be converted to emission allowances and traded in the EU ETS. Similar problems would arise if the power producer and the investor in renewable electricity would be two different persons, or if the investment in renewable electricity does not actually free up emission allowances in the EU ETS (for instance when the renewable electricity serves to replace nuclear energy or to meet rising, additional demand for electricity without actually reducing the total supply of fossil electricity). In all these cases, the number of emission allowances within the EU ETS would increase, thereby undermining the environmental effectiveness and integrity of the EU ETS.

Fifthly, encouraging one-way trading between green certificates and emission allowances could lead to problems of *unjustified double rewarding* of renewable electricity producers. Suppose that the CO_2 target is stringent and leads to a high allowance price, which is translated in a high electricity price on the wholesale spot market. Owing to this high electricity price, it will be much easier for producers of renewable electricity to over-comply with the renewable electricity target, resulting in low prices for green certificates (depending on the opportunities for bank-

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88 The fact that the CO_2 value is not included in the price of a green certificate is reflected by the fact that a more stringent CO_2 target leads to a higher price of an emission allowance on the carbon market but not to a higher price of a green certificate (actually, the price of a green certificate declines if the carbon price is translated into a higher electricity price on the spot market),

89 In the UK, an emission factor of 0.43 tCO_2/MWh is used to convert green certificates into emission allowances, i.e. 100 green certificates of 1 MWh are equal to 43 emission allowances of 1 tonne CO_2. In other EU countries, however, this (average) emission/conversion factor may vary widely, depending on the fossil fuel mix of generating electricity, the incidence of co-generation, etc.

90 Issues such as disputes over the ownership and control of emissions, double counting and double crediting are extensively discussed by Sorrell (2002b).

ing). In response, these producers will convert their surplus of cheap green certificates to emission allowances, and sell them at high prices in the EU ETS. The final result will be that producers of renewable electricity are doubly rewarded, i.e. on the one hand they receive a high electricity price due to a high allowance price in the EU ETS and, on the other hand, they can easily over-comply with their target and trade the surplus of green certificates at high allowance prices in the EU ETS. More generally, producers of renewable electricity become more competitive owing to the operation of environmental markets of emission allowances and green certificates (besides other means of support). Hence, there is no reason why they should be additionally rewarded by encouraging one-way trading between green certificates and emission allowances.

Finally, the (general) discussion above refers primarily to the option of allowing one-way fungibility between emission allowances and green certificates, based on an obligatory quota system such as in the UK. In principle, however, this could also be introduced in other countries with other green certificate systems. For instance, in the Netherlands, where green certificates are based on a voluntary approach to meet the renewable electricity target, this option could be introduced to prevent low prices of green certificates on the market or to stop the outflow of REB resources once the official target has been met. Such an approach, however, would be faced by similar problems and objections outlined above. Based on these problems and objections, Table 6.8 provides a multi-criteria assessment of the option of allowing one-way trading between Dutch green certificates and EU emission allowances, in terms of the *difference* between this option and the coexistence scenario (Table 6.4). It can be observed from Table 6.8 that the total score of this option amount to 30 points only, i.e. far below the performance of the coexistence scenario (40 points). Therefore, this option cannot be recommended to improve the interaction between the EU ETS and Dutch renewable energy policies.

Table 6.8 *Multi-criteria assessment of Option 4, i.e. encouraging one-way trading between green certificates to emission allowances: changes compared to coexistence scenario*

Criteria	Relevant issues	Score
Environmental effectiveness	– *Worse*: the RE_L target will be overcomplied, while the CO_2 quota will be blurred.	5
Economic efficiency	– *Worse*: the deployment of expensive, less efficient renewable energy/CO_2 abatement options will be encouraged. Moreover, a higher incidence of double regulation will occur.	5
Administrative simplicity	– *Worse*: the option will lead to double crediting, confusion, double counting, and to higher administrative demands.	5
Social equity	– Probably *no significant change*, but effects are hard to assess.	6
Industrial competitiveness	– On balance, *no significant change*: the competitiveness of renewable energy producers may improve, but the overall industrial competitiveness may deteriorate due to the loss of efficiency.	7
Political acceptability	– *Worse*: most policy makers will strongly disfavour this option because its presumed potential benefits can be better met by other measures, while it has clear negative effects: less environmental effectiveness, more inefficiencies, more confusion, higher administrative demands, etc.	2
Total		30

To conclude, allowing one-way trading between green certificates and emission allowances does not serve any real purpose that could be achieved better by other, more sensible means, while it creates a variety of problems, notably double crediting, which undermines the environmental effectiveness and integrity of the EU ETS. Moreover, the present study has shown that there will already be a positive, mutually reinforcing interaction between the objectives of the EU ETS and renewable energy policies in general and between the operation of the markets for emission allowances and green certificates in particular, despite (or perhaps, owing to) the formal separation of these markets proposed by the Directive on the EU ETS. Therefore, the option of allowing one-way trading should be rejected, while the option of the EU ETS Directive to introduce a formal separation between the markets for green certificates and emission allowances should be supported.

6.4 Summary of major findings and policy implications

The scope of the instruments

There is no overlap or interaction between the *direct* target groups of the EU ETS and the Dutch renewable support system. The EU ETS directly targets large fossil fuel users, including electricity generators, while the direct target groups of the Dutch renewable support system comprise, on the one hand, renewable electricity producers (through both the MEP and TGCs) and, on the other hand, renewable electricity consumers (through the ecotax benefit). However, the *indirect* interactions between the target groups of the EU ETS and the Dutch renewable support system are manifold, significant and complex.

The objectives of the instruments

Although the EU ETS and the Dutch support system for renewable electricity are focused on different target groups, there is a major overlap or synergy between the objectives of these instruments. The EU ETS is primarily aimed at reducing CO_2 emissions, thereby indirectly encouraging the saving of fossil fuel use in general and the switch to renewable energy in particular. On the other hand, the Dutch support system for renewable electricity is primarily aimed at promoting the use of renewable electricity.

Nevertheless, once the EU ETS becomes operational, renewable energy policies could, in principle, be abolished from a static CO_2 efficiency point of view as the EU ETS will realise the CO_2 target of the participating sectors at the lowest costs. However, there are other reasons to justify renewable energy policies within the context of the EU ETS. Perhaps the most important argument for supporting renewable technologies within the context of CO_2 mitigation is that a widespread diffusion of these technologies may result in a substantial fall in the costs of renewable energy and, hence, in meeting major cutbacks in CO_2 emissions at affordable costs (i.e. the so-called dynamic CO_2 efficiency argument).

The operation of the instruments

Although renewable energy policies should be accounted for when setting national quota under the EU ETS, the Directive opts for a formal separation between the markets for green certificates and emission allowances, i.e. green certificates cannot be converted to emission allowances (or vice versa) and, subsequently, traded among each other. Nevertheless, despite this formal separation between the markets for green certificates and emission allowances, in practice there will be all kinds of linkages and interactions between these markets, running through the power market. Based on a detailed analysis of the Dutch situation, it is concluded that the operational linkages and interactions between emissions trading and renewable energy policies in general, and between the markets for power, green certificates and emission allowances in particular, are quite intricate and sometimes complicated. Overall, however, there seem to be no major problems or conflicts between the operation of the EU ETS and the Dutch support policies for renewable electricity. On the contrary, the operation of the instruments seems to be mutually reinforcing in the sense that obtaining the operational target of one instrument enforces the achievement of the target of the other. The only problem might be the double or over-stimulation of existing MEP-subsidy receiving producers due to the interaction of the EU ETS and the Dutch system for supporting renewable electricity.

Policy options

Nevertheless, the recently introduced renewables support system in the Netherlands is still subject to both political discussion at home and the need to harmonise it with ongoing developments of similar policies elsewhere in the EU. Therefore, four alternative policy options have been considered with regard to the question whether these options result in an improved interaction between the EU ETS and the Dutch policies of supporting renewable electricity. These options include:

1. reducing the double regulation of existing MEP producers,
2. abolishing the REB support while raising the MEP support proportionally,
3. introducing an obligatory quota system for renewable electricity,
4. encouraging one-way trading between green certificates and emission allowances.

The overall performance of Options 1-3 do not deviate significantly from the multi-criteria assessment of the coexistence scenario (i.e. the baseline option of the EU ETS and the Dutch renewable electricity support system in their present form). The performance of Option 4, however, is quite poor. Allowing one-way trading between green certificates and emission allowances does not serve any real purpose that could be achieved better by other, more sensible means, while it creates a variety of problems, notably double crediting, which undermines the environmental effectiveness and integrity of the EU ETS. Moreover, the present study has shown that there will already be a positive, mutually reinforcing interaction between the objectives of the EU ETS and renewable energy policies in general and between the operation of the markets for emission allowances and green certificates in particular, despite (or perhaps, owing to) the formal separation of these markets proposed by the Directive on the EU ETS. Therefore, the option of allowing one-way trading should be rejected, while the option of the EU ETS Directive to introduce a formal separation between the markets for green certificates and emission allowances should be supported.

Policy recommendations

- When determining the MEP feed-in subsidies to renewable electricity producers for a period of 10 years, the potential impact of the EU ETS on electricity prices should be explicitly considered.
- The market for green certificates and emission allowances should be formally separated.

APPENDIX A THE BENCHMARKING COVENANT

A.1 Introduction

The Energy Efficiency Benchmarking Covenant is one of the key instruments of current climate policy in the Netherlands. The Covenant is a voluntary agreement signed by the Dutch government and the energy-intensive industry, including the electricity production sector. The central goal of the Benchmarking Covenant (BC) is to reduce greenhouse gas emissions from energy-intensive industries without compromising the international competitiveness of these industries. According to the BC, participating industries are required to become part of the top-of-the-world in terms of energy efficiency as soon as possible but no later than 2012. In return, the government will refrain from implementing additional specific measures aimed at further reducing energy use or CO_2 emissions by these industries.

A.2 Participants

On behalf of the government, the covenant was signed in July 1999 by (i) the Ministry of Economic Affairs (EZ), (ii) the Ministry of Housing, Spatial Planning and the Environment (VROM), and (iii) the Inter-Provincial Consultative Forum (IPO), representing the provincial authorities responsible for issuing environmental licenses to individual installations. On the other hand, signatories on behalf of the energy-intensive industry included (iv) the Confederation of Netherlands Industries and Employers (VNO-NCW), and (v) several branch organisations from various industrial sectors such as the chemical industry, the iron and steel sector, the non-ferrous industry, the electricity producers, the petroleum industry and the manufacturers of paper and cardboard.

Companies located in the Netherlands can join the covenant by means of a Declaration of Participation, provided they operate individual installations with an energy consumption of at least 0.5 Peta Joules per year. For companies with an energy consumption of less than 0.5 PJ per year, a second round of Long-Term Agreements (LTA-2) on energy efficiency has been reached. However, the Covenant does not completely exclude the possibility for companies below the 0.5 PJ threshold to join in. These companies may participate upon approval from the Benchmarking Commission, based on a motivation of the effectiveness of joining the Covenant to achieve CO_2 emission reductions and the unconditional acceptance of all obligations pertaining to the Covenant.

In addition to the participating companies that are responsible for achieving the world top in energy efficiency, other participating institutions and their role in the Benchmarking Covenant include:

- *Benchmarking Committee*. This Committee is responsible for the overall implementation of the Covenant. It is composed of representatives of all the participating parties. The Committee discusses a wide range of general bottlenecks, monitors the progress of the Covenant and reports to the responsible ministers.
- *Benchmarking Verification Bureau.* This Bureau is an independent body that is responsible for the verification of the implementation of the Covenant.
- *Industry organisations.* VNO-NCW and the branch organisations have a facilitary role in the implementation of the Covenant. They provide information to their members and are a liaison with the government on behalf of their members.

- *National government.* The Dutch Government commits itself not to impose additional CO_2 emission mitigation policy measures on the participants to the Covenant. Moreover, the Ministry of Economic Affairs and the Ministry of Housing, Spatial Planning and Environment carry the costs of establishing the Covenant, as well as the costs of the Verification Bureau and the Benchmarking Committee.
- *Provincial government.* In most cases, the provinces have authority on environmental licensing to the companies that participate in the Covenant. The role of the provincial environmental authorities under the Covenant consists of the evaluation of the Energy Efficiency Plans (EEP) of the participating companies to reach the world top in energy efficiency. After approval of the EEP, the provincial environmental authorities formalise the plan by incorporating it in the environmental license for a specific site.
- *Municipal government.* When the municipality is the appropriate environmental authority to grant a license to a firm or site that wants to join the Covenant, the municipality must also accede to the Covenant. After approval of the EEP, the municipal environmental authority incorporates the EEP in the environmental license.

A.3 Implementation of the Benchmarking Covenant

At the installation level, the implementation of the Benchmarking Covenant implies the following three major steps:

1. determining the world top in energy efficiency and the distance to achieving this benchmark,
2. drafting of an Energy Efficiency Plan (EEP), including a schedule for energy saving investments,
3. monitoring and reporting to the Benchmarking Commission.

A.3.1 Defining the benchmark

The process of benchmarking starts with a meeting between the company, the environmental authorities and the Verification Bureau to agree on the planning and procedures to be followed throughout the three steps of the benchmarking process. With regard to the first step, i.e. determining the benchmark, there are basically two approaches:

1. *Region method*: taking the average energy efficiency of the best region in de world.
2. *Deciel method*: taking the best 10 percent of the global installations, excluding those in the Netherlands.

The region method has the practical advantage that it is usually known what the most efficient region is. Thus, when using this method it is not necessary to involve the whole world in the benchmarking. Considering that the average of the region is taken, more efficient installations exist within the chosen region and a benchmarked company will not be part of the world top in an absolute sense. Using the deciel method an installation has to be at least as efficient as the least efficient installation of the top 10% in its sector or branch. The deciel method requires more extensive research and is more applicable if the most efficient processes are more likely to be spread out over the world. The top 10% target can be stretched to a higher percentage if the company can demonstrate that such a higher percentage is equivalent to the outcome of the region method for that company (KPMG, 2000). A proposal to adopt a higher percentage must be submitted to the Benchmarking Commission, which decides on the proposal after consulting with the Verification Bureau.

For very specific or unique processes it may not always be possible to establish a benchmark. Moreover, foreign companies may be reluctant to co-operate in the benchmark investigation. In such cases a best practice example can be used. The benchmark is then defined as the energy efficiency rate of the best process installation in operation in the world, minus 10%. Again, a higher percentage reduction than 10% is possible if the company can prove that this is in line with the application of the region method, and subject to approval from the Benchmarking Commission and the Verification Bureau (KPMG, 2000).

In case a best practice example can not even be found, the benchmark will be defined on the basis of an investigation. In this investigation, an external consultant makes an assessment of the potential for energy efficiency improvements for specific parts of a plant. The investigation is mostly used for ancillary processes, so that in combination with other benchmarking methods on the main installation a complete picture of the achievable energy efficiency improvements is provided (KPMG, 2000).

When defining the international benchmark, the anticipated autonomous energy efficiency improvements up to 2012 will also be taken into account. Moreover, the world top must be redefined every four years. Accordingly, the distance from the world top has to be re-established every four years by means of external consultants. The Verification Bureau verifies the qualifications of the consultant and the results of the benchmarking research in accordance with the Protocol for Establishing the World Top (Annex 2 to the Covenant).

A.3.2 Drafting and implementing the Energy Efficiency Plan

A company must draw up an Energy Efficiency Plan (EEP) for each separate installation that it owns or operates. In the EEP it should be indicated for each process installation how and within what timeframe the world top in energy efficiency will be reached. The drafting of the EEP takes place after co-ordination with the appropriate environmental authorities. Once the EEP is completed the environmental authorities will evaluate the energy efficiency plan. After approval the EEP will be formalised into the environmental license. In accordance with the re-establishment of the benchmark every four years, the EEP must be reviewed every four years as well.

Contents of the Energy Efficiency Plan

The Protocol Energy Efficiency Plan details which elements need to be included in the EEP, notably:

- measures that will be taken,
- anticipated improvement of energy efficiency and effects on CO_2 emissions,
- energy balance of the benchmarked processes,
- effects of the energy efficiency measures on other environmental concerns,
- alternative measures that have been considered,
- time planning, including a time target for reaching the benchmark,
- method of monitoring and reporting.

Phasing of investments

In the Energy Efficiency Plan, a company defines the investments necessary to achieve its benchmark. Article 8 of the Covenant deals with the phasing of these investments. As a general rule investments should be made as fast as reasonably achievable, taking into account the depreciation of previous investments, other investment plans, production stops, other environmental measures, technological developments and available means. More specifically, the Covenant specifies the following phasing of investments and other measures to reach the world top in energy efficiency (Benchmarking Committee, 1999):

1. If the gap with the best international standard can be bridged through cost-effective measures, these measures shall be taken as soon as possible, but in any event by 31 December 2005. 'Cost-effective measures' are deemed to be all measures with an internal rate of return of 15 percent after tax (Art. 8.2).

2. If the available cost-effective measures are not sufficient to bridge the gap with the best international standard, less cost-effective measures must be taken as soon as possible, but no later than in the year 2008, in order to realise the best international standard. 'Less cost-effective measures' are deemed to be measures that do not meet the minimum profitability requirements of the company in question, but which do meet the expected average cost rate for borrowed capital in the sector (Art. 8.3).
3. If the best international standard cannot be realised with the measures mentioned above within eight years, the company shall take measures to realise the best international standard as soon as possible, but in any event in the year 2012, or realise a comparable energy efficiency result by other acceptable means. These measures can include settlement with the results of other installations or companies, or the application of flexible instruments such as JI, CDM or ET (Art. 8.5).[91]

The concern approach
The Covenant provides for extra flexibility in the phasing of investments to concerns with several participating installations. A concern can align its investments to meet its benchmarks with its other investment decisions and possible obligations from other long-term agreements with the government. This approach seeks to decrease the impact on the competitiveness of concerns that may arise if these concerns would face a large amount of investments in several plants at the same time. However, the concern approach does not exempt individual installations from ultimately meeting their benchmark in 2012, nor does it provide for the possibility to compensate over-achievement in one plant with under-achievement in another. Each plant must meet its own benchmark target.[92]

The role of environmental authorities
Participating companies are required to submit a draft EEP to appropriate environmental authority. A copy is also submitted to the Verification Bureau, which consequently advises the environmental authorities on the effectiveness of the proposed measures. After reviewing the draft EEP, the environmental authorities send a written appraisal to the company. The company then adapts the EEP in accordance with the comments received from the environmental authorities and re-submits a final EEP. The environmental authorities re-assess the final EEP. In this assessment they make an integral evaluation of the environmental outcome of the EEP and the license in which it should be formalised. This integral evaluation focuses particularly on:
- possible trade-offs between different kinds of environmental effects,
- environmental effects of the proposed energy efficiency measures,
- alternative means of meeting the benchmark.

Moreover, the EEP should comply with the Alara (as low as reasonably achievable) principle. The EEP sets a target obligation. The authorities cannot prescribe the means of achieving the target.[93] The environmental authorities send a written approval to the company which EEP is under review. As of this moment, the EEP is public information, except for those parts that are considered competitively sensitive by the respective company.

[91] Furthermore, article 18 of the Covenant defines that in the evaluation of the implementation and functioning of the Covenant specific attention will be paid to national and international policy developments with respect to the flexible mechanisms and the possible use of these instruments to meet the obligations under the Covenant.
[92] This follows from the Dutch environmental licensing system. Under this system a separate license is required for each individual installation. As a consequence, each installation must meet certain environmental standards. If this rule would not exist, this could lead to environmentally sub-optimal outcomes for pollutants with local effects, and it could lead to a competitive bias in favour of concerns relative to single installation companies.
[93] As a general note, environmental licensing in the Netherlands over the last decade or so has seen a progressive development towards target obligations instead of prescribing the means and exact specification to meet certain emission norms.

A.3.3 Monitoring and verification

The Benchmarking Verification Bureau has been specially established to monitor the practical aspects of the Covenant. This independent bureau verifies for each company all the different stages in the benchmark process. For example, the bureau checks whether the definition of the world top is adequately underpinned and whether the energy efficiency plan has been put together properly. The bureau also issues advice to the participating company and to the competent authority on this matter.

Every year before the 1st of April, all companies under the Covenant have to submit an energy efficiency report to the Benchmarking Verification Bureau and the environmental authorities for each processing installation. This report should cover the energy efficiency improvements over the previous year, as well as the concomitant CO_2 emissions reductions (KPMG, 2000). Furthermore, it should monitor the progress relative to the EEP and it should report on any adaptations of the planning of investments. The report is verified by the Verification Bureau.

Based on the annual energy efficiency reports received from the participating companies, the Verification Bureau reports to the Commission Benchmarking on the realised energy efficiency improvements and the associated avoided CO_2 emissions (KPMG, 2000). The Benchmarking Commission consequently reports back to all participants of the Covenant. The Ministry of Economic Affairs and the Ministry of Housing, Spatial Planning and Environment report to Parliament about the progress of the implementation of the Covenant.

Every four years, the Verification Bureau also presents an outlook of the expected energy efficiency improvements and associated CO_2 emission reductions based on the implementation of the EEPs (KPMG, 2000).

A.3.4 Other implementation issues

The counter pledge by the government

In return, the Dutch government will refrain from implementing any additional specific national measures aimed at further energy conservation or reduction in CO_2 emissions by the participating installations of the companies as from the time they join the Covenant. This in any event means no specific energy tax for the companies, no compulsory ceiling on CO_2 emissions, no additional compulsory energy efficiency or CO_2 targets, no additional conservation commitments and no additional CO_2 or energy requirements.

This counter pledge only applies to government measures that are directly geared towards energy consumption by participating installations, not to the company as a whole. European measures or national generic measures relating to renewable energy and fuel consumption are not covered by the Covenant. This applies equally to generic energy taxes, such as the regulatory energy tax (REB). However, when making new legislation, the government will take into account the efforts that have been made by benchmarking companies and try to spare these companies as much as possible. Furthermore, the government commits to ensuring that further regulations will be drafted in such a manner that companies are not impaired in meeting their benchmarking obligations and that they are consistent with the intention and specifications of the Covenant. Moreover, the government promises to make an effort to ensure that national and EU measures will not impair the implementation of the Covenant, and that these measures support the Covenant where possible.

Legal framework and sanctions

The Covenant is an agreement under civil law in which the government is a party. As with any covenant, a non-compliant party can be sued by the other parties. Moreover, participants of the Covenant do not only have to comply with the specific commitments pursuant to the Covenant but also with the more general rights and duties of the Environmental Management Act. As the

Energy Efficiency Plan is incorporated in the environmental licence of an installation, the environmental authorities have in principle the same enforcement instruments available for the Covenant as for normal environmental licences. This implies that if a participating company fails to comply with its benchmarking commitments, for reasons for which it can be held responsible, the environmental authorities can impose fines or other sanctions such as tightening or withdrawing the environmental licence.

Disclosure and confidentiality
The rules and regulations regarding disclosure of information and confidentiality from the Environmental Management Act and the Act on Transparency of Public Administration also apply to the procedures and documents under the Covenant. Most disclosure requirements therefore coincide with the usual environmental licensing procedure. The following information and documents are publicly available:

- the text of the Covenant plus all protocols attached to the Covenant,
- the annual report of the Benchmarking Commission,
- the four-yearly report on the evaluation of the Covenant by the Benchmarking Commission,
- the final version of the Energy Efficiency Plan, excluding confidential parts,
- the annual progress report regarding energy efficiency improvements and reduced CO_2 emissions by the Benchmarking Verification Bureau.

A.4 Evaluation

The Benchmarking Covenant can be evaluated by means of the following criteria:

- *Environmental effectiveness*: There is no fixed target regarding energy efficiency or CO_2 mitigation. The environmental effectiveness of the Covenant is, hence, uncertain and depends primarily on the output growth in the sectors and on the compliance of the companies with their benchmark target.
- *Static economic efficiency*: As the Covenant primarily targets cost-effective energy efficiency measures (IRR >15%), the static economic efficiency is probably relatively high if you consider the benchmark targets. However, the transaction cost incurred in defining the benchmark, licensing, monitoring, reporting, verification and enforcement may detract from this theoretical efficiency.
- *Dynamic economic efficiency*. The process of benchmarking focuses the company's attention to energy efficiency. The Covenant will promote energy saving technological innovations for those companies not yet belonging to the world top, but hardly for those companies already being part of this top as the Covenant does not provide any incentive to reach higher than the world top.
- *Administrative simplicity*. The system is administratively complicated. The complexity emanates from the (i) the determination of a benchmark for each product installation, (ii) the drafting of an Energy Efficiency Plan for each installation, and (iii) the monitoring and verification process.
- *Equity*: The Covenant was conceived in order to achieve energy efficiency and greenhouse gas emission targets without compromising the competitiveness of businesses that are subject to strong international competition. As such it seeks to maintain a level playing field for Dutch energy intensive industry that operates in an international business environment. Moreover, for other sectors similar arrangements as the Covenant exist under the Long-Term Agreements. Within the current international business setting and considering the domestically applied policy instruments the Covenant can be considered a fair deal. However, it should be noted that the benchmarking process is very specific to each sector or firm. Therefore it is difficult (if not impossible) to compare the stringency of the targets and the level of effort required to attain the targets among the different sectors and businesses.

- *Transparency & participation.* The transparency is low, as a major part of the BC information is confidential. Moreover, the complexity of the benchmarking and licensing procedures complicates the comparison of the stringency of targets between different companies.
- *Political acceptability.* The Covenant was an initiative from industry and has been accepted by environmental authorities under the condition that it is consistent with existing Best Practise principles. By and large, the Benchmarking Covenant has a high degree of political acceptability among both Dutch policy makers and energy-intensive industries.

APPENDIX B THE ENVIRONMENTAL MANAGEMENT ACT

B.1 Introduction

The Environmental Management Act (EMA) has been in force since March 1, 1993. Its general objective is to protect and improve the environment. In order to achieve this objective, the EMA covers different sets of policy instruments. Besides sanctions, the instruments include particularly (i) environmental plans and programmes ranging from the national to the municipal level, (ii) environmental licences, (iii) general environmental rules, (iv) environmental quality demands, and (v) financial instruments such as levies, subsidies, allowances and deposits. In addition, the EMA sets rules and procedures with regard to the treatment of waste materials, the implementation of an Environmental Impact Assessment (MER) in specified cases, the supervision on the compliance of environmental laws, and the treatment of objections and appeals to administrative, environmental decisions.

The EMA can be characterised in several ways. Firstly, it can be regarded as an environmental *framework act* in the sense that it sets general rules and procedures with regard to different sets of instruments to protect and improve the environment. Secondly, it is an *integration act* as it covers not only different sets of instruments but also different aspects of the environment according to an integrated approach - including the use of energy and raw materials, waste treatment, and all kinds of pollution (water, air, soil, etc.). In addition, the EMA has also the function of an *implementation act* of some EU directives. Notably Chapter 8 of the EMA - which deals with the system of environmental licenses - can be regarded as the implementation of the EU directive on Integrated Pollution Prevention and Control (IPPC). Finally, the EMA can be seen as an *act in construction* as several parts - e.g. Chapter 3 on International Affairs - still have to be worked out and subjected to parliamentary approval.

Because of the wide scope of the EMA, the sections below will focus particularly on those parts that are relevant within the context of climate change and energy policies in the Netherlands.

B.2 Environmental plans and programmes

A major policy instrument laid down in Chapter 4 of the EMA concerns a system of integrated environmental planning at all administrative levels in the Netherlands. More specifically, this system includes:

- The determination of environmental plans at the national, provincial, regional and municipal level.[94] These plans - which have to be set once in four years - have a rather *strategic* character as they indicate predominantly the direction and main issues of the environmental policy in an integrated way for the medium term (i.e. the next 4-8 years).
- The elaboration of environmental programs. These programs - which have to be determined annually for the next four years - have a more *operational* character in the sense that, at each administrative level, they should further work out the environmental plan concerned by presenting the activities that need to be conducted as well as their financial implications.

The determination of the National Environment Plan (NMP) is the responsibility of the government - notably of the ministries of Housing, Spatial Planning and Environment (VROM), Agriculture, Nature and Fishing (LNV), Economic Affairs (EZ) and Transport and Water Infrastruc-

[94] At the municipal level, the determination of environmental plans is not obliged, but the municipal council is allowed to do so. The regional level refers to official, public bodies of administrative Cupertino among municipalities at the sub-provincial level.

ture (V&W) - with support from the national environmental planning agency RIVM (i.e. the National Institute of Public Health and the Environment). Once in four years, the RIVM is obliged to draft an environmental survey report (*'Milieuverkenning*') on the expected trends of the environment in the Netherlands during the next decade. In addition, the RIVM has to draft each year a report on the actual effects of the environmental policies in the Netherlands (*Milieubalans*'). Whereas the former report is meant to support the preparation of the National Environmental Plan (NMP), the latter is aimed at supporting the design of the national environment programme.

It should be noted that neither the environmental plans nor the environmental programmes include administrative decisions that are binding from a juridical point of view (and, therefore, can be subject of a legal objection or appeal). Nevertheless, they set the principles, objectives and margins within which environmental decisions have to be taken at each responsible administrative level. In order to actually implement the policies set out in the environmental plans and programmes - and to provide resulting environmental decisions a juridical basis - other instruments have to be used such as environmental licenses, general rules, environmental quality demands, financial instruments, etc.

B.3 The environmental license

B.3.1 General

One of the corner stones of the EMA concerns Chapter 8 dealing with licenses and general rules for so-called 'installations' (*'inrichtingen')*. Both licenses and general rules are major instruments of environmental *regulation.* Particularly the license is the outspoken instrument to judge and regulate the environmental effects of *individual* installations. Sometimes, however, it is not necessary to judge and regulate these effects for each installation separately. In that case, general rules can be set by means of a so-called 'General Order of Council' (*'Algemene Maatregel van Bestuur')* for a specific category of installations (see Section 3.2.4 below).

B.3.2 The scope of the license

According to Art. 8.1 of the EMA, it is forbidden without a license to establish, to operate or to change an installation. Given the wide reach of this obligation to have a license, the definition of the concept 'installation' is of great concern.[95] Stated in simple words, this concept refers to any stationary source of human, businesslike activities of some duration or regularity that take place within a certain (geographical) limitation.[96] The obligation to have a license, however, applies only to those installations that may cause harmful environmental effects and that are pointed out as such by a General Order of Council (i.e. the *'Inrichtingen en vergunningenbesluit milieubeheer'* or Ivb). Moreover, as noted above, for certain categories of installations or activities the obligation to have a license may be lifted as their environmental effects are regulated by general rules.

The environmental license has a broad integrated character as it covers a large variety of environmental aspects. As such, it replaces a variety of former, separately required licenses before the EMA was enforced in 1993. For certain environmental aspects, however, separate licenses are still required.[97] Hence, a good attunement between these latter licenses and the EMA license is still required.

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95 In juridical Dutch, the concept of 'inrichtingen' is defined as '*elke door de mens bedrijfsmatig of in een omvang alsof zij bedrijfsmatig was, ondernomen bedrijvigheid die binnen een zekere begrenzing pleegt te worden verricht'* (EMA, Art. 1.1).

96 For details on the jurisprudence regarding the concept installations, see Michiels (1998) and Backes, et al. (2001).

97 For instance, as part of *de Wet verontreiniging oppervlaktewater, de Kernenergiewet, de Meststoffenwet en de Woningwet.*

In general, the competent authority to grant a license is the Court of Mayor and Aldermen of the municipality in which the installation is fully or predominantly based. In some particular cases, however, - which are laid down in the EMA or in the Ivb - this authority rests with either the provincial administration or the minister of VROM.

The only reason to refuse a license is the interest of the protection of the environment (EMA, Art. 8.10). Besides environmental aspects such as noise, water, soil or air pollution, this interest also includes the improvement of the environment, the care for a thrifty use of energy and raw materials, the care for an effective removal of waste materials, as well as the traffic of persons and goods to and from the installation.

B.3.3 The contents of the license

The official request for a license should include the required data specified by the Ivb, notably with regard to the main activities of the installation and the resulting environmental effects. This request and the data provided are part of the license, although the latter may also include certain *restrictions*, for instance it can be stipulated that the license can only be used during certain periods or points of time. In addition, the license should include those *prescriptions* that are necessary to protect the environment. By setting these prescriptions, it should first of all be tried to prevent harmful effects for the environment. If this is not (fully) possible, the prescriptions should be based on the so-called ALARA-principle ('as low as reasonable achievable'), implying that the prescriptions should offer the 'highest possible protection against harmful environmental effects, unless this can not reasonably be required'. The key problem is what this (theoretical) principle means in practice. For instance, to which extent should business-economic criteria be considered in applying the ALARA-principle, or how is this principle related to other criteria such as the 'best practicable techniques' (BPT) or the 'best available techniques' (BAT). By applying the BPT criterion, business economic considerations are included, whereas they are excluded if the BAT-criterion is used. In practise, the application of the ALARA-principle in granting environmental licenses seems to move mainly in the direction of the BPT-criterion.[98]

The EMA distinguishes different kinds of prescriptions, notably:

- Target prescriptions. These prescriptions specify only a certain target to be reached, giving the licensee the freedom to choose the means to achieve this target.
- Means prescriptions. These prescriptions specify the means by which the appointed target has to be reached. Means prescriptions, however, may only be specified if necessary as preference should be given to stimulate the self-regulation and own responsibility of the licensee within the environmental limits set by the government ('*license on main issues*') as well as to prescriptions referring to or connected to a business environmental plan or care system.
- Other prescriptions such as research prescriptions, measure and registration prescriptions, reporting prescriptions, energy prescriptions, or prescriptions that specify certain demands regarding professional skills of staff employed by the installation.

In principle, the license is valid for an unlimited period and has a business-tied character, i.e. it is not only valid to the applicant/holder of the license but also to his/her legal successors. It is possible, however, to grant a temporary license, although only for a period of maximum five years. Moreover, the competent authority can change (e.g. sharpen) the restrictions and prescriptions of the license granted. It is even obliged to do so if harmful environmental effects can or have to be further restricted, depending on unforeseen trends in environmental quality or technological options. Finally, the competent authority can fully of partly withdraw a license, especially if the installation concerned causes unacceptable harmful environmental effects.

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[98] For details on this issue, see Michiels (1998) and Backes, et al. (2001).

B.3.4 Energy aspects in the environmental license

As noted above, energy prescriptions can be part of an environmental license.[99] In a recent circular, the Ministries of VROM and EZ provide advise and suggestions how competent authorities at the provincial and municipal levels can do so (Ministry of VROM/EZ, 1999). As a first step, these authorities should determine whether an installation is obliged to have a license according to the EMA or not (the latter may be the case if the installation or part of its activities fall under a general rule). Subsequently, those license-obliged installations can be subdivided into:

- Installations that participate in a Long Term Agreement (LTA) or in the Benchmark Covenant (BC) on energy efficiency. These installations should have a business energy plan as well as an advice of Novem regarding this plan. If this advice is positive, the license can refer to the LTA/BC, the business savings plan and the Novem advice, making additional prescriptions with regard to energy savings measures unnecessary. From a point of view of upholding and complying the prescriptions of the license, however, it is preferable to include all measures of the business energy plan separately in the license. If the Novem advice is negative, the installation should be treated as a non-LTA/BC installation.
- Non-LTA/BC installations (which mostly belong to the medium and small-scale industry, trade and services). If it is determined that an installation is obliged to have a license on behalf of the EMA and does not fall under a LTA or the BC on energy efficiency, the next step is to check whether energy is a relevant aspect of the installation concerned. Following some GOCs and jurisprudence regarding this issue, the circular of the Ministry of VROM/EZ (1999) suggests that the aspect is only relevant if the installation uses more than 50.000 kWh of electricity or 25.000 m^3 of gas (equivalents) per annum. If the energy aspect is relevant, then the license should include prescriptions to take measures regarding the saving and thrifty use of energy. For an installation having an approved business energy/environment plan - including energy savings measures - the license should preferably include all these measures separately (making additional energy prescriptions not or hardly necessary). For installations not having such a plan, the energy prescriptions should be determined by the competent, license-granting authorities (after consultation with the installation concerned).

According to the circular of the Ministry of VROM/EZ (1999), energy prescriptions in an environment should be based on the following principles:

1. The ALARA principle. This principle implies that energy prescriptions should refer to ‘reasonable measures’ of energy saving.
2. The ‘state of technology’. Indicative of what is meant by ‘reasonable measures’ is the state of technology of a branch of industry, notably those energy savings measures that can be applied successfully in a current and financially healthy installation within the branch of industry concerned. In order to weigh the reasonableness of energy savings measures, it is suggested to use the business-economic remunerativeness of these measures as a major criterion. Based on this criterion, an energy savings measure is judged reasonable if it results in (i) a positive net present value by applying an internal interest rate of 15 percent, or - alternatively - (ii) a pay-back period of the measure up to five years.
3. Integrated assessment. Besides energy, all other environmental aspects and interests at stake should be weighted in order to judge which measure can reasonably be required and laid down in a license.
4. Promoting self-activity. In order to stimulate the self-activity of installations, energy prescriptions should as far as possible link up with own initiatives of the installation concerned.
5. Other principles such as limiting administrative burdens and a good attunement of the environmental license - including energy prescriptions - with other rules and instruments.

[99] A recent questionnaire shows that one or more energy prescriptions are included in some 81 percent of the licenses issued at the municipal level. In most cases, however, these prescriptions - or the supervision on their compliance - are considered to be inadequate (Infomil, 2000; VROM, 2000a).

B.4 General rules

Besides licenses - which refer to individual installations - the EMA offers also the opportunity to set general rules by means of a so-called 'General Order of Council' (AMvB) with regard to the environmental effects of certain categories/activities or installations. The major advantage of general rules is that they reduce the administrative burden for both installations and administrative authorities. On the other hand, the major disadvantages are more centralisation and fewer opportunities to deliver an optimal diversified regime of fine-tuned regulations adjusted to individual installations. Setting general rules by a GOC has to be based on similar considerations as setting a license. These considerations include particularly (i) the state of the environment and the environmental effects that installations may cause, (ii) the opportunities to protect the environment weighted by expected financial and economic effects of the general rules (i.e. the ALARA-principle), and (iii) the operative environmental quality demands (see Section 3.2.5 below).

Within the framework of the EMA, three variants of general rules can be distinguished:

1. General rules that are set *instead of* a license (Art.8.40). Operators of installations that fall under a GOC ex EMA, Art.8.40 do not have to obtain a license but can simply contend with a timely mention of the establishment or change of an installation to the competent authority. They are, of course, obliged to follow the general environmental rules set by a GOC.
2. General rules that are set *besides* a license (Art.8.44). These rules refer only to certain aspects of a certain category of installations, whereas the other aspects are still part of license specified for each individual installation. An example of such a general rule concerns the 'Decree emission demands of combustion-installations' (*'Besluit emissie-eisen stookinstallaties'*).
3. General rules that set instructions for the competent authority (Art.8.45 and 8.46). These rules are not directly related to installations but rather to the administrative authorities competent to issue a license. By means of such rules, these authorities receive instructions obliging them to include certain prescriptions in licenses granted by them.

B.5 Environmental quality demands

As noted in Section 3.2.2, objectives of environmental plans and programmes are hardly or only limited binding from a legal point of view. Chapter 5 of the EMA, however, offers the opportunity to translate these objectives in more binding legal norms called 'environmental quality demands' (*'milieukwaliteitseisen'*). These can be defined as demands concerning the quality of parts of the physical environment that indicate in which state the relevant part has to be at a certain point of time. Examples of such demands are specified levels of concentrations of certain particulates or materials in the air, water or soil in the year 2015 or 2025. Environmental quality demands can be set by either a GOC, a ministerial decree or by a provincial environmental ordinance (*'provinciale milieuverordening'*). It should be noted, however, that a major part of these demands are not only derived from environmental plans and programmes at the national or provincial level but also from EU legislation and directives.

Environmental quality demands are particularly relevant to authorities competent to grant an environmental license as these demands have to be respected or accounted for when issuing such a license. Depending on their degree of legal bindingness, they can be differentiated in three categories: an environmental quality demand can be a limit value (*'grenswaarde'*), a guide value (*'richtwaarde'*), or a target value (*'streefwaarde'*). A limit value is a minimum value that the environment at least has to meet and that, hence, has to be respected by the authorities concerned. Therefore, besides force majeure, exceeding this limit value can not be allowed or tolerated. A guide value indicates the environmental quality that has to be reached or maintained as far as (reasonably) possible. Such a value has to be accounted for by the authorities concerned, but motivated deviations are possible. Finally, a target value refers to the ultimate goal that has to be reached in the long term, but is not binding when setting general rules or license prescriptions for the short or medium term.

APPENDIX C THE LONG-TERM AGREEMENTS

C.1 Introduction

Since 1992 the Dutch government has entered into Long Term Agreements (LTAs) to improve energy efficiency in economic sectors. An LTA is a voluntary agreement between the Ministry of Economic Affairs and a business sector (branch) to make an effort to increase the energy efficiency by a certain percentage within a certain timeframe (Ministry of Economic Affairs, 1998). The first generation LTAs (LTA1) ended in 2000. A new generation of LTAs (LTA2) now replaces the earlier agreements. The Benchmark Covenant replaces the old LTAs for the energy intensive industry. Both LTA2 and BC run until 2012. LTA1 focussed primarily on the production processes of the sectors involved. As many of these sectors have indicated that most of the potential to improve process efficiency has been exploited to achieve the targets of LTA1, LTA2 has broadened the base for energy efficiency improvements to additional themes such as renewable energy, industrial ecology, logistics and life cycle management (Ministry of Economic Affairs, 2001).

C.2 Scope

The LTA 2 establishes a number of conditions for businesses to participate in the agreement (Ministry of Economic Affairs, 1998):

- homogeneity of the sector in product or processes,
- energy use of sector >1 PJ per annum,
- participating companies should at least comprise 80% of the energy use in the sector,
- branch organisations need to be well organised,
- branch organisation demonstrated commitment to the implementation of the LTA.

Within the boundaries of the above criteria the following parties have acceded to the LTA2:

- The Ministries of Economic Affairs (EZ); Agriculture, Nature and Fisheries (LNV); and Housing, Spatial Planning and Environment (VROM)
- The Inter Provincial Consultative Forum (IPO)
- The Association of Dutch Municipalities (VNG)
- Individual companies
- Branch organisations
- Municipalities (adopting a target themselves).

Companies can accede to the LTA once their branch organisation has signed the LTA (Novem, 2001). Companies with an annual energy use >0.1 PJ that do not belong to a branch organisation can accede to the LTA 'Other Industry' on an individual basis (Ministry of Economic Affairs, 1998; Novem, 2001).

In the new generation of LTAs since 2000, the scope of the agreements has been expanded beyond production processes and the scope of the EMA to include activities in the fields of:

- Energy efficient product design
- Industrial ecology
- Renewable energy
- Sustainable building
- External logistics
- Life cycle management.

These themes have been added to the LTA2 because it was felt that much of the low hanging fruit in energy efficiency was reaped under LTA1. Adding these themes to the agreement enlarges the potential for businesses to achieve energy efficiency improvements. A key feature of these activities is that they are not tied to a production installation of an industry. For energy efficiency activities in the above categories it should be possible to quantify them, attribute them to the firm and accurately monitor them (Novem, 2001).

C.3 Nature of the objectives

The policy goal of the LTA is to improve energy efficiency without compromising the competitiveness of Dutch business sectors. The Implementation Document Climate Policy it is estimated that the energy efficiency agreements under the LTA2 should contribute 1.3-1.8 Mt of CO_2 of greenhouse gas emissions reductions in 2010. This general goal has been translated into commitments on the side business sectors and the government.

Commitment private sectors (Novem, 2001):

- Improvement of energy efficiency by taking economic measures (internal rate or return of 15% or payback time of 5 years or less),
- Establishment of energy care systems within companies. These systems are intended to improve energy management and facilitate the monitoring of energy use in a company,
- Stimulating measures in additional energy efficiency themes.

Commitment government:

- No additional national measures in the field of energy efficiency are imposed on the sectors and companies that are party to the LTA.

C.4 Nature of the obligations and incentives

The LTA2 text specifies the obligations to all parties to the LTA2, i.e. individual companies, branch organisations, and the government. Targets are defined at the sectoral level and are implemented at the company level through a company energy efficiency plan (EEP) (Novem, 2001). The company's obligations - reflected in the EEP - are incorporated in the environmental license for a specific installation. The incentives for compliance with the LTA2 are provided through the licensing system and sanctions and compliance regulations of the Dutch Environmental Management Act. In addition, the companies commit to implement an energy care system to facilitate the monitoring of energy efficiency within their company. Moreover, they commit to make an effort to achieve energy efficiency improvements through the additional energy efficiency themes listed in the LTA2.

The branch organisations oblige themselves to make an effort to stimulate participation and implementation of the LTA2 within their branch through transfer of knowledge, providing information for the evaluation of the LTA2 in 2004 and 2008, stimulating energy analyses within the branch, and playing a co-ordinating role between the sector/branch and the other parties to the LTA2 (Novem, 2001).

The government from its side pledges not to impose any specific additional measures that are targeted at energy efficiency or CO_2 abatement on the parties to the LTA2 (Novem, 2001). However, the government does retain the right to impose on these sectors generic measures such as in the field of emissions trading and energy taxation (REB) (Novem, 2001). In addition, the government commits to facilitate the implementation of the LTA2 as much as possible through financial and non-financial means.

C.5 Mechanisms for implementation

C.5.1 Multi-annual plan on energy conservation for the sector or branch

Within 8 months after signature of or accession to the LTA2 branch organisations draft a multi-annual plan on energy conservation for their sector. The plan is based on a sectoral energy conservation potential study (Ministry of Economic Affairs, 1998) and contains quantified energy efficiency targets - expressed in an energy efficiency index - for the combined companies under the respective branch organisation (Novem, 2001). Moreover, the plan considers qualitative and quantitative targets for the implementation of energy care systems and the additional energy efficiency themes. Finally, the plan provides an overview of how the branch organisation plans to meet its specific obligations under the LTA2 (Novem, 2001). The energy efficiency plan is reviewed by Novem[100], which consequently advises the ministries on the adoption of the plans. The multi-annual plan on energy conservation is updated in 2004 and 2008, in line with the revisions of the company energy efficiency plans (see below).

C.5.2 The company energy efficiency plan

The sectoral targets have to be translated into individual company activities. Therefore, the LTA contains specific obligations to companies such as the drafting of an energy efficiency plan and obligations on monitoring (Ministry of Economic Affairs, 1998). Within 6 months after signing the LTA2 a company must submit a concept energy efficiency plan for each individual installation under the LTA2 to the competent environmental authority as well as to an independent consultant who validates the plan (Novem, 2001). The independent consultant (Novem) confirms to the environmental authority and the company involved whether the plan meets the requirements that are set out in the LTA protocols. Furthermore, the environmental authorities take into account the opinions of other relevant administrative bodies in the reviewing of the energy efficiency plan. Based on the comments received from the environmental authorities, the company consequently makes adjustments and drafts the final energy efficiency plan. In its consideration of the final energy efficiency plan the environmental authorities test whether the plan meets the conditions for a license under the environmental management act (EMA). The plan is specifically tested to meet the ALARA principle. During the whole procedure Novem offers free advice on the energy efficiency plan to the companies under the LTA2.

The energy efficiency plan should contain the following information (Ministry of Economic Affairs, 2001; Novem, 2001):

- description of energy use including the energy efficiency index for the reference and current year,
- energy efficiency targets expressed in an energy efficiency index,
- overview of planned/certain, conditional and uncertain energy efficiency improvements in the short and longer run, along with an indication of the anticipated energy efficiency improvement and concomitant avoided CO_2 emissions,
- timing of energy efficiency improvements,
- method of reporting of results to Novem,
- initiatives in the additional energy efficiency themes such as life cycle management, logistics, renewable energy, etc., possibly including targets for these themes,
- use of the concern approach.

To facilitate monitoring and target setting each participating company must have an energy care system in operation within two years after signing the LTA2 (Ministry of Economic Affairs, 2001).

[100] Novem is an agency of the Dutch Government that carries out the administration of certain policies, consulting work, and the administration of subsidy schemes, including several fiscal facilities that the LTA sectors can use to finance energy effiency improvements.

The first energy efficiency plan is to be drafted in 2001. Revisions are due in 2004 and 2008. These revisions should make a new overview of planned/certain, conditional and uncertain energy efficiency improvements in the short and longer run. Proposed energy efficiency improvements should preferably be based on a detailed energy analysis with full energy and material balances of the processes involved. The same administrative procedure as for the initial energy efficiency plans applies to the revised energy efficiency plans (Novem, 2001). If necessary, the environmental license will be modified to accommodate the revised plans. A summary of the energy efficiency plan is made public for the purpose of the licensing procedure (Novem, 2001).

C.5.3 Concern approach

The concern approach allows companies with multiple production installations to establish its own priorities in the sequencing of energy efficiency investments in accordance with its depreciation schedule and strategic decision making (Novem, 2001). As with the Benchmark Covenant, the concern approach does not exempt individual installations from ultimately meeting their energy efficiency target in 2012, nor does it provide for the possibility to compensate over-achievement in one plant with under-achievement in another. This follows from the Dutch environmental licensing system. Under this system a separate license is required for each individual installation. As a consequence, each installation must meet certain environmental standards. If this rule would not exist, this could lead to environmentally sub-optimal outcomes for pollutants with local effects, and it could lead to a competitive bias in favour of concerns relative to single installation companies.

C.5.4 Integration issues

A company cannot be obliged to implement measures with respect to the additional energy efficiency themes listed in the LTA2, nor can it be held liable for not attaining any quantitative or qualitative targets in this field. Companies and branch organisations do, however, have an obligation to make a certain level of effort in this field in accordance with their energy efficiency plans.

C.5.5 Monitoring, reporting and verification

Each company annually reports to Novem, the competent environmental authority and their branch organisation on the progress of implementation of the energy efficiency plan and the energy care system. The report separately indicates the energy efficiency improvements in terms of an energy efficiency index (reference year 1998) as well as the associated avoided CO_2 emissions for improvements in process efficiency and activities with regard to the additional energy efficiency themes (Novem, 2001). Novem verifies the report according to the protocol monitoring and energy care (Annex 5 of the LTA2).

Novem in turn annually reports to the ‘Platform Energy Saving’ at an aggregated level per sector. Furthermore, twice a year Novem reports to the competent environmental authorities on the progress with respect to the drafting, updating and testing of energy efficiency plans.

C.5.6 Enforcement

In case a company does not comply with the targets set out in the energy efficiency plan the environmental authority can use the sanctions and enforcement provisions of the environmental management act (EMA). Furthermore, if one or more companies in a sector do not comply with their approved energy efficiency plan, the other companies in the sector can dissolve the LTA agreement for their own sector. As a consequence these companies will then be subject to a more stringent EMA license (Ministry of Economic Affairs, 2001). Thus, the EMA provides incentives both through its sanctions regime and through the threat of imposing a more stringent licensing regime.

APPENDIX D THE DUTCH SUPPORT SYSTEM FOR RENEWABLE ELECTRICITY

D.1 Background: the performance of the old system

Up to late 2002, the Dutch system of supporting renewable electricity was primarily based on two special provisions of the ecotax scheme (REB):

- The granting of a producer subsidy to renewable energy generators from the ecotax revenues (REB, Art. 36o).
- The exemption of the ecotax on renewable energy consumption (REB, Art. 36i).

Since 1 July 2001, when the retail market for green electricity was liberalised, the implementation of the latter provision has been facilitated by the introduction of a system of tradable green certificates, in the sense that suppliers of renewable electricity have to surrender green certificates to the tax authority in order to qualify for the exemption of the REB.[101]

Owing to these two provisions, the competitive position of supplying green electricity improved significantly, notably in the first years of the new millennium when the REB tariffs for small energy users were raised to relatively high levels. In 2002, the REB exemption on green electricity consumed by an average household amounted to 6 cents per kWh, while the ecotax subsidy to renewable power producers was 2 cents per kWh. Hence, the total support of green electricity from the Dutch REB system amounted to 8 cents per kWh, i.e. one of the highest support levels in Western Europe (Ministry of Economic Affairs, 2002c).

Owing to the relatively high support level in the Netherlands, the price of green electricity on the Dutch market could compete with the price of grey electricity, while the marketing margin was still highly attractive for renewable electricity suppliers who were eagerly looking for new customers, notably when the retail market for green power was liberalised in mid-2001. As the fiscal support was offered to both domestic and foreign suppliers, it led to the following performance:[102]

- The number of households consuming renewable electricity expanded rapidly from 83,000 in mid-1999 to 1 million in mid 2002, resulting in a swift increase in the domestic demand for green power from 250 GWh in 1999 tot 3000 GWh in 2002 (Kroon, 2002).
- While the domestic production of renewable electricity grew steadily from 1800 GWh per annum in the years 1997-99 to about 3000 GWh over the period 2000-2002, the imports of green power escalated from, on average, 500 GWh in 1997-99 to 1500 GWh in 2000 and even to, on average, some 8000 GWh in 2001-2002 (Kroon, 2002; CBS, 2002). Although the latter amounts were mainly imported as renewable electricity (and, hence, benefited from the REB production subsidy), a major part was just sold as grey electricity on the Dutch market (and, hence, did not benefit from the ecotax exemption) either because enough domestic demand was lacking or because it was not eligible for REB exemption (as was the case for hydro power, starting from 1 January 2002).

[101] Both REB provisions referred to electricity from renewable energy sources, i.e. wind, solar PV, biomass and small-scale hydropower (<15MW). Starting from 1 January 2002, however, electricity from hydropower was no longer exempted from the ecotax (REB, 36i) but continued to receive green certificates and, up to 31 December 2002, the ecotax production subsidy (REB, 36o).

[102] The impact of the 'old' Dutch support system for renewable electricity has been extensively analysed by Boots, et al. (2001), Reijnders (2002), Kroon (2002), de Jong and Mulder (2002), Damme and Zwart (2002), van Sambeek (2002) and van Sambeek and van Thuijl (2003).

Moreover, the imports of green electricity were mainly generated from existing biomass and hydropower installations in Scandinavian countries that just redirected their output to the Netherlands. Hence, although the Dutch support system resulted in a major outflow of tax resources to other countries, it did not trigger additional investments in renewable energy capacity abroad.[103] In addition, the Dutch system of supporting green electricity was characterised by the following drawbacks (Ministry of Economic Affairs, 2002a, 2002c and 2002d):

- Whereas the costs of generating renewable electricity vary significantly by type of technology (notably when foreign options are considered as well), the level of support was hardly differentiated, implying that some relatively cheap technologies were overstimulated, i.e. received a financial incentive which was too high, while other relatively expensive options were hardly promoted.
- As the support system was largely based on generic fiscal measures, EU rules did not allow any discrimination between domestic and foreign producers of green electricity. In other EU countries, on the contrary, renewable energy policies were usually based on non-fiscal stimuli (e.g. feed-in tariffs), which were exclusively targeted to domestic generators of green power.[104]
- The large imports of renewable electricity in the Netherlands threatened the competitive position of domestic producers of green power. Moreover, these imports may be uncertain in the longer run if the renewable electricity is needed by the exporting countries themselves to meet their own national renewable energy targets.
- The support system did not offer enough certainty to new investments in renewable electricity capacity, notably since 2001 when it became increasingly clear that the support system needed major reforms.

In the autumn of 2002, the Dutch government launched some major reforms of the renewable energy support system (triggered by the need to meet agreed budget savings on renewable energy). The core of these reforms is a shift from a predominantly demand-oriented support system of which imported green electricity may also benefit to a mainly supply-oriented system that applies largely to domestically generated renewable electricity only. More specifically, the reforms included (i) the reduction of the REB exemption on renewable energy, (ii) the abolition of the REB producer subsidy, and (iii) the introduction of a feed-in subsidy system, called MEP, in order to support domestic producers of renewable electricity. The role of the green certificate system, however, was remained largely in tact, i.e. facilitating the operation and promotion of the renewable electricity market in general and the granting of the REB benefit on green power consumption in particular.

D.2 Major features of the new support system

Starting from mid-2003, the reformed system for supporting renewable electricity in the Netherlands consists primarily of (i) the MEP feed-in subsidy to domestic producers of green power and (ii) the ecotax benefit on renewable electricity consumption, with an additional facilitating role by (iii) the green certificate system.[105] The major features of these three instruments will be discussed below.

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103 For the years 2001-2002, estimates of REB resources flowing abroad to foreign producers and importers/suppliers of renewable electricity vary between €150-250 million per annum (Kroon, 2002; van Sambeek, 2002; Damme and Zwart, 2002; Ministry of Economic Affairs, 2002c; and van Sambeek and van Thuijl, 2003).

104 In some cases, producers outside the Netherlands even benefited twice, i.e. from both the Dutch and their domestic support systems.

105 In line with the EU Directive on renewable electricity (CEC, 2001c), a system of 'guarantees of origin' will be introduced in the Netherlands (and other EU Member States) by the end of 2003 which will replace the existing system of green certificates (Ministry of Economic Affairs, 2003). In the present report, however, the word 'green certificate' will be used rather than the new concept 'guarantee of origin'

D.2.1 The MEP feed-in subsidy

The heart of the new system for supporting renewable electricity is an amendment to the Electricity Law of 1998 called 'Environmental Quality of Electricity Production' (or 'MEP', after its Dutch abbreviation). The essence of the MEP is to stimulate the environmental quality of generating electricity, notably by granting a subsidy to domestic producers of renewable electricity for each kWh fed into the grid.[106] The height of this feed-in subsidy varies per category of renewable energy technology, depending on the so-called 'unprofitable top' or 'financial gap' between the cost of renewable electricity and the value of the electricity on the wholesale market.[107] Whereas the value of the electricity is based on a uniform wholesale price of 2.7 €cents per kWh for all renewable electricity installations during their economic lifetime, the average costs of the generated electricity varies widely per category of technology options and, hence, the financial gap per kWh also varies widely.[108] The level of the MEP subsidy per category is determined by subtracting the value of the ecotax benefit on renewable electricity from the financial gap for each category of renewable technologies (subject to a maximum level of the feed-in subsidy). The height of the MEP subsidies will be determined annually by the Ministry of Economic Affairs in a Ministerial Regulation.

In order to be eligible for the MEP feed-in subsidy, a producer of renewable electricity has to meet some major conditions (Ministry of Economic Affairs, 2002d; van Sambeek and van Thuijl, 2003):

- The electricity has to be generated from eligible sources of renewable energy, i.e. wind energy, hydropower, wave and tidal energy, solar PV and bio-energy (including waste incineration, landfill gas, digestion and sludge).
- The electricity has to be produced domestically and fed into the Dutch electricity grid.
- The producer must be granted green certificates as the regulation on green certificates guarantees that the electricity fed into the grid is generated from specified eligible sources and subject to reliable metering.
- The installation may not be older than the 1st of January 1996 (i.e. the date when the REB producer subsidy was introduced). Exceptions may be made if the producer can prove that (i) a completely new installation has been established at the same connection after loss of the preceding installation, (ii) the installation was drastically renovated or extended after the 1st of January 1996, or (iii) the installation used renewable energy sources for the first time after that date.
- The installation for the production of renewable electricity must be maintained and exploited for at least 10 years. The MEP subsidy, however, will only be granted for a duration of maximum 10 years following the start of operating an installation.[109] Moreover, the period that an eligible installation has been in operation before the application of the MEP subsidy is subtracted from this maximum period of 10 years.

In order to actually obtain a MEP subsidy, a renewable electricity producer has to submit an official application to TenneT, i.e. the operator of the national transmission system. Once TenneT has approved this application, a contract is signed between TenneT and the producer in

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[106] While the MEP also covers electricity generated from either CHP or 'climate-neutral, fossil-based resources', this report discusses only the elements of the MEP related to electricity from renewable energy sources.

[107] The categorisation of renewable electricity technologies and the methodology for calculating the financial gap of these technologies are explained in van Sambeek, et al. (2002) and van Sambeek and van Thuijl (2003).

[108] For electricity from wind and solar energy, the long term wholesale price is assumed to be slightly lower, i.e. 2.1 ctt/kWh, due to the so-called 'balancing costs' of solar and wind power estimated at, on average, 0.6 ct/kWh (van Sambeek, et al., 2002). The wholesale price of 2.7 ct/kWh for renewable electricity corresponds to the average production costs of conventionally generated electricity in the Netherlands (ex plant), whereas the additional costs of generating renewable electricity varies from 0 ct/kWh for landfill gas and digestion to some 40 ct/kWh for solar PV (Ministry of Economic Affairs, 2002d).

[109] Although the MEP subsidy will only be granted for a duration of maximum 10 years, the height of the subsidy has been based on the calculation of the financial gap between the costs and benefits of an installation during its usual economic lifetime (which may be significantly longer than 10 years), assuming that the feed-in subsidy should cover this gap in 10 years.

which the subsidy provisions are specified. While the MEP subsidy is granted for a duration of maximum 10 years following the start of operating an installation, its level is fixed for this whole period at the level of the MEP subsidy in the year that the official application was submitted. Hence, whereas the level of the MEP subsidy will be annually adjusted for new applications in order to account for dynamic changes in the financial gap of renewable electricity technologies, it is contractually fixed for an approved application during a period of maximum 10 years. However, in order to provide long-term security to investors and producers of renewable electricity, the government guarantees that the total level of support to green electricity, i.e. the sum of the MEP subsidy and the REB benefit, will remain the same for a period of 10 years after an eligible installation has entered into operation. This implies that future changes in the level of the ecotax benefit will be compensated by an equivalent adjustment of the MEP subsidy in order to guarantee that the total amount of support remains the same for a producer who has successfully applied for a MEP subsidy (Ministry of Economic Affairs, 2002d; van Sambeek and van Thuijl, 2003).

The feed-in subsidies are financed through an annually fixed MEP levy on all connections to the Dutch grid. For 2003, this levy is set at €34 per connection. The burden of the MEP levy is compensated by an equivalent reduction in the annual amount of the REB charged on final energy consumers. The MEP is, therefore, financially neutral to these customers (Ministry of Economic Affairs, 2002c).

The responsibility for the implementation and administration of the MEP is assigned primarily to TenneT and, secondary, to the operators of the electricity distribution network. The latter are responsible for (i) the collection of the MEP levy from the customers connected to the grid, (ii) the verification of the renewable status of electricity production installations, and (iii) the metering of the electricity generated from these installations and fed into the grid. The major tasks of TenneT include (a) the collection of the MEP levies from the distribution network operators, (b) the judgement of the eligibility of renewable electricity producers who apply for a MEP subsidy, and (c) the allocation of the feed-in subsidy to eligible producers. In order to meet these tasks, TenneT will be granted the status of an autonomous administrative body under the responsibility of the Ministry of Economic Affairs (van Sambeek and van Thuijl, 2003).

In summary, the major advantages of the MEP system include that (i) the subsidy level can be differentiated by type of renewable electricity technology, thereby avoiding over stimulation (‘free-riding’) of some relatively cheap options to generate green power, (ii) the MEP system is organised as a non-fiscal environmental support scheme which, according to present EU rules, allows to discriminate between domestic and foreign producers of renewable electricity and, hence, to focus available resources to the promotion of green power generated at home rather than abroad, and (iii) the MEP system seems to offer domestic producers of renewable electricity more long-term certainty regarding the level of support than the old, previous system.[110]

On the other hand, a major disadvantage of the MEP system is that, because of a lack of reliable data, it may be hard to determine the ‘right’ level of the MEP subsidy for an adequate categorisation of renewable sources and technologies. As a result, the annual setting of the MEP subsidy levels may be subject to a process of intensive political bargaining between the government and stakeholder pressure groups (as indeed occurred in late 2002 when proposals for the subsidy levels in 2003 were launched). Moreover, for similar reasons, it may be hard to predict which impact the MEP system will have on the policy targets regarding renewable electricity production and consumption in, for instance, 2010 (both over- and undershooting may be possible). Finally, the MEP system does not address non-financial barriers to the development of renewable electricity, such as cumbersome planning and administrative procedures, which may hamper the effectiveness of this system.

110 Nevertheless, as the ecotax benefit on renewable electricity is not passed directly/fully to green power producers, they are still faced by some uncertainty regarding the total level of support they can acquire (See Section 5.3).

D.2.2 The ecotax benefit on renewable energy

Up to late 2002, the consumption of renewable energy was fully exempted from the REB (i.e. the so-called 'nill-tariff' was applied). As the marginal REB rate on grey electricity used by an average household amounted to 6 cent per kWh in 2002, this implies that the delivery of green power to such a household was supported by a similar amount in that year. Starting from mid-2003, however, the REB tariff on green power will be raised to 3.49 cent per kWh, compared to 6.39 ct/kWh for grey electricity, implying that the support due to the differentiation of REB rates on grey versus green electricity will be reduced to 2.9 ct/kWh.

Apart from the need to meet the agreed budget savings on renewable energy, the major reason for the reduced ecotax benefit on green electricity has been to reduce the above-mentioned over stimulation of certain technology options in general and the outflow of tax resources due to imports of cheap green electricity from old, existing installations in particular.

The specific height of the reduced REB benefit (2.9 ct/kWh) has been motivated by the government on the ground that it corresponds to 'current norms with regards to the costs of reducing CO_2' [Ministry of Finance, 2002; Ministry of Economic Affairs, 2002a and 2002d]. These costs are set at €45 per tonne CO_2 which corresponds to 2.9 ct/kWh when using an emission factor of 0.644 kg/kWh.

D.2.3 The green certificate scheme

Under the new support system, the role and operation of the green certificate scheme remains largely the same as under the old system. The latter has been operational in the Netherlands since the 1st of July 2001. On that date, the retail market for renewable electricity in the Netherlands was liberalised, implying that final consumers of green electricity were free to choose their suppliers while the latter, including new entrants, were free to compete on this market. In order to facilitate the operation and promotion of the liberalised market for renewable electricity, the Dutch government introduced concurrently a system of tradable green certificates. The responsibility for the implementation and operation of this system has rested with the Green Certificate Body (GCB), a 100% daughter of Tennet, i.e. the national transmission system operator.

In the Netherlands, the green certificate system serves to facilitate the operation of a renewable electricity market based primarily on the promotion of a voluntary demand for green power (in contrast to other countries where it usually serves to facilitate the operation of a renewable electricity market based on an obligation to meet a certain amount of total electricity use by means of renewable resources). As indicated above, the demand for green power in the Netherlands is encouraged through the ecotax reduction on renewable electricity consumption.

This tax reduction, however, can only be claimed by the energy supplier, if he surrenders to the tax authority both a supply contract with the renewable electricity consumer and an amount of green certificates corresponding to the amount of renewable electricity delivered to this consumer. Hence, in the Dutch system, there is a close link between the green certificate scheme and the ecotax incentive for renewable electricity.[111]

Up to late 2001, green certificates were issued only to domestic producers of renewable electricity and, hence, only Dutch green power was able to claim the ecotax benefit.[112] Since 1 January

111 See Chapter 6, notably Box 6.1, for an explanation of the linkages between the REB, the MEP and the green certificate system in the Netherlands.

112 The conditions under which green certificates are issued to producers of renewable electricity are specified in the Ministerial Decree on Green Certificates, as published in the Staatscourant of 7 May 2001. These conditions refer particularly to the type of generation technology used as well as to the metering of green electricity fed into the grid).

2002, however, foreign renewable electricity has also become eligible for Dutch green certificates subject to the following conditions (Ministry of Economic Affairs, 2001b; van Sambeek, 2002):

1. *Reciprocity*: Green certificates are only issued to imports of renewable electricity from so-called 'reciprocal countries', i.e. countries that have liberalised their electricity market to at least the same extent as the Netherlands. These countries include Austria, Germany, Finland, Norway, United Kingdom and Sweden.
2. *No double subsidisation*. Importers of renewable electricity have to sign a declaration that the renewable electricity for which the issuance of green certificates is requested has not been sold or subsidised as renewable electricity elsewhere.
3. *Metering data and plant verification*. Metering data as well as information relating to the type of plant has to be provided by the competent authority in the country of origin.
4. *Import capacity*. Importers have to demonstrate that they have acquired sufficient transport capacity on the cross border interconnectors to physically import an amount of electricity corresponding with the amount for which the issuance of green certificates is requested.
5. *Renewable according to Dutch definition*. Imported renewable electricity should qualify as renewable electricity according to the definition given in Article 53 of the Dutch Electricity Law of 1998. This definition includes wind, solar-PV, biomass, and hydro power under 15 MW. Waste is not eligible for green certificates.[113]

As noted above, under the new support system, the role and operation of the green certificate scheme remain largely the same as under the old system. A major difference is that, under the new support system, the definition of renewable electricity in the amended Electricity Law of 1998 (including the MEP and the Green Certificate Regulation) has been adjusted in conformity with the EU Directive on Renewable Electricity, which assumes a slightly broader definition of renewable electricity (CEC, 2001c; Ministry of Economic Affairs, 2002d). This implies that electricity generated from certain sources of renewable energy – notably large-scale hydropower (>15 MW) and wave and tidal energy – will also receive a green certificate when the new support system becomes operative.

Under the new support system, the same categories of renewable electricity options are, in principle, eligible to receiving both a green certificate and a MEP subsidy (although the level of the feed-in subsidy may be 0 for a specific category in a specific year). It has to be stressed, however, that receiving a green certificate is, in principle, detached from receiving a MEP subsidy. The only link is that to become eligible to the MEP subsidy a producer of renewable electricity must be granted green certificates as the latter guarantees that the electricity production has been (i) generated from eligible sources, (ii) fed into the grid and, (iii) metered in a reliable way. Moreover, the same metering data (in kWhs) will be used to determine both the amount of green certificates and the total amount of MEP subsidy that will be granted to an eligible producer. It is possible, however, that a producer receives a green certificate but not a MEP subsidy because either (i) the level of the subsidy is set at 0, (ii) the producer does meet the eligibility conditions for receiving a green certificate but not all other conditions for receiving a MEP subsidy, or (iii) the maximum subsidy period (10 years) is expired, but the installation is kept in operation and remains eligible for receiving a green certificate (and the ecotax benefit). In addition, green certificates will be granted to eligible producers of renewable electricity generated abroad but these producers are not eligible for a MEP-subsidy (Ministry of Economic Affairs, 2002a).

Finally, all categories of renewable electricity - either produced domestically or imported from abroad - are eligible to the ecotax reduction, except renewable electricity from hydropower and mixed biomass streams (see Table D.1 for an overview of the eligibility of renewable electricity technologies to the MEP, the ecotax benefit and the green certificate system).

[113] Since 1 January 2001, however, hydropower has been excluded from the ecotax benefit, implying that this benefit has been granted only to renewable electricity generated by means of wind, solar-PV and biomass.

Table D.1 *Eligibility of renewable electricity technologies under the new support system*

Options	Feed-in subsidy (MEP)	Ecotax benefit (REB)	Green Certificates
Landfill gas and digestion	✓	✓	✓
Pure biomass	✓	✓	✓
Mixed biomass streams	✓		✓
Onshore wind	✓	✓	✓
Offshore wind	✓	✓	✓
Stand-alone bio-energy (installations <50 MW)	✓	✓	✓
Solar PV	✓	✓	✓
Wave and tidal	✓	✓	✓
Hydropower	✓		✓
Imports of renewable electricity[1]		✓	✓

1 Imports of renewable electricity generated from hydropower or mixed biomass streams are excluded from the ecotax benefit.

APPENDIX E MINUTES OF THE INTERACTION WORKSHOPS

E.1 Workshop on the interaction between the EU ETS and the Benchmarking Covenant (Amsterdam, June 21, 2002)

Table E.1 *Participants to the workshop on the interaction between the EU ETS and the Benchmarking Covenant*

Name	Affiliation
Mr C. Pietersen	Corus
Mr H. de Waal	Ministry of Public Housing, Planning and the Environment
Mr P. van Slobbe	Benchmarking Committee/Ministry of Economic Affairs
Ms L. de Maat	Ministry of Economic Affairs
Ms M. Koster	University of Groningen
Mr W. Klerken	VNO-NCW (Confederation of Netherlands Industry and Employers)
Mr H. Warmenhoven	PriceWaterhouseCoopers (PWC)
Mr G. Smeenk	Nerefco
Mr J. de Vries	SNM
Mr J. van der Kolk	KPMG
Mr H. Feenstra	AKZO
Mr A. Spaninks	SCA de Hoop
Mr J. van der Kooij	EnergieNed
Mr J. de Jong	Essent/EPZ
Mr J. Sijm	ECN (Energy research Centre of the Netherlands)
Mr T. van Dril	ECN (Energy research Centre of the Netherlands)
Mr J. Jansen	ECN (Energy research Centre of the Netherlands)
Ms H. de Coninck	ECN (Energy research Centre of the Netherlands)
Mr M. Mittendorf	ECN (Energy research Centre of the Netherlands)

The workshop discussion focussed on the following issues:

E.1.1 Meaningful emissions trading

- Will emissions trading develop, considering that allowances will be based on the Benchmarking Covenant requirements and companies are already well on their way to meet these requirements?

VNO-NCW expects there will still be a number of companies, especially the smaller companies, estimated at 80% of the total benchmarking companies, that want to buy allowances instead of meeting their Benchmark in 2008-2012, provided a system with low enough prices develops. A number of big companies, responsible for the larger part of emissions, is expected to sell.

- Must the BC be adapted?

In the BC, the option of meeting obligations by flexible instruments is already considered. The BC has to be adapted to allow for trading under the EU-directive. The requirements to adopt all cost-effective measures with internal rates of return of 15 percent in 2004 and 7.5 percent in 2008 respectively have to be dropped.

Ministry of Economic Affairs: When the BC was drafted the Dutch government recognised the necessity of adapting the BC when a concrete emission trading system would emerge. Evaluation of the BC has been scheduled for 2004 and makes necessary adaptations possible. One adaptation mentioned is to drop the lower IRR border.

- Does the aggregate allocation based on Benchmarking warrant an effective cap for the Netherlands and the EU?

Ministry of the Environment: If the EU imposes a cap that is more stringent than the PSR according to the BC, the BC will become obsolete.

E.1.2 Allocation method

- Is granting a *fixed amount based on performance standards and estimated output* a viable option in the Netherlands?

VNO-NCW: points out that this is not possible according to Directive. VNO-NCW favours an European PSR in which case the BC can stay in place for many years to come.

Ministries of Economic Affairs and Environment: state that this is possible and preferable. Various stakeholders consider granting a fixed amount based on performance standards and estimated output a viable option. However, the question is posed whether the Dutch government will be able to sell this kind of system to Brussels. The Ministries believe this is possible as long as it is a properly functioning system. The Dutch government intends to use the BC as a design basis for an allocation plan.

- Is this allocation method in the interest of maintaining a competitive position for Dutch industry?

Spaninks of SCA de Hoop was not particularly optimistic about this. He fears that paper industry in Nordic countries with access to biomass will gain considerable advantage.

E.1.3 Harmonisation

- Will allocation of allowances be largely harmonised in the EU in de period of 2008-2012? (equal PSR for coal/gas/nuclear based electricity; equal PSR for biomass/gas based pulp and paper; equal PSR for BF/EAF steel?). Why not?

A problem arises if allocation of allowances is harmonised within the EU as a result of differences in the power supply between countries. Country governments are expected to support and favour important country-specific industries. *Industry* expects that harmonisation can take place and can be harmful in several cases. *The Ministries of Economic Affairs and Environment* expect national allocation can protect industry to a large extent in these cases. Governments are compelled to distribute credits in a reasonable way. This means they are not allowed to exempt specific industries from emissions trading. *KPMG:* The burden sharing agreement makes a level playing field impossible, unless governments take part of the burden sharing via CDM/JI in countries with a tight burden. *Industry:* Fair harmonisation will be difficult as a result of burden sharing and different allocation systems within states. Differences will remain. Ministry of EA: PSR can be used as a tool to guarantee a certain minimum efficiency level for industries within the member states. Industry stakeholders consider this to be a good option as well.

E.1.4 Heat and electricity

- Will efficient consumption of electricity and heat require any adaptation of the system, e.g. an indirect emission allowances system for heat and electricity?

Industry, Electricity companies: A PSR for electricity companies will not, or only to a limited degree stimulate the efficient use of electricity by end users companies. CO_2 emission costs are accounted for by the generating company and as long as the generator complies to the PSR it does not matter how much is being generated. Consequently not all CO_2 costs are integrated in the price of electricity under a PSR system. As a result a shift can be expected from fossil energy sources (direct energy carriers) to electricity and heat (indirect energy carries). End user companies will only experience extra cost as a result of increasing use of electricity and a limited rise in electricity prices, a rise that does not include total CO_2 costs. To prevent large fuel shifts the price of electricity must be compensated for the total costs.

Corus: (referring to primary aluminium). Such a high price for electricity (which includes total CO_2 costs) would be adverse to historically large users of electricity since now they have to account for the integral cost of CO_2 emissions without receiving any emission credits for their electricity use. This would resemble similar conditions as would be experienced under an auctioning system. Therefore direct allocation to electricity generators is not compatible with a PSR system.

- Will nuclear and renewable electricity gain permanent advantage over coal and gas in any viable case of CO_2 emission trading? Will national governments not be able to maintain compensating allocations for e.g. coal?

Yes, in the long run coal will disappear.

E.2 Workshop on the interaction between the EU ETS, energy taxation and renewable energy policies (Amsterdam, July 11, 2002)

Table E.2 *Participants to the workshop on the interaction between the EU ETS, energy taxation and renewable energy policies*

Name	Affiliation
Mr G. Schuurman	APX (Amsterdam Power Exchange)
Mr R. Breugem	PDE (Renewable energy bureau)
Mr J. Benner	CEA (Consultancy)
Mr C. Cronenberg	DHV (Consultancy)
Mr H. J. Wijnants	DHV (Consultancy)
Mr L. Beurskens	ECN (Energy research Centre of the Netherlands)
Mr J.C. Jansen	ECN (Energy research Centre of the Netherlands)
Mr E. van Sambeek	ECN (Energy research Centre of the Netherlands)
Mr J. Sijm	ECN (Energy research Centre of the Netherlands)
Mr P. Niermeijer	Ecofys (Consultancy)
Mr J.W. van de Ven	Essent (Electricity industry)
Mr J. Vorrink	Groencertificatenbeheer (Green Certificates Board)
Ms L. de Maat	Ministry of Economic Affairs
Mr C.J. Jepma	RUG (University of Groningen)
Mr R. Kleiberg	Shell (Energy company)
Mr B. Pheifer	Tennet (Transmission System Operator)
Mr F.J. de Groot	VNO-NCW (Confederation of Netherlands Industry and Employers)

The workshop discussion focussed on the following issues:

E.2.1 Issues regarding the RES-E Directive

For stimulating the development of RE currently several systems can be distinguished in Europe: (i) the Dutch system, where RES-E suppliers buy certificates to become eligible for REB –exemption in order to meet the preference for green electricity revealed by their clients, (ii) the German feed-in tariff system in which RES-E generators are offered a fixed feed-in price during several years and where additional costs are divided among all power grid users (a system that in the Netherlands would receive lots of criticism from industry), and (iii) the Italian system characterised by an obligation for producers to meet part of their power generation by means of RES. Also, (iv) an obligation for consumers or suppliers is a possible system, as recently introduced in, for example, the United Kingdom and Sweden. At present, only the German system does not use certificates for the controlling system, but this can very well be implemented. For all options, it is important to guarantee continuity in the regulatory framework.

The use of an obligation for suppliers to meet the national RE-target has its advantages, both for the producers and the government: the market becomes more predictable, and there are no expenditures for government. A practical problem remains the definition of the penalty in case of neglecting the obligation: it can only be estimated when the distance to the target is known.

Will it be possible to use a specific subsidy instrument to promote RE benefiting domestic producers only, given the EU-directive? Answer: yes.

E.2.2 Issues regarding green certificates

In some countries several systems exist next to each other, for example in the UK, where RECS (Renewable Energy Certificate System) and ROCs (Renewable Obligation Certificates) exist. How is double counting prevented? Answer: by making the two certificates mutually exclusive for each unit of electricity consumed. If for a certain kWh a ROC has been issued, it won't be accepted by RECS anymore and vice versa.

A difference should be made between CO_2 mitigation from renewables versus other saving options: different CO_2 labels will indicate the additional value of RE compared to other CO_2 reduction options. Moreover, it has been put forward that in order to reduce CO_2 emission, large gains could be reached with respect to heat generation, which constitutes a significant part of the Dutch annual energy consumption.

E.2.3 Issues regarding the price impacts of emissions trading

A major issue is the possible impact of ET on the electricity prices of end users and, therefore, its potential implications for the REB system. First of all, it was argued that only the prices of electricity generated by fossil fuels might be affected by ET, whereas prices of nuclear and hydropower will be unaffected. Secondly, the price effect will probably be small, notably during the initial years of ET when CO_2 restrictions will be relatively modest and, hence, the price - or costs - of CO_2 reductions will likely be relatively low. Current estimates of the price of a tonne of CO_2 reduction vary widely from €5 to €200 per tonne CO_2 (to compare: assuming that during the initial years of ET the costs of reducing CO_2 will range between €25-50 per tonne, the impact on electricity prices generated by fossil fuels might be in the order of 1-2 cents per kWh.

However, there is at present a major overcapacity in EU power generation. Whereas some 1-2 cents increase in generation costs can be expected from the introduction of an EU emissions trading system, it can be seriously questioned whether these cost increases will be reflected in the spot price if the overcapacity situation does not change significantly.

Therefore, it can be concluded that in the short to medium term the impact of ET on the retail electricity price will most likely be rather modest. Hence, there seems to be no reason to abolish or to reduce the REB when ET is introduced (in addition to the argument that stimulating RE by means of the REB serves other objectives besides CO_2 mitigation). However, in the long run, when ET might lead to significant CO_2 reductions and subsequent price increases of electricity to small end users, a compensation of these increases by means of lowering REB rates might be considered in order to avoid a 'double taxation' of these end users.

E.2.4 The formal linkages between green certificates and emissions trading

In the framework of RECS the concept of a 'jewel box' is proposed: assigned to a unit of energy this 'box' incorporates different types of product-specific information such as CO_2, NO_x and SO_2 emissions, impact on employment and other factors. In the concept, redemption takes place by a governmental body, in order to keep control and confidence. On the whole, the concept helps preventing a situation that currently occurs in the Netherlands: RE-certificates are imported, but the CO_2 credits remain in the country of origin. Since emissions of imported electricity are not added to the total emissions account of an importing country, from the viewpoint of CO_2 reduction it does not make a difference whether to import green or grey power. A condition for international trade is that all production characteristics are really transferred over borders. Advantages of the RECS proposal are thus: no double counting, and no free riders. It is stated that, whereas the system of green power certificates is just a back-office system, the RECS concept is more comprehensive. Workshop participants however disagree on the applicability: market players want to decide for themselves where to trade the contents of the jewel box. In the current state of market development, the idea of a jewel box may be attractive, but reality is that conditions are not yet met for such a system.

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