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SECTORAL CO_2 EMISSIONS IN THE NETHERLANDS UP TO 2010

Update of the Reference Projection for Policy-making on Indicative Targets

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Abstract

The Dutch government is aiming to formulate Indicative Targets for maximum sectoral CO_2 emission levels in 2010. To this end, emission levels expected in the future were determined in this study for four sectors: Households and Services, Agriculture, Transportation and Industry/Energy, with heavy reliance on the Reference Projection for energy and greenhouse gases in the Netherlands. Published in 2002, the Reference Projection has been used to evaluate the progress in realising the national climate change policy in the Netherlands. The Reference Projection, since updated to accommodate a number of newly implemented policy measures, focuses on partial changes in future CO_2 emissions; a detailed overview of developments with respect to energy use, energy saving, fuel mix or energy costs is not included in this projection. The results of the study have led to some adjustments to the energy trends up to 2010 and to extra emission changes after discussion with the relevant sector representatives. Results for the Industry/Energy sector in 2005 are of special interest, because they play a role in the development of the Dutch National Allocation Plan under the EU Emission Trading Scheme.

The report starts by defining the new sectoral emission format and fitting the base year figures to the updated national emission statistics, with a substantial downward correction of industrial emissions being implemented. Next, three rounds of recent policy updates, totalling more than 40 emission changes, are described. Collectively, these policy updates also provide for a significant decrease in future emission levels. Results are then presented for the national level and the four different sectors mentioned above. In the Industry/Energy sector, emissions increase due to adjustments to the previously expected trends in the outlook. All changes in emissions taken collectively lead to a total emission in 2010 in accordance with present GHG policy. Finally, as a contribution to the discussion on allocation of emission rights, the results for Industry/Energy are compared to future emission levels according to sector expectations, as expressed by the respective representatives. The sector perceptions that showed diversion from the study results are also described; diversion may be explained by such factors as differences in expected growth rates.

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SUMMARY

Introduction

The climate policy evaluation document, 'The progress of the Netherlands climate change policy: an assessment at the 2002 evaluation moment', (VROM, 2002) states the desire for more certainty on the realisation of the Dutch CO_2 emission target between 2008 and 2012. More than in the past, the responsibility for meeting this target is now allocated to the various ministries as emission levels are formulated per sector (Indicative Targets). In this way the effort required from the target groups becomes transparent. The Indicative Targets only apply to CO_2; these are formulated by the Netherlands Ministry of Spatial Planning, Housing and the Environment (VROM) in consultation with the other ministries involved (Ministry of Transport, Public Works and Water Management; Ministry of Agriculture, Nature and Food Quality and Ministry of Economic Affairs) and the VROM General-Directorate for Housing. Estimates for CO_2 emissions from ECN and RIVM up to 2010 are used as starting point for formulating sectoral Indicative Targets.

Estimated emissions

ECN and RIVM determined the expected development of CO_2 emissions up to 2010 in a Reference Projection, which was published in January 2002 (see Table S.1, last column). This has been updated to allow sectoral Indicative Targets to be formulated. The expected updated emissions in 2010 are given in the fourth column. For comparison, the CO_2 emissions for 2000, based on the most recent Emission Registration data, are also provided, as well as an estimate of emissions in 2005. The expected total emission in 2010 is equal to the Kyoto target of 186 Mton. This is partly the result of extra policy measures but also of a number of other adjustments.

Table S.1 *Estimated CO_2 emissions [in Mton] in the Reference Projection update and the Reference Projection, 2002*

	Reference Projection Update			Reference Projection 2002
Indicative Target Sector	2000[1]	2005	2010	2010
Agriculture/Horticulture	8.1	7.7	6.5	8.3
Transport	35.2	36.8	38.3	36.4
Households and Services	31.7	30.1	29.0	30.5
Industry/Energy	101.2	109.0	112.2	115.3
Industry and Construction	*37.8*	*40.7*	*42.9*	*55.8*
Energy	*63.4*	*68.3*	*69.2*	*59.5*
Total	176.1	183.6	186.0	190.5

Adjustments to the Reference Projection

The emission figures from the Reference Projection have been adjusted in three ways (see Figure S.1). The first adjustment involved the allocation of the emissions to four Indicative Target Sectors (ITS): Households and Services, Agriculture/Horticulture, Transport and Industry/Energy. These sectors correspond roughly with the responsibilities of the Netherlands Ministry of Spatial Planning, Housing and the Environment (VROM), the Ministry of Agriculture, Nature and Food Quality, the Ministry of Transport, Public Works and Water Management and the Ministry of Economic Affairs. The figures for the base year 2000 have been adjusted in agreement with the most recent figures from the Emission Registration. These corrections also affect future emissions.

[1] The emission figures have been corrected for temperature and include process emissions.

The second adjustment involved a large number of changes (minor and major) in current policy, which had taken place after the formulation of the Reference Projection (mid-2001). Here we are concerned with 'policy in the pipeline' changes leading to emission reduction in 2010 (total -4.0 Mton), measures from the Strategic Agreement between political parties (2002, a total of +0.2 Mton) and measures in the recent Framework Agreement (a total of -0.1 Mton).

The third adjustment was based on a consultation of the target groups in the spring of 2003 and realised developments that were still uncertain in the Reference Projection of 2002.

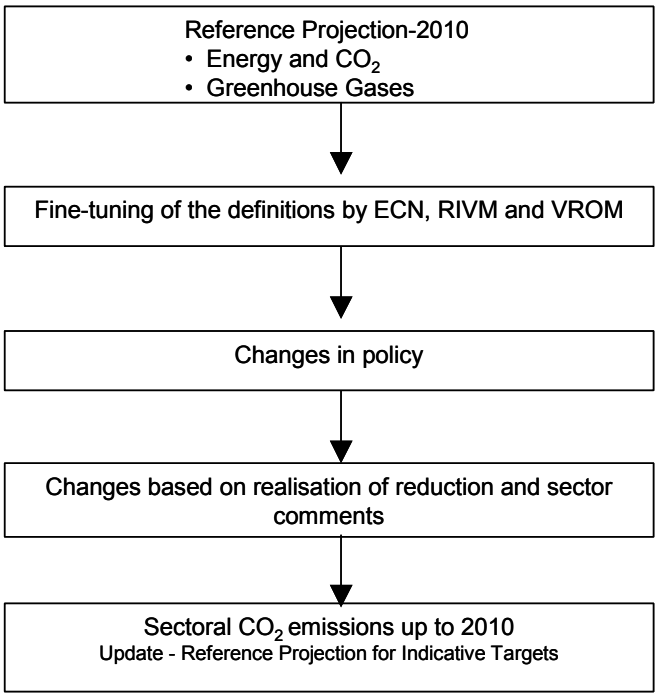

Figure S.1 *Flow chart for determining 'Sectoral CO_2 emissions up to 2010'*

Overview of emission changes up to 2010

Table S.2 shows the results of the adjustments with respect to the figures in the ECN/RIVM report, *Referentieraming energie en CO_2 ('Reference Projection on Energy and CO_2') 2001-2010'*, dating from 2002. Further details can be found in the individual chapters arranged per sector.

The difference in 'Fine-tuning of the definitions' is, first of all, a consequence of new sector definitions[2]. The emissions from mobile equipment in the sectors: Agriculture/Horticulture, Services (part of ITS Households and Services) and Construction (part of ITS Industry) have been transferred to ITS Transport. This has no consequences for the total emission, however. The large mutations within Industry/Energy are the result of a different allocation of cogeneration production. Moreover, emission in the Industry sector has been adjusted downwards because of a double counting in previous Emission Registrations (-3.8 Mton). The total adjustment after the fine-tuning of the definitions amounts to -2.5 Mton. Of this amount, +1.2 Mton is the result of definition adjustment and -3.7 Mton stems from revised figures from the Emission Registration.

[2] The difference with the RIVM/ECN report 'Reference Projection Greenhouse Gases 2001-2010' (2002) is that some deviations are a result of rounding off the figures.

Table S.2 *Adjustment of CO_2 emissions in 2010 compared to the 2002 Reference Projection [Mton]*

Indicative Target Sector	Fine-tuning of definitions	Policy changes	Mutation trends in sectors
Agriculture/Horticulture	-1.0	-0.8	0
Transport	+3.0	+0.3	-1.4
Households and Services	-1.8	+0.3	0
Industry/Energy	-2.7	-3.7	+3.2
- Industry and Construction	*-13.5*	*-0.0*	*+0.6*
- Energy	*+10.8*	*-3.7*	*+2.6*
Total	-2.5	-3.9	+1.8

In order to be able to adhere to international reporting obligations, the national Emission Registration method needs to be improved. The possibility that future improvements may lead to more CO_2 emissions than estimated in the Reference Projection cannot be excluded. The windfall reduction that climate policy experienced this year may be counteracted by future setbacks.

The total effect of policy adjustments on CO_2 emission is determined by the balance of positive and negative contributions of approximately 40 policy changes. The most important policy adjustments, in terms of reduction volume, are found in the Coal Agreement (-1.5 Mton above the reductions already included in the Reference Projection 2002); the Borssele nuclear power plant, if kept in production (-1.4 Mton); the horticulture regulation (-0.8 Mton) and the introduction of the 'environmental quality of electricity production' (MEP) subsidy scheme for renewable energy (-0.4 to 0.5 Mton). The termination of the Energy Premium Scheme (EPR subsidies) is the measure that resulted in the largest increase in emissions (+0.6 Mton).

The adjustments in sectoral trends involve mainly developments in transport and industry/energy. Developments in fuel mix for the car fleet and in passenger car use are beneficial for reducing CO_2 in transport. Industry is dealing with a larger growth in physical production, on the one hand, and a smaller growth in cogeneration (balancing out to +0.6 Mton) on the other. Power plants are facing a higher electricity demand from companies and a lower electricity demand from households, a smaller growth in cogeneration production in industry and some internal changes that will lead to an increase in emissions (balancing out to +2.6 Mton).

Translation into Indicative Targets

In the Reference Projection2002 future developments are assessed on the basis of a number of driving factors. Here, several uncertain factors play a role e.g.:

- economic development, especially in the energy-intensive industry,
- the transition towards more liberalised markets for gas and electricity,
- the solidity of historical figures,
- the effect of policy measures.

The effect of these uncertain factors has been analysed in the Reference Projection 2002, where the margin for total emissions in 2010 is established at 191 +/- 12 Mton.

The same margin, i.e. a CO_2 emission of 186 +/- 12 Mton, is used for 2010 in the update of the Reference Projection. The sector representative consultation has confirmed the presence of various socio-economic uncertainties. The liberalisation trend has also become somewhat clearer with respect to the energy and emission effects. Yet, the intended introduction of the CO_2 emission trade is creating new uncertainties about emission reductions in the industrial and energy sectors. The uncertainty of historical data manifested itself strongly in the earlier mentioned substantial adjustment of the emission figure for 2000. As for policy uncertainties, ECN and RIVM maintain their doubts about the estimated reductions as a result of the glasshouse cultivation regulation and the Coal Agreement for power plants.

The manner in which the uncertainty margin is taken into account is a matter of policy. The total of expected emissions per sector constitutes the Dutch target for 2010 (± 186 Mton). Statistically speaking, there is a 50% chance that this target will not be reached. In order to increase the chances of achieving the CO_2 target, the Indicative Targets should be lower than the sectoral emissions that were estimated in this report. Another option to improve the chance of meeting the CO_2 target is to have a set of reduction measures in reserve that can be activated at short notice if existing policy measures are insufficient.

Comparison with information on social groups

Dutch companies that are obliged to participate in the EU emission trade system are responsible for approximately 57% of total Dutch CO_2 emissions. According to the Benchmarking Verification Agency for energy efficiency (VBE in Dutch) the emission trend of these companies is higher than according to the update of the Reference Projection. The difference is due to an alternative method for estimating future emissions and a larger VBE-assumed growth in volume of the industrial and energy sectors. VBE's micro-growth figures, which are based on questionnaires among individual companies and branch organisations, are less suitable for the macro-sectoral approach that is used by ECN and RIVM. In addition, representatives from industry, energy and glasshouse cultivation have commented on ECN and RIVM projections. In some cases, new insights of the representatives have been adopted, while in the others, there was no need for ECN and RIVM to adjust the figures.

1 INTRODUCTION

The Climate Policy evaluation document of February 2002 (VROM, 2002) calls for more certainty with respect to the realisation of the Kyoto target. As the implementation of the Kyoto Protocol draws near, the Dutch obligation becomes binding. In order to increase certainty on the reduction of greenhouse gases, the intended result will have to be formulated in terms of an emission level target per sector (Indicative Target). In this way, the government wants to provide more clarity on the focus of the policy intended for the target groups. The Indicative Targets for emissions in 2010 serve as focal points for the sectors and ministries involved. A solution to threats of exceeding the Indicative Target will be sought following the established procedure. The Indicative Targets for CO_2 are formulated per sector, while the Indicative Targets of other greenhouse gases are formulated on a national level. The non-CO_2 greenhouse gases are not discussed in this report. Starting point for the Indicative Targets are the emissions per sector from the following ECN/RIVM reports: *Referentieraming energie en CO_2, 2001-2010* by Ybema et al. (2002a) and the *'Reference Projection for Greenhouse Gases in the Netherlands - emission projections for the period 2001-2010'* (Van den Wijngaart, 2002).

However, the CO_2 emission figures from the Reference Projection 2002 cannot be used without some adjustment for the following reasons:

1. In the publication of the Reference Projection 2002 differences were shown between the RIVM and ECN definitions with respect to the emission figures for the base year, 2000. This resulted in some uncertainty in the sectoral emissions for 2010 and therefore a policy request for a further fine-tuning of the ECN and RIVM figures.
2. During the formulation of the Indicative Targets, a sector division was agreed on, in which sectors would be linked to a responsible ministry. This division deviates to some extent from the division normally used by ECN and RIVM. As a result, the available emission figures for 2010, as well as the historical figures, had to be translated into a new format, the so-called 'Indicative Target sectors'.
3. Since the publication of the Reference Projection, various parts of policy have been adjusted and completed. First of all, some policy measures, which were still in the pipeline during the Kok II Cabinet, were to be implemented in the short term. This has partly taken place e.g. the Coal Agreement (see Chapter 3). The possible effects on CO_2 emissions were assessed per adjusted policy measure (Menkveld, 2002). At the start of the Balkenende I Cabinet, some adjustments were also proposed in the so-called Strategic Agreement, sometimes resulting in extra reduction and sometimes in extra emissions (see Ybema et al, 2002b). Finally, new policy proposals affecting CO_2 emissions were formulated in the Framework Agreement. All these mutations must be translated to the selected sectors and the effect for 2010 established.
4. In 2003, the estimated future emissions were presented to representatives of the various consumption sectors. The resulting discussions with the sectors led to the estimated emission figures being adjusted in a few cases.
5. The expected emission figures were also determined for 2005, which is the year that the emissions trade will be launched. For the Industry/Energy sector, this emission value can be used as the upper limit for the emission of companies participating in the European system of emissions trade, although not all companies in this sector will participate.

The various definitions, the new policy measures and the sector discussions will collectively determine the new emission figures on the basis of which ministries will formulate their Indicative Targets. The figures for 2005 provide information that can assist in the allocation of emission rights.

This study also includes an analysis of the costs of CO_2 emission reduction, both for the future (2001-2010) and the past (1990-2000). These results will be published in a separate report (Boonekamp, 2003). The study was conducted by the Policy Studies Unit of the Energy Research Centre of the Netherlands ECN, in close consultation with the Netherlands Environmental Assessment Agency (MNP) of the National Institute for Public Health and the Environment (RIVM), which was also responsible for the emission data for the transport sector. Finally, it must be noted that a new Reference Projection will be formulated in the second half of 2004, in which estimated future emissions will be updated again.

This report is intended as background to aid in the establishment of sectoral Indicative Targets. It aims to offer insight into the realisation of the emission figures for 2010 to policy makers and those directly involved in this work. It is not our intention to re-explain the Reference Projection. Neither is it up to us to go into the same level of detail as in the report on policy adjustments (Menkveld, 2002; Ybema, 2002). Here, the relevant sectors are discussed in separate chapters, allowing readers to select the chapters in which they are interested. Each chapter provides an overview of the most important emission-determining factors and a brief, but complete, overview of policy and the effect of adjustments on previously obtained emission figures. Each chapter ends with the relevant figures for the Indicative Targets and an analysis of the uncertainties. Sector-based chapters are:

- Households and Services (Chapter 5)
- Agriculture/Horticulture (Chapter 6)
- Industry/Energy (Chapter 7)
- Transport (Chapter 8).

The sector-based chapters are preceded by a short description of sector definitions by ECN and RIVM. Chapter 2 represents a new division for sectoral Indicative Targets, followed by a summary of the effects of all adjustments (Chapter 3) and an overview of the developments in total CO2 emission (Chapter 4). The report concludes with information on the developments up to 2010 from a sectoral viewpoint. ECN/RIVM results are first compared with the results of the sector questionnaire (VBE, 2003); this is followed by the deviating views from the various sectors

2 FINE-TUNING OF DEFINITIONS AND CATEGORIES OF EMISSION DATA

2.1 Fine-tuning the definitions between RIVM and ECN

During the formulation of the Reference Projection 2002 it became evident that ECN and RIVM emission data differed. RIVM uses the annual Emission Registration (ER) as a basis for its historical CO_2 emission figures. Emission Registration utilises an internationally prescribed format and method. Their CO_2 emission monitoring is partly based on the environmental reports of individual companies and partly on sectoral energy figures from Statistics Netherlands (CBS) (see Figure 2.1 below). The results, including process emissions and other greenhouse gases, have been presented in the Environmental Balance (RIVM). The definitions in the 'Reference Projection Greenhouse Gases 2001-2010' have been based on the definitions of the Emission Registration and the Environmental Balance. ECN determined the historical CO_2 emissions using the MONIT system (Boonekamp, 1998), on the basis of energy consumption figures from CBS-NEH and emission factors per fuel type. Future consumption developments were determined with the National Energy Outlook calculation system (NEV-RS). MONIT translates these consumption developments into future emissions (see Figure 2.1). The trends for energy and CO_2 are described in the 'Reference Projection on Energy and CO_2, 2001-2010'.

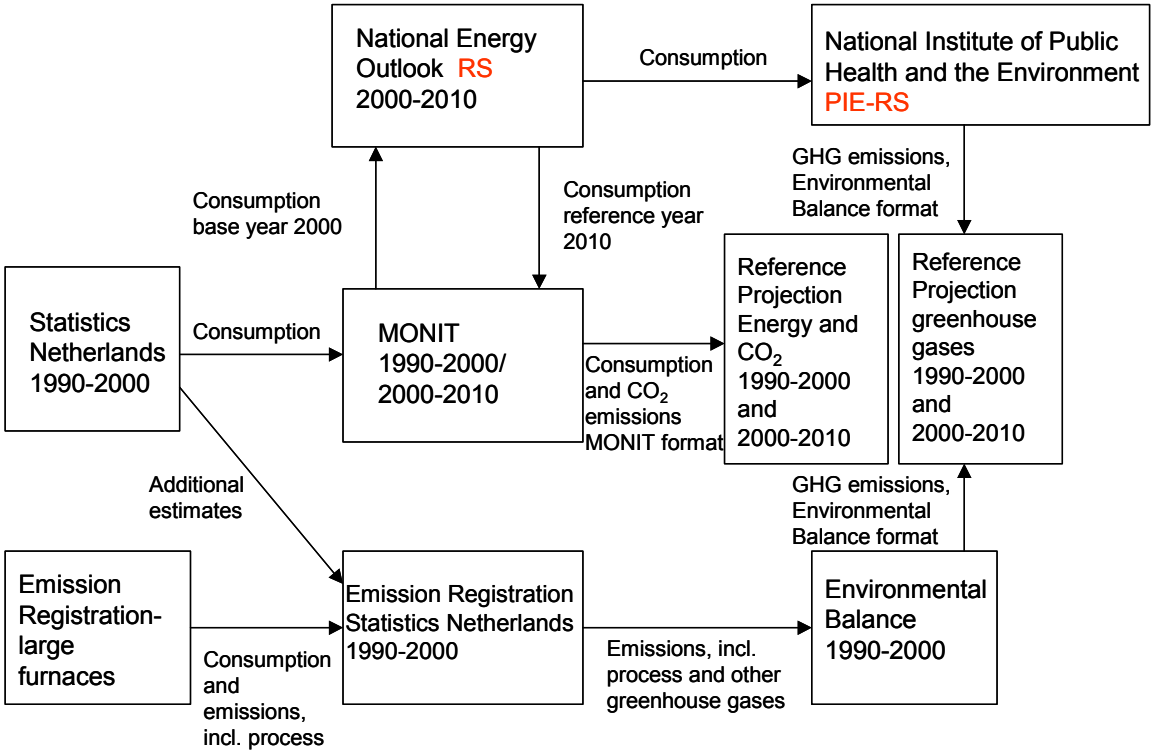

Figure 2.1 *ECN and RIVM information systems with respect to greenhouse gases*

An extensive analysis took place with respect to the differences in definitions of historical emission figures between MONIT and the Emission Registration (ER, 2002), covering the years 1990, 1995 and 1999-2001. The differences in total emissions ranged from 0-2%. For some sectors, however, the differences were larger, depending on the year analysed. The differences were also due to the so-called process emissions (totalling 1-2 Mton), which have been included in the Emission Registration, but do not form part of the energy-related MONIT emissions.

The differences are not fixed once determined. The latest Emission Registration (ER, 2003) contains some improvements that were processed retrospectively in previous years. The largest change involves a substantial adjustment of the emissions from the chemical industry in 2000. Ever since the change from a central database to company delivery of data in their environmental reports, Emission Registration (ER) has suffered loss of quality. The ER is obliged to use the CO_2 emission figures from the environmental reports of individual businesses, as a result of which the ER is unable to distinguish between energy and non-energy-related emissions. This is why some emissions were included twice in the Emission Registration, leading to an extra 3.8 Mton. To be able to fulfil international reporting obligations properly, the ER's approach and/or the environmental reports need improvement. It is not inconceivable that these improvements may lead to larger emissions. This year's windfall emission reduction may be undone by future setbacks.

The differences have been partly reduced by improving several specific emission coefficients in the MONIT system, for example, with waste incinerators and refineries. The remaining differences were processed in MONIT as corrections to the emissions that ECN had calculated earlier. This way, MONIT delivers emission figures that correspond entirely with the figures from the Emission Registration. The emissions in historical years are also corrected for annual fluctuations in average temperature during the heating season. Moreover, some minor corrections have been applied to bring ECN and RIVM's methods for correcting these fluctuations completely in line with each other. The corrections found for base year 2000 have also been applied to the calculated emissions for 2005 and 2010. Thus, the future emission figures presented in this report are the result of the Emission Registration's emission figures for 2000 plus the increase of emissions in accordance with the Reference Projection 2002 and all further updates (see Chapter 3).

2.2 CO_2 emission categories for Indicative Targets

In the process of formulating the sectoral Indicative Targets for CO_2 emission, the interdepartmental advisory committee decided to define the sectors in such a way that they could be linked to a responsible ministry. To avoid confusion with other divisions, these sectors will be indicated with the prefix 'ITS' (Indicative Target Sector). The following sectors and ministries are involved:

- ITS Industry/Energy (Ministry of Economic Affairs),
- ITS Households and Services (Ministry of Spatial Planning, Housing and the Environment),
- ITS Agriculture/Horticulture (Ministry of Agriculture, Nature and Food Quality),
- ITS Transport (Ministry of Transport, Public Works and Water Management).

The ITS Industry/Energy sector will be subdivided into the subsectors, ITS Industry and ITS Energy, in all overviews. Thus emission figures will be provided for five sectors. Table 2.1 provides an overview of the structure of the Indicative Target Sectors and the relation to the division in target groups, which RIVM uses in its Environmental Balance, and the division in consumption sectors according to energy statistics (Statistics Netherlands - CBS-NEH).

Noteworthy differences:

- Mobile equipment: according to CBS these are allocated to agriculture/horticulture, construction and other businesses. Here, they are allocated to the transportation sector.
- Building industry and coke plants: here these are allocated to ITS Industry; CBS separates construction building sector from the rest and considers coke plants as belonging to the energy sector.
- Joint venture cogeneration plants at industrial sites: until 1993 CBS categorised these plants under industrial energy use and after 1993 placed them in the 'decentralised or local' sector as part of the energy sector. Here, they are also allocated to the ITS Energy sector.

The sectoral emissions refer only to the *direct emissions* of fuel consumption; supplied electricity or heat does not contribute to sectoral emissions. The indirect emissions of electricity and heat consumption that occur during production are completely allocated to the ITS Energy subsector. As a result of this approach, the emissions of a sector may decrease, despite strongly increasing electricity consumption.

The MONIT system has been extended with a new reporting format for CO_2 emissions to provide emission figures per Indicative Target Sector. The emissions per Indicative Target Sector can only be provided for a limited number of historical years, however. Format adjustment of ECN and RIVM emission figures only took place for the years 1990, 1995, 2000 and 2001. A similar translation into Indicative Target Sectors took place for future reference years. With these adjustments, emissions per Indicative Target Sector can be produced for every reference year and scenario.

Table 2.1 *Division of emittants according to Indicative Target Sectors, target groups and CBS consumption sectors*

Indicative Target Sectors	CBS/MONIT Consumption Sectors	Target groups - RIVM
ITS Industry	Chemical industry	Chemical industry
	Food and luxury goods	Other industry
	Paper	
	Base metal	
	Construction materials	
	Other metals	
	Other industry (excl. recycling)	
	Coke plants (part of E sectors)	
	Construction (incl. sand/gravel, excl. mobile equipment)	Construction (incl. sand/gravel)
	Part of other industry (Recycling = part of waste disposal)	Part of waste disposal (recycling)
ITS Energy	Centralised generation	Energy sector
	Decentralised generation	
	Oil/gas extraction (incl. oil processing, excl. refineries)	
	Distribution companies	
	Waste incineration	Part of waste incineration
	Refineries	Refineries
ITS Households and Services	Services (excl. mobile equipment) = Non-profit + commercial	Trade, services and government
		Water companies
		Sewerage and sewage plants[3]
		Part of waste disposal
	Households	Consumers
ITS Agriculture/ Horticulture	Agriculture and horticulture (excl. mobile equipment)	Agriculture
ITS Transport	Transport (incl. mobile equipment construction, agriculture and services)	Traffic and transport

[3] Mainly gas for offices, as electricity consumption does not result in (direct) emissions.

2.3 Emission 2000 in the new format

Table 2.2 provides an overview of emissions per Indicative Target Sector for 2000; the figures were jointly established by RIVM and ECN. Previously published emissions from the Reference Projection 2002 are also provided. Important process emissions are put in parentheses.

The total CO_2 emission for 2000 turned out to be 3.7 Mton[4] lower than the emission previously published in the Reference Projection of 2002. This can be almost completely attributed to the revision of a number of emission figures in the most recent update of the Emission Registration (see also Section 2.1).

Looking at the differences per sector, Industry and Energy attract the most attention. However, these large differences are also the result of joint venture cogeneration being transferred from industry (Reference Projection 2002) to central electricity production (Update Reference Projection).

Table 2.2 *CO_2 emissions in 2000 after fine-tuning and in Reference Projection 2002 [Mton]*

	Fine-tuning of definitions ECN/RIVM	Reference Projection 2002
Total MONIT Indicative Target Sectors		179.8
ITS Agriculture/Horticulture.	*8.1*	
incl. mobile equipment	9.6	9.2
ITS Transport .	*35.2*	
excl. mobile equipment	32.9	32.9
ITS Households and Services	*31.7*	
Households	21.3	21.5
Services	10.4	
incl. mobile equipment	10.8	12.0
ITS Industry[*]	*37.8*	*>50.3*
Industry	37.2	49.1 (1.3)
Construction	0.6	
incl. mobile equipment	0.9	1.2 (0.5)
ITS Energy	*63.4*	*<54.0*
Refineries	12.0	11.9
Power plants, etc.	47.9	34.8
Other E companies		7.2
- Waste incineration	1.6	
- Oil/gas extraction	1.8	
- Distribution companies	Some power plants	
ITS Industry/Energy	*101.2*	*104.2*
Total Indicative Target Sectors	176.1	

[*] Fine-tuning of ECN/RIVM definitions incl. coke plants; Reference Projection 2002 excl. coke plants.

[4] In Table S.2 the total decrease in 2010 amounts to only -2.5 Mton. The difference is caused by fine-tuning of future emission figures in transport and industry in 2010, which are not related to adjustments in the base year.

3 ADJUSTMENTS FOR RECENT POLICY AND TRENDS

The development of CO_2 emissions, as provided in the Reference Projection 2002, constitutes the basis for the establishment of sectoral Indicative Targets for the coming years. The policy determined as of June 2001 was processed in the calculations in the Reference Projection 2002.[5] After this, the effects of the so-called 'pipeline policy' of the Kok II Cabinet (1998-2002) were charted, followed by some adjustments by the government to (previously planned) energy and climate policy since the publication of the Reference Projection 2002. These had, first of all, to do with the Strategic Agreement of the Balkenende I Cabinet (2002). More recently, several new policy measures have been announced in the Framework Agreement, set up during the present Balkenende II Cabinet). Finally, the projection results have been tested against the perceptions of the sector representatives, which has also led to some adjustments in future emissions. The emission effects of various adjustments are overviewed below. Appendix 2 contains a summarised overview of all individual mutations.

3.1 Pipeline policy

Reference Projection 2002 includes government policy determined as of 1 July 2001, with a few exceptions. The continuation of established policy up to 2010 was used as starting point. Moreover, there was still policy under preparation then ('pipeline policy') that could contribute to bridging the gap between expected realisations and the target for CO_2 emission in 2010. Table 3.1 shows the estimates of the additional effect of separate measures that were made at that time. In the meantime, some policy components have been amended, e.g. the kilometre tax. Further details can be found in the sector chapters.

Given the uncertainties, specified policy could lead to an additional emission reduction of approximately 2.5 Mton up to a maximum of 5.0 Mton in 2010 (see Menkveld, 2002). Where the full potential of some of the policy agreements with the sectors is realised, the total effect estimated is 4 Mton. The extra reduction is mainly realised in the regulations for glasshouse cultivation, the Coal Agreement and the kilometre tax (see Section 3.2), but also by sharpening and intensifying the Households and Services policy. For the year 2005, this can result in a total extra emission reduction of 1.2 Mton.

Table 3.1 *Estimated additional CO_2 reduction of 'pipeline policy' for 2010*

	[Mton]
Wind Energy Covenant (BLOW)	0.05
Commercial and industrial building (sharpening of the Energy Performance Coefficient -EPC- and Energy Performance Advice Utility - EPA)	0.15
Housing (sharpening of the EPA and the BANS Agreement)	0.16
Industry Long-term Agreement -2 with topics for expansion)	0.08
Horticulture (regulation relating to glasshouse cultivation	0.79[6]
Kilometre tax, 'the new driving force', etc.	1.30
Covenant on Coal-fired Plants and CO_2 reduction	1.50[7]
Total	4.0

[5] Exceptions are policy on cogeneration, import of renewable energy and energy labels.
[6] In Menkveld (2002) margin of 0.1 – 0.8 Mton, see Chapter 6.
[7] In Menkveld (2002) margin of 0.7 – 1.5 Mton, see Chapter 7.

3.2 Strategic Agreement

The Strategic Agreement of the Balkenende I Cabinet (2002) proposed a few policy adjustments in energy and climate policy, including:

- limitation and adjustment of subsidy regulations for renewable energy and energy-saving,
- cancellation of the kilometre tax, decrease in taxes on petrol, increase in investments in infrastructure and termination of the premium regulation for energy-efficient cars,
- keeping the nuclear power plant at Borssele in operation after 2004.

Ybema (2002) has estimated the effect that can be expected for 2010 if these policy adjustments are implemented. The emission effects would be the result of a different development of renewable energy, energy saving and fuel deployment than at present. It was also assumed that the remaining existing policy and policy plans of the Kok II Cabinet would be implemented as planned (see also the specific chapters per sector).

Table 3.2 *Changes in CO_2 emissions in 2010 with the implementation of the Strategic Agreement*

	[Mton]
Transport (no kilometre tax, etc.)	+1.7
Renewable energy (MEP)	-0.1
Energy sector (keeping Borssele open)	-1.4
Savings - Industry	+0.1
Savings - Households and Services	+0.1
Cogeneration	-0.2
Total	+0.2

Transport has experienced an increase in emissions as a result of cancelling the kilometre tax. On the other hand, a large reduction in the energy sector will be achieved because the nuclear plant in Borssele will be kept in operation for a longer period. The total effect of the Strategic Agreement would amount to an increase in emissions of 0.2 Mton. However, the margin in this figure is large due to uncertainty on the magnitude of the various effects (see Chapter 4).

The effects of the Strategic Agreement have also been determined for 2005. For most policy measures the effect applies to a proportional share of the effect for the period of 2001-2010. The extra emission reduction resulting from keeping Borssele open will already be realised in 2005. This results in a decrease in emission of 0.7 Mton, which adds up to the extra reduction of over 1.2 Mton as a result of the pipeline policy.

3.3 Framework Agreement and sector trends

Recent policy plans

In the summer of 2003, the government announced several policy plans having an effect on future emissions in the Framework Agreement (Dutch Government, 2003). The effects have been determined here on the basis of further development in the budget of 2004, (see Table 3.3).For traffic, this involves refraining from lowering the taxes on petrol as stated in the Strategic Agreement (Kok's 25 cent tax measure will not be revoked). Instead, investments will be made in expanding road capacity and simplifying the fiscal commuter traffic regulation. For renewable energy, there is a shift in incentive method, i.e. from indirect incentives (Art. 36-i of the regulation) to direct incentives with MEP compensation. For Households and Services various policy changes are experienced, such as an increase in the regulatory energy tax (REB: small consumers' tax) and termination of EPR (Energy Premium Scheme). Another policy measure, which is not national but worth mentioning, is the recently formulated EU Directive for energy labelling of buildings and houses (EU, 2002). The increase in the REB will also influence the

expected emissions of the energy sector through a decrease in electricity demand. More details can be found in the sector chapters.

Table 3.3 *Changes in CO_2 emissions in 2010 with implementation of the Framework Agreement*

	[Mton]
Transport	-0.1
Renewable energy	-0.4
Households and Services	+0.5
Electricity supply	-0.1
Total	-0.1

Adjustment of sector trends

The presentation of the projection results to representatives of various sectors has led to a discussion on the selected starting points and expected developments. This has resulted in both positive and negative mutations per sector. Especially the trend breach in cogeneration has been a cause for readjustment of expected emissions (see Table 3.4). It must be noted that this is partly a shift in emissions in the industrial, refining and electricity sectors. For transport, a different composition of the fuel mix of the fleet and less growth in private car use has been assumed. The somewhat decreased growth in domestic electricity consumption has been processed as a mutation in the emissions from the electricity supply. The new figures are the result of current perceptions of ECN and RIVM; they need not necessarily correspond to the perceptions of representatives of the sectors.

Table 3.4 *Changes in CO_2 emissions in 2010 as a result of adjusting sector trends*

	[Mton]
Chemical industry	+0,5
Base metal industry	+1,0
Cogeneration industry	-0,9
Transport	-1,4
Refineries (cogeneration)	-0,7
Electricity supply	+3,3
Total	+1,8

4 NATIONAL RESULTS OF THE TOTAL REFERENCE PROJECTION UPDATE

4.1 Development of total CO_2 emissions

Table 4.1 provides an overview of the total emissions and the emissions per Indicative Target Sector (ITS) up to 2010. The emissions in 2000 correspond to the most recent Emission Registration figures (ER, 2003). The expected emissions in 2005 and 2010 are the result of:

- Trend developments for 2001-2010 according to the Reference Projection for 2002, including emission reductions resulting from the policy as of mid-2001.
- Extra emission reductions or increases as a result of various policy additions.
- Emission effects after adjustment of sector developments.

The emission figures, corrected for temperature[8], also include process emissions[9].

Table 4.1 *Expected CO_2 emissions in the Reference Projection update [Mton]*

	2000	2005	2010
ITS Agriculture & Horticulture	8.1	7.7	6.5
ITS Transport	35.2	36.8	38.3
ITS Households and Services	31.7	30.1	29.0
Households	*21.3*	*20.4*	*20.1*
Services	*10.4*	*9.6*	*9.0*
ITS Industry	37.8	40.7	42.9
Industry	*37.2*	*39.9*	*42.1*
Construction	*0.6*	*0.8*	*0.8*
ITS Energy	63.4	68.3	69.2
Refineries	*12.0*	*13.6*	*14.3*
Power plants, etc.	*47.9*	*51.3*	*51.5*
Waste incineration	*1.6*	*1.6*	*1.6*
Oil/gas extraction	*1.8*	*1.9*	*1.9*
ITS Industry/Energy	101.2	109.0	112.2
Total ITS	176.1	183.6	186.0

Figure 4.1 illustrates the future development of expected emissions and also the emissions for the reference years, 1990 and 1995 (corrected for temperature). According to the Reference Projection update, CO_2 emissions will increase from 176 to 186 Mton. The average growth in the 2000-2010 period thus amounts to 0.6% per year. Between 1990 and 2000 the average CO_2 emission growth amounted to 0.5-0.6% per year. The trend of increasing CO_2 emissions seems to continue after 2000.

[8] The emissions in 2000 have been corrected for the relatively high temperature during the heating season. For 2000 and future reference years the average temperature for 1970 to 2000 during the heating season has been used as a basis.

[9] This represents a total emission of 1.8 Mton in 2000 and 2.3 Mton in 2010, mainly from the Industrial sector (construction materials and production) and the Energy sector (plants).

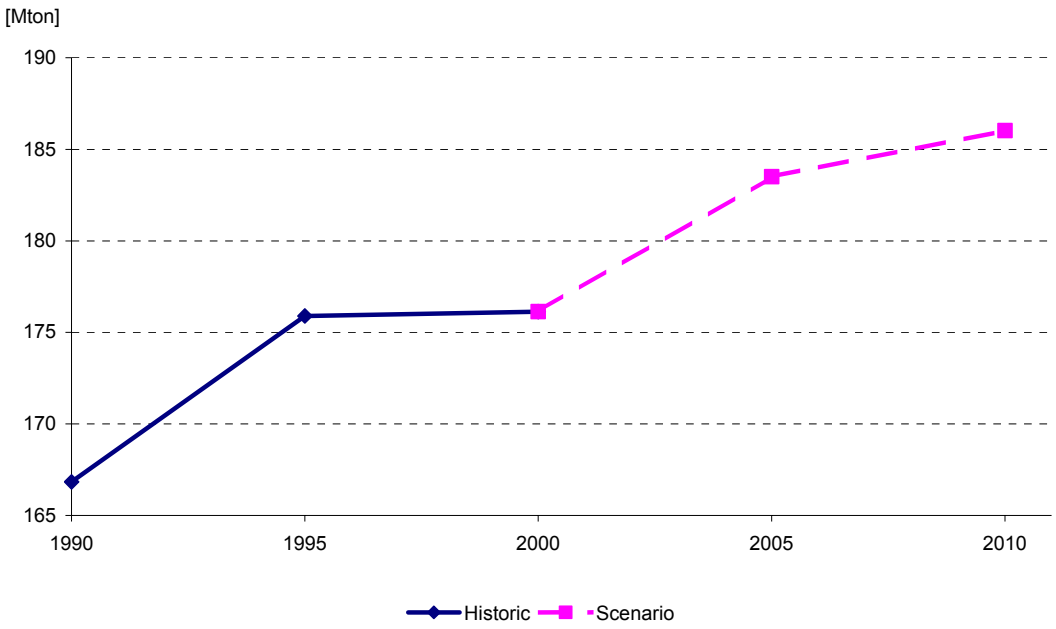

Figure 4.1 *Development of total CO_2 emissions in the 1990-2010 period*

The expected emission in 2010 is shown to correspond exactly with the Kyoto target of 186 Mton; however, this is partly a coincidence. The Reference Projection 2002 reported an emission of 191 Mton. Some additional policy (especially the so-called pipeline policy) was implemented to reduce these emissions to target level. Next, various mutations not related to policy were added, including the adjustment of base year figures as a result of fine-tuning between ECN and RIVM, the adjustment of the Emission Registration because of double counting in industry and the adjustment of some sectoral trends (see Chapter 7). These mutations result in the emission of 186 Mton in 2010. Without recent adjustment of the Emission Registration (ER, 2003), the emission level would have reached 190 Mton.

4.2 Achievements and starting points in Reference Projection

The 2002 Reference Projection assumed an average economic growth of 2.5% per year. Table 4.2 illustrates that a higher GDP growth is needed in the remaining period in order to achieve the earlier estimated average GDP growth of 2.5% per year.

Energy consumption figures are also available up to and including 2002. After correction for yearly temperature variations, total energy consumption in 2001 and 2002 showed an average increase of 1.1% per year. The 2002 Reference Projection originally assumed a growth rate of 0.6% per year in 2001 - 2010. In the update of the Reference Projection this figure is adjusted to 0.7% per year. This is the result of trend adjustments that are somewhat compensated by extra energy-saving policy, which will be implemented mostly after 2002. As a result, the growth for 2003-2010 amounts to 0.6% per year.

As for CO_2 emissions, the realised growth is also higher than originally assumed. The emission for base year 2000 has, however, been adjusted downward. Given the target of 186 Mton in 2010, the emission is allowed to increase by 0.4% per year in the remaining period. This is the case in the update of the Reference Projection; the emission growth is lower than the energy consumption. This lower CO_2 emission growth is a result of the extra emission policy implemented after the Reference Projection 2002. The entire extra reduction is achieved after 2002.

Table 4.2 *Achievements, starting points and expectations in the Reference Projection 2002 and the update [% per year]*

	1990-2000	2001 and 2002	2003-2010	2001-2010
GDP growth				
- Reference Projection 2002		+1.5	+2.75	+2.5
- Realisation / Update Reference Projection	+2.95	+0.8	+2.9	+2.5
Energy consumption				
- Reference Projection 2002				+0.6
- Realisation / Update Reference Projection	+1.0	+1.1	+0.6	+0.7
Emission CO_2				
- Reference Projection 2002				+0.6
- Realisation / Update Reference Projection	+0.5	+1.4	+0.4	+0.6

4.3 Uncertainties in emission figures

In the Reference Projection of 2002 the 95% reliability interval for CO_2 emissions was set at ± 12 Mton. Thus, given the value of 191 Mton established earlier, the margin in 2010 is found between 179 and 203 Mton CO_2. The most uncertain factor with the largest effect on CO_2 emissions in 2010 is the future import of electricity. Other important uncertain factors consist of the growth in energy intensive industries and refineries, and the gas price.

Recent policy adjustments with respect to the Reference Projection 2002 will result in extra CO_2 emission reduction. A number of adjustments, e.g. the BANS Agreement (Administrative Agreement New Style; see Chapter 5), do not lead to substantial extra reductions but do enhance the chance of other policy measures achieving the intended effect. Moreover, the extra reduction achieved by keeping the nuclear plant at Borssele in production (see Section 7.3) seems relatively robust in view of the positive political decisions determined here. The uncertainty with respect to the policy effect in 2010 might be more limited than estimated in the Reference Projection 2002. However, the EU decision regarding the implementation of emission trade has been found to lead to new uncertainties in sectoral emission trends. All in all, it cannot be expected that the total uncertainty of the policy effects will diminish. Moreover, the other uncertainties surrounding social developments and emission factors are not fewer than in the Reference Projection 2002. Therefore, a margin for a total CO_2 emission of 174 to 198 Mton (186 +/- 12 Mton) must be assumed.

5 HOUSEHOLDS AND SERVICES

This chapter will examine developments in the Households and Services sectors, followed by the total Households and Services Sector. Emphasis is put on policy that may influence CO_2 developments, especially recent additional policy that could not be included in the Reference Projection.

5.1 Households

5.1.1 Main determining factors

The following factors are important for the developments in households:

- demography (15.9 to 16.6 million inhabitants in the period 2000-2010),
- number of houses and households (6.85 million in 2000 compared to 7.42 million in 2010),
- increase in consumption (3.1% per year),
- energy prices (rising gas prices),
- energy and climate policy (see overview).

Demographic factors mostly determine the number and types of houses and, thus, gas consumption. The number of households and consumption growth mostly determine electricity consumption. Increasing energy prices and policy measures can curb the increase of consumption.

5.1.2 Existing policy and recent adjustments

The existing policy is described in Reference Projection 2002 (Ybema, 2002). Below, this policy will be summarised in combination with a description of recent adjustments.

Regulating Energy Tax (REB)
Since 2000, this tax is raised on all gas and electricity consumption and amounts to 5.45 €ct/kWh for electricity and 12.0 €ct/kWh for natural gas. In the Reference Projection 2002, the level of the tax was assumed to increase with inflation and thus remains constant. Recently, the Balkenende II Cabinet decided to increase the REB for small users by 10% as of 2005. As a result, the gas price will increase by 3.3% and the electricity price by 4.2%. The somewhat smaller energy demand results in an extra reduction of 0.15 Mton in 2010, of which only the share of gas (0.09 Mton) counts for the emission reduction of households.

Energy Performance Standard (EPN)
The EPC standard of 1.0 that applies to new housing since 2000 generally corresponds with a consumption of 850 m^3 gas. The Reference Projection 2002 assumes that this standard will not be further adjusted.

Energy labels
Consumers are informed about annual consumption of various electric appliances via energy labels. The effect of labels is enhanced because subsidies from the Energy Premium Scheme are linked to the most energy-efficient appliances. Although this measure had not yet been established in 2001, the Reference Projection 2002 already assumed that the label specifications for washing machines and refrigerators would be adjusted by the EU. As for tumble dryers and dishwashers, it is assumed that no further adjustment/sharpening will take place until 2010. As a result of recent termination of the EPR, the label system will lead to fewer saving, especially with respect to appliances whose energy label will be adjusted. This has been included in the effect of the mutations in the EPR.

Energy Premium Regulation (EPR)
The EPR involves subsidies for housing isolation, very efficient central heating boilers (better than high efficiency boiler), solar boilers, PV systems, efficient white goods/appliances and (until this year) LCD screens for computers. The EPR is financed from the revenues of the REB tax. In the Strategic Agreement it was decided to halt public funding of the EPR and replace it with an energy subsidy regulation. This would lead to a slight increase of emission with 0.08 Mton. In the Framework Agreement, however, it is suggested that the regulation be abolished altogether. Including the effects on EPA/certificates and labels for appliances, this results in an extra increase of emissions of 0.6 Mton (margin 0.3 - 0.9 Mton).

Energy Performance Advice (EPA)
Since 2000, energy saving measures in existing houses are mapped through EPAs. It is the intention that the advice given by EPA then leads to the implementation of measures. The EPA advice and the implementation of advised measures are voluntary, but both are supported by EPR subsidies. The Reference Projection 2002 does not assume any obligations until 2010. The additional pipeline policy involves intensification of the EPA measures. (Menkveld, 2002) assumes an extra reduction of 0.08 Mton (margin of 0.05 - 0.20 Mton). The decision of the Balkenende II Cabinet to abolish EPR does not apply to EPA, for which a limited budget remains available. Moreover, EPA's information function could be partly taken over by the energy certificate (see EU Directive). However, as the EPR for energy saving measures will be terminated, the profitability of investments will decrease and a smaller share of the improvement advice will be implemented. The actual effectiveness of EPA will thus decrease. The negative effect on previously determined EPA emission reductions has been included in the mutations concerning EPR.

BANS
The Climate Covenant in the framework of the Administrative Agreement New Style (BANS) between the government, IPO and VNG involves the efforts of local authorities with respect to their contribution to government climate policy. Within the theme of house-construction, three ambition levels can be distinguished, i.e. 'active', 'trend setting' and 'innovative'. The levels involve different demands as to the reduction of energy consumption of new houses. In current construction, there are certain preconditions for sustainability and the number of EPA consults. During the establishment of the effect of pipeline policy it was assumed that the BANS regulation will be continued after 2004. For current house-construction (Menkveld, 2002) does not assume an additional effect, given the developments of the EPA approach (see EPA), the obligatory EU certificates and the EPR. If new housing constructed between 2002 and 2010 would have a 10% lower EPC value, this could result in an additional reduction of 0.2 Mton. Menkveld (2002), however, assumed that BANS will lead to a reduction of no more than 0.08 Mton.

EU Directive Energy Performance Buildings
This Directive (EU, 2002) establishes the energetic requirements for new houses and houses that are to be renovated and the availability of energy certificates with respect to existing buildings that change owners. The first requirement is already covered by the prescribed EPC values for new housing in the Netherlands. The system of energy certificates should be activated by 2006 in the Netherlands. This certificate should indicate achievable measures for improvement, yet the implementation of these measures is not obligatory. The system of certificates will co-exist next to the existing systems of voluntary EPAs (see EPA). The advice may also be the Dutch implementation of the EU certificate. Certificates must be drawn up when a house actually changes owners. Given the number of times that people move there will soon be more certificates than (voluntary) EPAs. The improvement advice may be of lesser quality than the current EPAs if only the EU demands are fulfilled. The certificates do seem to be linked to the 'natural moment' for improvements, i.e. a change of owner of a house. Therefore, the combination of the certificate and the EPR could lead to an extra reduction compared to the current system with EPA. As a result of the abolishment of EPR, however, a smaller share of the advice will lead to

actual improvement measures. The remaining effect of the EU Directive will be included in the EPR.

5.1.3 Other adjustments

Beside policy adjustments, a limited reduction of electricity demand compared to the Reference Projection 2002 has also been assumed. Given the recent small consumption growth, the larger average growth that was assumed in the Reference Projection 2002 does not seem very realistic anymore. An average growth in annual consumption of 2.1% (instead of 3.1%) will now be assumed. The lower growth will result in 2-3 PJ_e less electricity consumption in 2010.

5.1.4 Development of emissions in household sector until 2010

The development of CO_2 emissions between 2000 and 2010 is provided in Table 5.1, including the effect of various policy measures (see also Chapter 3). On balance, these measures hardly seem to affect the CO_2 developments that were established in the Reference Projection 2002. The adjustment of trends in electricity consumption do not affect the direct emissions of the household sector.

Figure 5.1 illustrates the development of the total CO_2 emission of households, i.e. the direct emissions of fuel consumption; the indirect emission of electricity consumption is allocated to the energy sector (see Section 7.3).

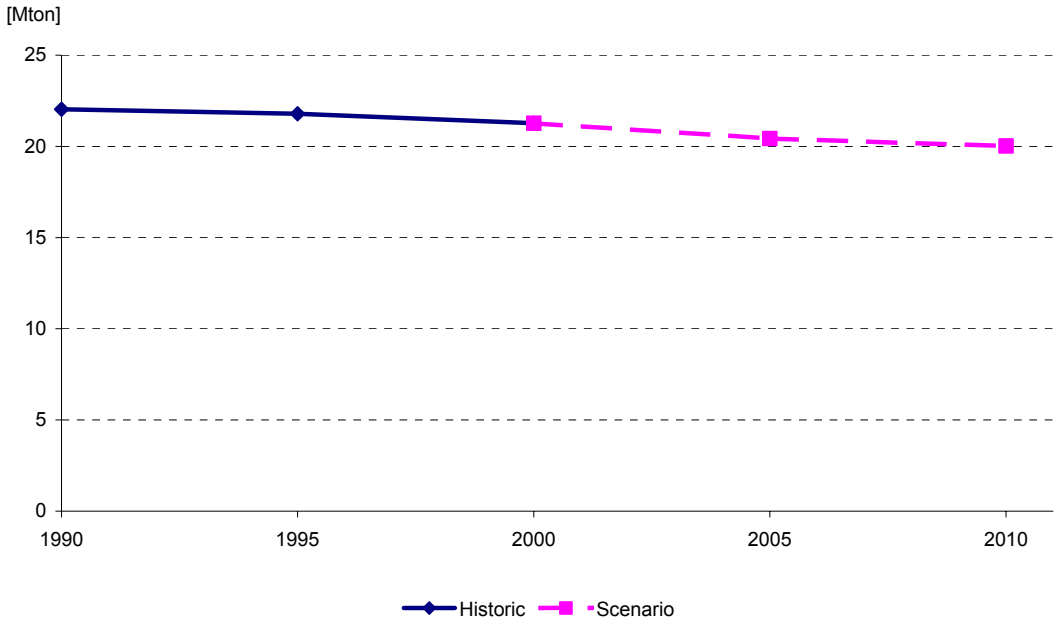

Figure 5.1 *Development of CO_2 emission household sector 1990-2010*

5.2 Services sector

The services sector comprises of all companies outside of Industry, Energy and Agriculture/Horticulture as well as the non-profit sectors Government, Health care and Education. Mobile equipment are not included.

5.2.1 Main determining factors

Important factors for the development of Services are:

- economic growth of the services sector and government (3.0 and 1.7% per year respectively),
- increase in number of employees,
- floor area per employee,
- energy prices (rising gas prices),
- energy and climate policy (see overview).

The number of employees and the floor area per employee determine the required volume of buildings and thus gas consumption and part of electricity consumption. It is also influenced by economic growth, i.e. through the speed with which new buildings arise. The growth also influences electricity consumption of activities other than housing construction. Rising energy prices and policy measures may curb the increase of energy consumption.

5.2.2 Existing policy and recent adjustments

Regulating Energy Tax (REB)

For electricity this tax amounts to 1.75 €ct/kWh until 50,000 kWh and 0.34 €ct/kWh for more than 50,000 kWh; for natural gas the tax amounts to 5.6 €ct/kWh until 70,000 m^3 and beyond 1.0 €ct/kWh. Until 5000 m^3, i.e. 10,000 kWh, small user levies apply (see households). A large share of consumption in the services sector is covered by the lowest REB tax as a result of which the effect of REB on end user prices remains limited. In the Reference Projection 2002 the tax remains at the same level. Recently, the Balkenende II Cabinet decided to increase the small user REB by 10% as of 2005. As a result, the average energy price will increase by only 0.6%. This will result in an extra reduction in 2010 of 0.02 Mton, half of which (in the case of gas) leads to a reduction within the sector itself.

Fuel tax (BSB)

This tax applies to a large range of fuel types. For cogeneration, the fuel tax was transformed from input tax to output tax. This has been included in the Reference Projection 2002.

EIA and VAMIL

EIA and VAMIL are fiscal instruments for companies that pay corporation tax (35%). In the case of the raised Energy Investment Deduction (EIA), 55% (previously 40%) of the investment costs are deductible. On the basis of VAMIL (Early Depreciation Environment Investment), an investor can deduct the investment after one year. On balance, these instruments lead to 15-20% lower investment costs. The Reference Projection 2002 assumed that both instruments will remain active.

Because of the large free rider effects, it was decided in the Strategic Agreement to adjust the EIA-list and to abolish the VAMIL arrangement. There appears to be plenty of potential to adjust the EIA list in such a way that the effect on energy saving is limited (Jeeninga, 2002). Because the VAMIL regulation is of little consequence for the services sector, abolishment will hardly result in fewer saving. In total, CO_2 emissions will increase by 0.02 Mton in 2010.

Energy Investment Regulation Non-Profit (EINP)

The regulation focuses on non-profit and special sectors that cannot use the EIA arrangement. The techniques that are eligible for subsidy are largely the same as on the EIA energy list. The subsidy regulation has been abolished in the Strategic Agreement. The effect on emissions is quite limited for the same reasons as with EIA/VAMIL.

LTA-2
In addition to the Long Term Agreements (LTA's) for efficiency improvement of the 1990s, some new agreements have been made (LTA-2) with branch organisations, among which companies from the services sector. Beside improvements in energy consumption, more saving can be achieved by adjusting products or logistics. Until 2005, a 1.4% annual saving is expected from the participating sector. In the Reference Projection of 2002, the LTA-2 was not included as an instrument. Given the limited participation of the services sector at the moment, no emission reduction is expected in 2010 that is worth mentioning.

Energy Performance Coefficient Utility Construction (EPC-U)
The Households and Services has a standard for energy consumption in new housing, which is known as the EPC value. The standard differs, depending on the function of the building. In the Reference Projection 2002, the EPC standard for 2000 was maintained as starting point until 2010. The pipeline policy involved more stringent energy performance demands for utility construction in 2002, amounting to approximately 6.5%, as an average of the building categories. This resulted in an additional reduction of CO_2 emissions of 0.15 Mton compared to the Reference Projection 2002, which is mainly caused by a decrease in gas consumption.

Energy Performance Advice Utility (EPA-U)
The Reference Projection 2002 still assumed that EPA for existing buildings and on a voluntary basis would not play a substantial role until 2010. The effect of EPAs is limited because they are only expected to affect those measures that penetrate to a lesser extent than could have been expected on the basis of their profitability, which is because they are not widely known. The adjustment of policy involves linking EPA-U to the Environmental Protection Act. No additional effects are expected here because a large number of EPAs have already been incorporated in the Reference Projection 2002 (see also the EU Directive).

EU Directive Energy Performance Buildings
This Directive involves energetic demands for new houses and houses that are renovated as well as the availability of an energy certificate for existing buildings that change owner. The former is already covered in the Netherlands by the prescribed EPC values for new buildings. The certificate system must be implemented in the Netherlands in 2006. The certificate must indicate attainable measures of improvement, however, the implementation of these measures is not obligatory. The certificates are added to the existing EPA-U arrangements. No large differences can be detected per implemented advice, because the EPA-U has been attuned to the Directive. As for the amount of advice, the certificate will eventually cover a wider area, but until 2010 it will remain limited. The timing of the moment when the advice is formulated, i.e. when a house changes owner, may possibly lead to wider implementation of the advice. All in all, no emission reduction effect is expected until 2010.

BANS
Compared to the Reference Projection 2002, the adjusted policy will also include the effects of the Administrative Agreement New Style (BANS). The theme involved is municipal buildings and facilities, as part of the services sector, i.e. all municipal buildings (new and existing) and public lighting. Due to the limited number of municipal buildings (Menkveld and Coenen, 2001), the previous efforts in this area as well as in new housing, which is already part of EPC, the BANS theme results in an extra emission reduction of 0.01 Mton.

5.2.3 Other adjustments

Beside policy adjustments, there have been no adjustments of energy consumption trends in the services sector, compared to the Reference Projection 2002. The emission in the base year has been increased by 0.2 Mton, however, due to new figures from the most recent Emission Registration. This mutation also affects the reference years, 2005 and 2010.

5.2.4 Development of emission services until 2010

Recent policy adjustments appear to have hardly any effect on the CO_2 emission development that was previously established in the Reference Projection 2002 (see Table 5.1). Figure 5.2 illustrates CO_2 development since 1990. The breach in trend starting in 1995 appears to continue in the future. It is worth noting that the strongly increasing electricity consumption does not affect the direct emissions presented here. This effect becomes visible as extra fuel and emission in power plants (see Energy sector).

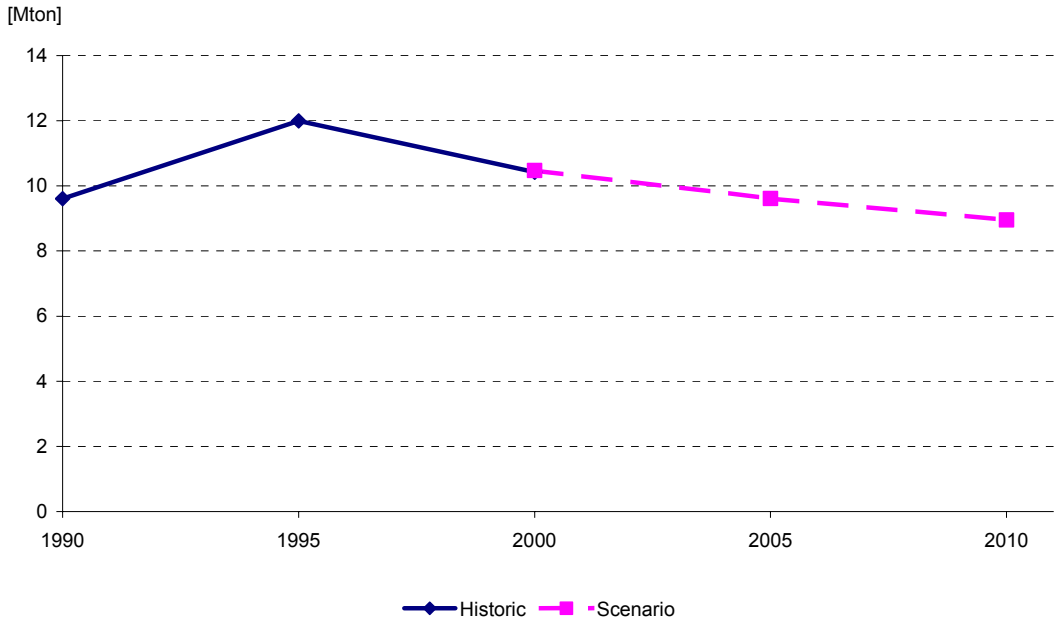

Figure 5.2 *Development of CO_2 emission sector ITS services 1990-2010*

5.3 Total Households and Services

The households and services sectors are combined in the formulation of Indicative Targets for CO_2 emission (see division of sectors, Chapter 2). Below, the results will be presented of the ITS Households and Services (see Table 5.1).

Adjustment of trends and policy

No adjustment of trends in the Households and Services have taken place that will affect emission. The emission of the base year has been slightly increased (see Section 5.2). The adjustments of emission in the Reference Projection 2002, given in Table 5.1, involve the policy effects of the Pipeline policy, the Strategic Agreement and the Framework Agreement. All in all, the total emission increases slightly as a result of the adjustments.

Development of emissions

The emissions in the ITS Households and Services appear to decrease by 6% (households) and 13% (services) after 2010. It is worth noting that the CO_2 emission is not related to the consumption of mobile equipment (e.g. agricultural contractors) or the electricity consumption.

Table 5.1 *Emissions ITS Households and Services 2000-2010 in Reference Projection 2002 and Update Reference Projection [Mton]*

	Reference Projection 2002		Adjustments policy	Reference Projection update	
	2000*	2010*		2010	2005
Households	21.3	19.6	-0.2 + 0.1 + 0.5	20.1	20.4
Services	10.4	9.1	-0.2 + 0.0 + 0.0	9.0	9.6
Households and Services	31.7	28.7		29.0	30.1

* Incl. update for improved figures for 2000 for the Emission.

Figure 5.3 shows the development of CO_2 emissions in the period 1990-2010. The decreasing trend that started in 1995 seems to continue until 2010.

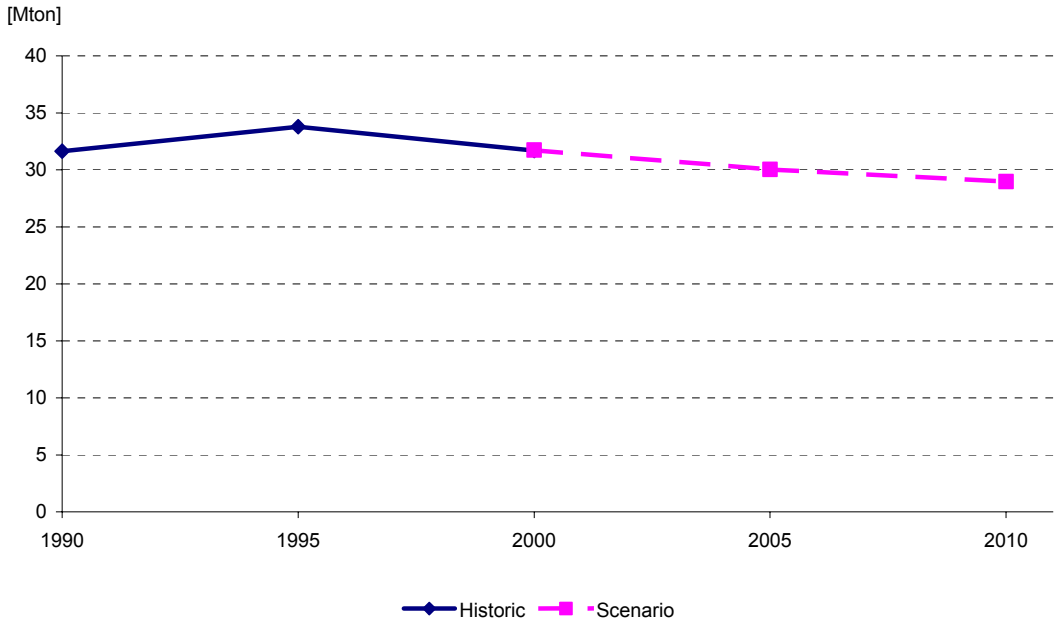

Figure 5.3 *Development of CO_2 emissions sector ITS Households and Services 1990-2010*

Uncertainties emission 2010

Various factors influence uncertainty with respect to emissions:

- Economic growth and the translation into floor area and number of employees.
- The effectiveness of the EPN, which is uncertain because a larger economic growth will lead to the construction of more buildings, in conformity with EPN.
- The effectiveness of other policy measures, especially new policy (EPA); the uncertainty is connected to the very heterogeneous character of the sector.
- The effect on investment behaviour of energy prices, combined with EPA and EPN.
- Inaccuracy in the figures of the energy consumption in the base year, which affects expectations for 2010.

The uncertainty in the increase of ICT-related applications is not important here, because electricity consumption does not lead to CO_2 emission in the services sector. Given the limited effect of recent policy adjustments, the margins in emission, as previously illustrated in the Reference Projection, does not change.

6 AGRICULTURE AND HORTICULTURE

6.1 Main determining factors

In agriculture and horticulture, glasshouse cultivation dominates energy consumption. CO_2 emission developments are mainly determined by the following factors:

- The volume of the glasshouse cultivation area and the added value per m^3.
- The liberalisation of the gas market, which leads to less favourable gas tariffs for horticulture.
- The development of heat supply from external cogeneration plants.
- The energy saving policy (see overview).

The starting points of the Reference Projection 2002 are given in Table 6.1. With a mostly constant area and an increase in physical production of 1% per m^3, the total physical production increases by 1% per year. The added value increases more rapidly, such that one can speak of an 'upgrading' of the product range. In addition, the heat consumption for glasshouse cultivation decreases because, according to expectations, gas costs will rise as a result of the transition towards a new system for gas prices. The large growth of electricity consumption is linked to the upgrading (more illuminated cultivation), which affects the CO_2 emissions of the sector, insofar as the extra electricity is generated by the sector itself.

Table 6.1 *Overview of developments in glasshouse cultivation 2001-2010 according to the Reference Projection*

		[%/year]	Source
Added value		2.4	CPB/ECN
Area		0	LEI, LNV
Physical production/ha		1	LEI
Physical production		1	
Upgrading product package		+1.4	
Specific consumption:	heat	-1.9	ECN
	electricity	+2.9	ECN

More heat supply from cogeneration capacity, which is partly owned by energy companies, will replace part of gas consumption and thus reduce CO_2 emission. The Reference Projection 2002 assumes a growth in cogeneration heat supply[10], but not as much as in the 1990s.

6.2 Existing policy and recent adjustments

REB and BSB

The Regulating Energy Tax on gas and electricity considers the total glasshouse cultivation sector as one consumer. Due to the lower tariffs for large users, the average REB tax in glasshouse cultivation is negligible. The small users in agriculture do face taxes (see Chapter 5). The fuel tax (BSB) applies to a broad range of fuels. For cogeneration this tax was transferred from an input tax to an output tax. Both REB and BSB are increased with inflation. The effect of the intended 10% increase of REB is negligible in this sector.

[10] In the case of 'privately-owned' cogeneration plants, gas consumption and CO_2 emissions do belong to the agriculture/horticulture sector. A limited growth is assumed for this type of cogeneration in the period 2000-2010.

EIA/VAMIL

The Reference Projection 2002 assumed that the existing (improved) EIA and VAMIL regulations would be maintained. EIA and VAMIL lead to an effective contribution of approximately 20% on investments. The 'green label' greenhouse is a quality mark with which one can apply for this regulation. Other fiscal regulations such as green investments are assumed to have been included in the EIA/VAMIL-effects. The most important recent changes, stemming from the Strategic Agreement, are the exclusion of energy investments from the VAMIL regulation and the revision of the list of facilities that are eligible for EIA. The effect on energy consumption and CO_2 emission are negligible in agriculture and horticulture. On the one hand, Senter is expected to succeed in the revision of the EIA list in such a way that especially the saving options that have a large free rider effect (80% or more) are removed from the list. These options are profitable enough for implementation anyway. On the other hand, less profitable investments in saving will be done because of agreements (see Order in Council), which will result in extra applications for EIA and VAMIL. The effect of the adjustments of EIA and VAMIL on emissions remains limited to an increase in CO_2 emission of 0.01 Mton in 2010.

BANS

Compared to the Reference Projection 2002, the effects of adjusted policy are included in the Administrative Agreement New Style (BANS). The consequences for the 'Agriculture' theme involve a more active role of local authorities in the implementation of the GLAMI Covenant and an active role in providing information about options for energy saving and renewable energy. Insofar as additional effects can be achieved here, they largely overlap with GLAMI/Orders in Council.

GLAMI Covenant

In the Horticulture and Environment Covenant 1997-2010 (GLAMI), the government and the horticulture sector established targets for energy efficiency, i.e. an improvement of 65% in 2010 compared to 1980. In 2001, an improvement of 48% was achieved compared to 1980, yet the target of 50% in 2000 was not reached. In order to achieve the GLAMI target in 2010, an improvement of another 40% is needed compared to 2000. In the meantime, the role of GLAMI has almost completely been taken over by the Order in Council Agreement.

Order in Council for Glasshouse cultivation

The Order in Council is the most important instrument for the sector and ensued from the GLAMI Covenant. Via a so-called implementing ordinance, obligations are enforced on individual companies with respect to energy standards per crop (energy consumption per hectare in greenhouse). Basically, this should be sufficient to ensure the achievement of the energy and emission targets before 2010. Both the GLAMI Covenant and the Order in Council Agreement are considered current policy in the Reference Projection 2002. The implementation methods, however, are not considered strict enough by ECN/RIVM, as a result of which the achievement of the targets in 2010 remains uncertain. In order to realise the GLAMI target, an annual efficiency increase of 4.5% must be realised between 2000 and 2010. An additional analysis has been conducted for the Indicative Targets, based on the realisation of the target for 2010. In order to achieve the corresponding crop standards of the Order in Council of 2010, over 2% will have to be saved in energy consumption per hectare annually. This would result in a total emission of 5.1 Mton for horticulture in 2010. Compared to the target in the Reference Projection 2002, this involves an extra reduction of 0.8 Mton for the entire agriculture/horticulture sector. Given the uncertainties with respect to the observance of the Order in Council, the institutes estimate a lower emission reduction than could reasonably be expected on the basis of the Order in Council standards.

Cogeneration policy
Glasshouse cultivation distinguishes three types of cogeneration production:

- gas engines owned by the market gardener, especially for assimilation lighting,
- gas engines located at the gardener, owned by a distribution company,
- large generating facilities with heat distribution to horticultural areas.

The earlier described EIA, GLAMI Covenant and Order in Council regulations are important for general incentivisation of cogeneration production. In the Reference Projection 2002 a temporary payment discount of 0,57 €ct/kWh is valid for feeding into the grid from existing and new cogeneration, which is especially important for the last two options. In the Strategic Agreement, the Regulatory Energy Tax (REB) is replaced by a variable kWh subsidy from the MEP regulation (environmental quality of electricity production) to compensate for the abolishment of the VAMIL regulation. Especially STAG plants with a large energetic output should be able to profit from the MEP. Large-scale heat distribution to horticulture requires some investments in the heat distribution grid, preferably in combination with new concentrations of glasshouse cultivation. The CO_2 Reduction Plan has financing options for specific projects of up to 40%. The development of cogeneration has been estimated quite optimistically in the Reference Projection 2002, i.e. a 25% growth between 2000-2010. At the moment, there is a decrease in capacity in smaller cogeneration facilities as well as a diminution of operating time, which can be seen a necessary adjustment to market circumstances. A large growth was not estimated for large-scale heat distribution[11]. Due to current financial circumstances, a decrease in heat supply by third parties is estimated, compared to the Reference Projection 2002.

6.3 Other adjustments

There has been no adjustment of the production trend for agriculture and horticulture, compared to the Reference Projection. Adjustment of the emission in the base year as a result of new figures from the Emission Registration was not necessary either.

6.4 Development of emissions until 2010

The figure for the entire agriculture and horticulture sector was corrected for differences in emission figures in the base year, which is common practise for Indicative Targets (see Table 6.2). The figures for horticulture are based on an analysis of ECN[12], in consultation with LTO Netherlands (the Dutch Organisation for Agriculture and Horticulture). To keep the figures identifiable, they have not been corrected in accordance with the total figures.

According to the Reference Projection 2002, the emission already decreases in the period 2000-2010. The relatively large decrease in agriculture is also a consequence of the restructuring that was suggested in the Reference Projection 2002. Based on the starting point of achieving the crop standards in conformity with the Order in Council, the Indicative Target for horticulture implies a significant extra reduction effect of 0.8 Mton.

[11] The pipeline policy study indicates that extra policy, e.g. large government investments in a residual heat grid in the Westland, will enhance efficiency improvement with the aid of cogeneration and heat from third parties to 0.5% per year.
[12] Note on Indicative Target calculation concerning glasshouse cultivation (Dril, June 2003).

Table 6.2 *Emission ITS Agriculture and Horticulture in Reference Projection 2002 and Update Reference Projection [Mton]*

		Reference Projection 2002	Update policy	Update trend	Reference Projection update	
	2000	2010			2010	2005
Glasshouse cultivation	6.9	6.2	-1.1	0	5.1	×
Agriculture & other horticulture	1.8	1.4	0	0	1.4	×
Agriculture & horticulture	8.1*	7.3*			6.5	7.7

* Incl. update for improved figures for 2000 in the Emission Registration and split-off consumption of mobile equipment.

Figure 6.1 indicates the CO_2 development as of 1990. The strong decrease until 1995 seems to repeat itself after 2005. It is worth noting that electricity and heat from third parties has not been included here.

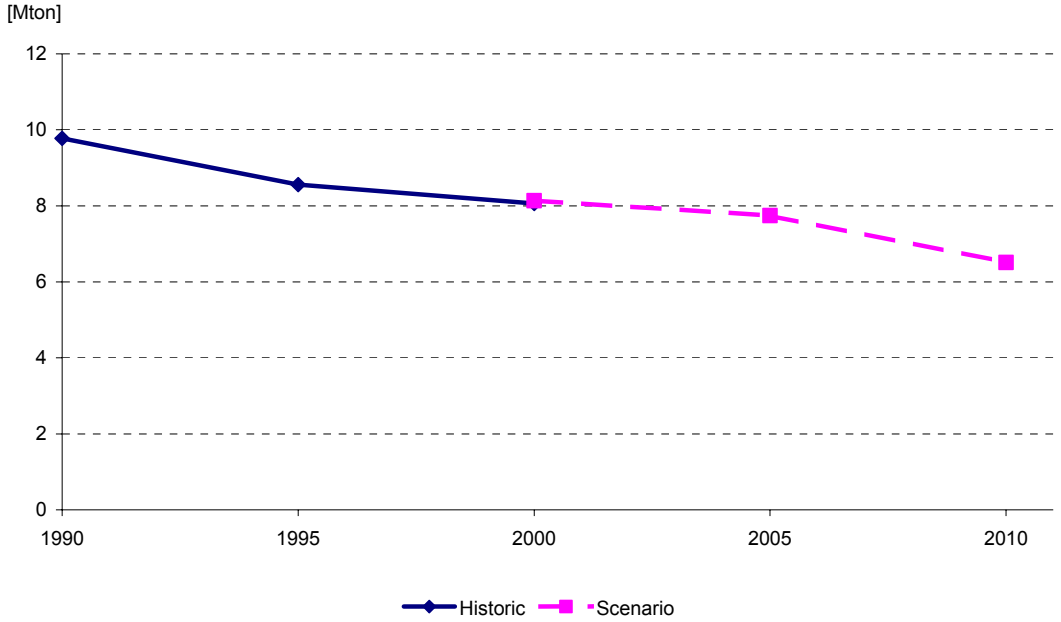

Figure 6.1 *Development of CO_2 emission ITS Agriculture and Horticulture 1990-2010*

Uncertainties CO_2 emission 2010

The bandwidth in CO_2 emissions is relatively small as a result of uncertainty with respect to the area volume. As for the available technology: large changes are not to be expected. The reorientation of the sector will only slightly be influenced by the macro-economic developments. The effects of an adjusted system of gas prices and a higher energy bill as a result of liberalisation are more uncertain. Both energy-extensive and intensive cultivation can be a consequence as well as possible adjustment of the sector structure. The implementation and enforcement of Order in Council standards by local authorities also requires further research. Finally, there is some uncertainty as to the consumption figures and emissions in the base year, especially with respect to agriculture and other horticulture. This uncertainty affects the figures for 2010. The resulting bandwidth in CO_2 emissions in 2010, which was estimated at 15% in conformity with the Reference Projection 2002, is therefore rather large.

7 INDUSTRY AND ENERGY

7.1 General

The Indicative Target Sector Industry/Energy is by far the largest sector with respect to their total CO_2 emission. Moreover, the energy sector distinguishes itself from other sectors because its emissions result from production of electricity, which is consumed by other sectors without emitting substances. As a consequence of this difference, the ITS Industry and ITS Energy will be described separately.

Since 1994, cogeneration facilities that are managed jointly by industry and energy companies, are considered part of the energy sector in energy statistics. As a result, CO_2 emissions in industry are lower than otherwise would have been the case. The gas consumption of the strongly increased cogeneration capacity has been allocated to the energy sector since 1994. The development of the cogeneration capacity will be discussed in a separate section on ITS Energy.

7.2 Industry

ITS Industry consists of the usual industrial sectors, excluding refineries, but including construction and cokes plants.

7.2.1 Main determining factors

The industry also distinguishes non-energetic applications of fuels, with the fuel functioning as feedstock, e.g. in the production of synthetics, fertilizers and iron. Within industry, energy consumption is dominated by the chemical industry (over 50%). The development of CO_2 emissions in industry is mainly determined by:

- the economic development per sector (see Table 7.1).
- dematerialisation, the decoupling of physical production and added value.
- the continuation of energy intensive production in the Netherlands, e.g. aluminium.
- the development of heat supply from joint venture cogeneration plants[13].
- the level of energy prices and differences with competitors abroad.
- policy measures (see overview).

The economic growth of the total industry amounts to 2.5% per year. The expected economic growth of relatively energy-intensive sectors can be found in Table 7.1. The Reference Projection 2002 assumes a somewhat decreasing gas price, stabile electricity prices and competing prices compared to abroad. As a consequence, it is not likely that energy-intensive industry will disappear from the Netherlands. As for dematerialisation, a relatively large growth is expected for energy-extensive sectors such as metallurgic and electro-technical industry, as well as a diminished growth of the organic base chemical industry as of 2005. As a result, the entire industry will become less material-intensive. In addition, the Reference Projection 2002 assumes a growth in cogeneration, but not as strong as in the 1990s (see also cogeneration policy).

[13] Heat from joint venture cogeneration does not contribute to industrial CO_2 emission. This is the case, however, with private cogeneration plants where gas consumption results in CO_2 emission. The latter is not expected to show any growth.

Table 7.1 *Development of added value and emissions of industrial sectors 2000 - 2010 in the Reference Projection 2002 [%/year]*

	V&G	Paper	Chemical	Base metal[14]	Building materials	Refining
Added value[15]	1.6	2.1	2.2	1.9	1.6	2.6
Emission[16] CO_2	0.6	1.1	1.2	-0.2	1.9	2.2
Share:						
• Process emission					30-45%	
• Feedstocks			60%			

7.2.2 Existing policy and recent adjustments

REB Tax

The Regulating Energy tax on gas and electricity is rapidly decreasing with a larger annual consumption. Given the scale of consumption in industry, the tax hardly affects energy prices. Only the smallest companies are facing substantial levies (see Chapter 5), which involves only a small fraction of industrial consumption. Therefore no emission reduction in industry is allocated to the increase of the REB tax in the Framework Agreement.

Fuel Tax (BSB)

The fuel tax applies to a large package of fuels and any consumption scale. The fuel tax for cogeneration has been transferred from an input tax to an output tax. It is assumed that this transfer will not affect the marginal costs for end users. In the budget for 2004, the fuel tax is transferred into an REB tax for large users, with the exception of coal. This transfer is neutral for the government budget and does not affect the CO_2 emission of the industry.

Benchmarking Covenant

The government has made agreements with nearly all energy-intensive companies about striving to belong to the world's top of energy efficient companies in 2012. The top is determined by means of a benchmark. If case of an efficiency gap with the top, extra measures will need to be taken before 2005. If the top has not been reached by then, other less profitable measures will have to be taken before 2008 or measure such as emission trade may be deployed. Many industrial companies appear to be in reach of the top level already. The establishment of the goal (i.e. the actual distance to the world top in 2012) and the translation into saving measures has not been completed. Therefore, the speed of efficiency increases is still surrounded by uncertainties. Since the agreements no new measures have been proposed. This update is based on the effects that were determined earlier in the Reference Projection 2002.

LTA-2

The second generation of long term agreements (LTA's) focuses on smaller industrial consumers with a share of 10-15% of primary industrial consumption. Next to the old target for efficiency improvement (best practise) LTA-2 also includes some broader themes such as 'renewable energy' and 'energy efficient product design' (energy consumption outside the company boundaries, such as the use of energy efficient appliances, sustainable business parks and transport and logistics in the chain). The Reference Projection 2002 already assumed that all companies are obliged to implement 'best practise' via LTA's or environmental permits. In the pipeline policy it was assumed that a more stringent interpretation could result in extra savings of some PJs, i.e. a reduction of 0.08 Mton. A limited assessment of the effect of the broader themes has been included in the projection (some PJs) but it hardly results in emission reductions within

[14] Including coke plants.
[15] In steady prices.
[16] Excluding emission joint venture cogeneration production.

the sectors. In 2003, 500 of the 900 potential companies had acceded the LTA-2. According to the saving plans, 1.4% will be saved annually via more efficient energy consumption and 0.5% will be saved through broader themes. As these themes hardly result in reductions within the sector and the estimated 1.4% complies with the energy-saving rate of the Reference Projection 2002, an additional effect is not projected compared to the pipeline policy.

CO_2 reduction plan
The CO_2 reduction plan focuses on all projects that reduce CO_2 and other greenhouse gas emissions, among which heat distribution grids. An important effect for industry is the stimulation of residual heat utilisation.

EIA/VAMIL
The Reference Projection 2002 assumed an increased EIA, as a result of which 55% (previously 40%) of investment costs is deductible from corporation tax. The VAMIL is added on top of this. All in all, the regulations result in 24% lower investment costs. It was decided in the Strategic Agreement to exclude energy investment from the VAMIL regulation and to revise the list of facilities that are eligible for EIA. The termination of VAMIL results in a lower contribution of the government to 19% of the additional investments. Moreover, it has been assumed that Senter will revise the EIA list in such a way that only the saving options are removed that have a large free rider effect. As a result, the consequences of this policy adjustment remain limited. Worth noting about the abolishment of the VAMIL regulation is the fact that investment decisions are also strongly determined by other instruments, such as Benchmarking and LTA-2. Both adjustments result in an emission increase of +0.1 Mton.

BANS
Compared tot the Reference Projection 2002, the pipeline policy does include the Administrative Agreement New Style (BANS). With respect to local authorities, the theme ‘companies’ involves the implementation plan for the encouragement of sustainable energy in business parks. An important instrument is energy in the environmental permit. In fact, this is current policy, the implementation of which leaves much to be desired for on a local level. Hardly any additional effects are assumed because the Reference Projection 2002 already included this government policy.

7.2.3 Other adjustments

Some starting points and expected developments in industrial sectors that were assumed in the Reference Projection have been adjusted (see Section 3.3). Recent developments in cogeneration have given cause for adjusting the expected growth of industrial cogeneration capacity. As a result, a part of the electricity production and accompanying emissions (0.9 Mton) is moving to the electricity supply sector. In the base metal industry, a larger physical production has been assumed in 2010 within the boundaries of technical options. Given the competing price, the market will not restrict production. For the chemical industry, a somewhat larger production and emission (+0.5 Mton) was assumed. The sum of the trend adjustments amounts to +0.6 Mton (see Table 7.2).

Next to the trend adjustments, the emission in the base year was also considerably adjusted. Compared tot the figures in the Reference Projection 2002, a correction of +3.8 Mton had to be applied to the emissions of industry in order to make the figures consistent with the most recent Emission Registration (see also Chapter 3). This correction also affects emissions in 2005 and 2010.

7.2.4 Development of emissions Industry until 2010

The expected emission in 2010 is not only the result of policy adjustments but also of corrections in the base year as well as the adjustment of production trends. The effects of policy adjustments are given in Table 7.2. The extra reduction of the pipeline policy (LTA-2) is almost completely neutralised by the negative effect of the Strategic Agreement (abolition of VAMIL and adjustment of EIA). All in all, the policy adjustments hardly affect industrial emissions.

The emission of the ITS Industry sector is 0.6% higher in 2010 than estimated in the Reference Projection 2002. It must be noted that a significant correction of the emission in the base year has taken place (see Chapter 3). This correction has been applied to the Reference Projection 2002 figures and in the emission figures for the update.

Table 7.2 *Emission ITS Industry 2000-2010 in Reference Projection 2002 and update [Mton]*

		Reference Projection 2002	Update policy	Update trend	Reference Projection update	
	2000*	2010*			2010	2005
Industry (incl. cokes plants)	37.2	41.5	-0	+0.6	42.1	39.9
Construction	0.6	0.8	0	0	0.8	0.8
ITS Industry	37.8	42.3			42.9	40.7

* Incl. update for improved figures for 2000 in the Emission Registration and split-off consumption for mobile equipment.

Figure 7.1 shows the CO_2 development as of 1990, i.e. the direct emissions of fuel consumption, feedstocks (especially chemical industry) and process emissions (especially construction materials). The decrease starting in 1995 is caused by the substitution of heat production in boilers with joint venture cogeneration capacity, the emissions of which are not part of industry. In the Reference Projection 2002, this process of substitution halts after 2000 and a new increase in emissions occurs. Moreover, it is worth noting that the increasing electricity consumption is also not included in the emission trend.

Uncertainties industrial emissions in 2010

On the one hand, a large increase of production capacity until 2010 is only partly possible, because of the lengthy construction periods. On the other hand, maintaining or even expanding of capacity depends on the choice of (other) locations of international companies when investing in production capacity. The degree of utilisation of existing capacity is determined by the market, which usually operates on a European or global scale when it comes to energy-intensive products. The national and international development is therefore an important determinant with respect to physical demand in the industry and the CO_2 emission. In addition, the statistical observation of emissions has its flaws, as a result of which the starting point for the projection is somewhat uncertain. Finally, the application and performance of new process and energy techniques are facing uncertainties.

As far as policy is concerned, the Benchmarking Covenant has a more obligatory nature than the LTA's. The uncertainty lies in the distance to the world top, which depends on developments elsewhere and in the future. This affects the efficiency improvement that is yet to be achieved. The translation into required measures has only been done for a limited number of years in advance.

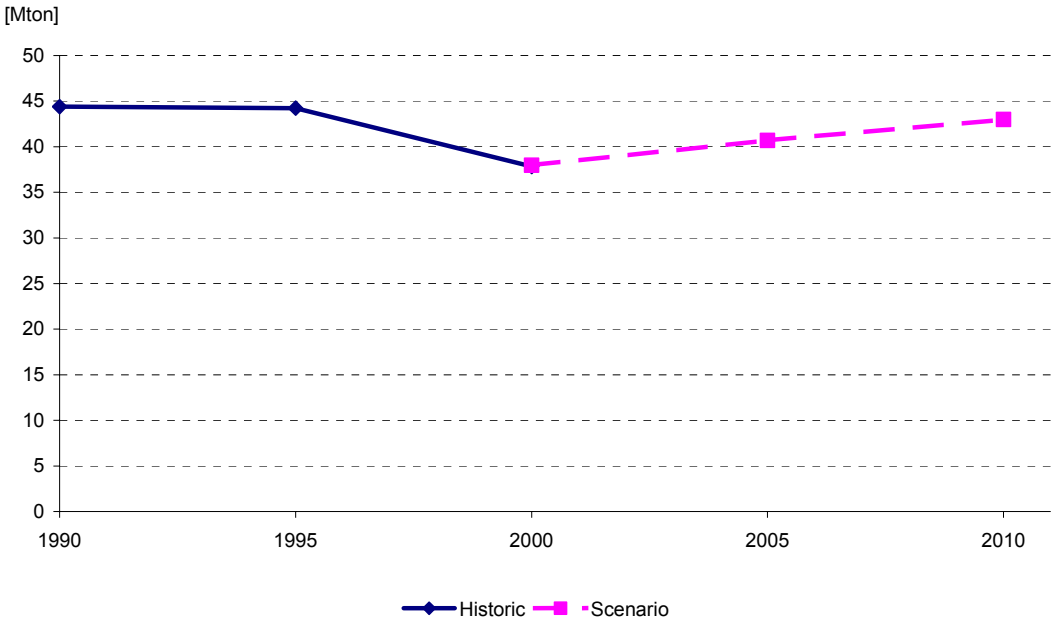

Figure 7.1 *Development of CO_2 emission sector ITS Industry 1990-2010*

Since the Reference Projection 2002 a new uncertain factor has emerged, i.e. the European emission trading system. In 2004, the Netherlands must submit an allocation proposal. The exact details of the system still have to be filled in. First of all, this system could lead to less uncertainty about future emissions. Companies can buy emission credits if they are unable to reduce their emissions sufficiently. The question remains, however, where the reduction actually takes place, i.e. within the Netherlands or abroad. Thus, the uncertainty surrounding the actual emissions in the Netherlands does increase.

7.3 Energy sector

The energy sector consists of electricity production companies, refineries, decentralised electricity production (mainly cogeneration), waste combustion and energy distribution. Refineries and decentralised production will be discussed separately.

7.3.1 Main determining factors

The development of CO_2 emissions is mostly determined by:

- development of energy demand by consumption sectors, especially electricity.
- development of import (electricity) and export (oil products).
- deployment of power plants, fuel choice in power plants and share of renewable electricity.
- shift between 'own' cogeneration production and joint venture cogeneration[17].
- effect on the policy measures (see overview).

The choices that were made in the Reference Projection 2002 concerning these determinant factors are provided for refineries (7.3.3.), decentralised generation (7.3.4.) and power plants. The conversion of fuels in the energy sector is not a goal in itself, but a derivation of the demand for fuels in other sector. The future emission of the energy sector is linked to the future fuel demand and thus depending on economic developments and policy for other sectors.

[17] Heat from joint venture cogeneration for the industry contributes to CO_2 emission of the energy sector; this is not the case with cogeneration plants owned by the industry.

7.3.2 Existing policy and recent adjustments

Various parts of policy have been adjusted in the past. This section indicates which adjustments are important for energy companies.

REB-nil tariff

The demand for renewable energy has so far been encouraged by the zero rate on the REB for green energy (article 36-i of the Act on Environment-based Taxation). The amount of incentivisation had increased to 6.01 €ct/kWh in 2002. In 2003, the nil tariff was reduced to 2.9 €ct/kWh and will be terminated on January 1st 2005. The Reference Projection 2002 assumed 3 million customers in 2010, which is about 40% of the total number of households. Halting the public funding for the stimulation of renewable energy will result in less green electricity demand and less incentive for companies to market green electricity. This will lead to a major decrease in import of green electricity, but has no consequences for national production (see also MEP).

MEP (replaces REB regulation)

The Reference Projection 2002 assumed so-called channelled rebates and tax reductions for producers. Energy distribution companies do not pay part of the collected REB tax (2 €ct/kWh) when they transfer their benefits to the producers of the renewable energy (Art. 36-o, Act on Environment-based Taxation). This transfer reimbursement also applied to 50% of the electricity that was generated by waste incineration plants (article 36-r). Imported electricity from renewable sources, which was sold as green energy, was also eligible for this method of fiscal stimulation. For cogeneration there was a special tax reduction (article 36-t) for electricity fed into the grid. Article 36-u is for co-firing of biomass in coal plants.

Due to the character of the regulation, which was too generic and because of the significant support for the import of electricity from renewable sources, policy has been adjusted. In conformity with the Strategic Agreement, most REB arrangements have been replaced with MEP arrangements (Environmental quality of electricity production) as of July 2003. Part of the 36-i regulation will be transferred mid 2004. The MEP tariffs have been specified per type of renewable energy, depending on the unprofitable top in investments. For cogeneration, there is a compensation that depends on the relative savings. This means that a generic incentive is replaced by an effort-oriented (renewable sources) or performance-oriented (cogeneration) incentive. The greater certainty of support is also important for investors because the yearly updated reimbursements are transferred into regular reimbursements for a longer period of time. The effect on renewable energy production (incl. extra CO_2 free electricity resulting from more efficient generation of renewable energy production) is marginal and corresponds with a reduction of 0.08 Mton CO_2. It was decided in the Framework Agreement to transfer the remaining 36-i compensation to MEP in 2005. Moreover, new MEP tariffs have been established recently that will result in extra renewable production. Altogether, this adds up to an additional emission reduction of 0.36 Mton.

Green investment

Investments in the production of renewable energy are exempted from tax to a certain extent. As a result, financial investors settle for a lower interest rate and project developers can obtain capital at a lower rate. Despite the fact that the termination of the regulation was announced in the Strategic Agreement, it was decided to continue the arrangement.

BANS

Contrary to the Reference Projection 2002 the Administrative Agreement New Style (BANS) is included in the update. The contribution of provincial and local authorities to the renewable energy theme is very important for electricity supply. BANS aims at more progressive allocation of wind energy in zoning plans (see also BLOW). The collection of biomass residual flows for energy generation is also supported. These contributions to biomass co-firing are discussed in the Coal Covenant.

BLOW

The Covenant on the National development of Wind Energy (BLOW) stems from July 2001 and was therefore not included in the Reference Projection 2002. BLOW involves agreements between provinces, local authorities and the government about providing administrative support for the realisation of 1500 MW of onshore wind energy in 2010. Some interaction exists with the BANS Climate Covenant, in which local authorities must realise their targets for the theme of renewable energy. The Reference Projection estimates that 1050 MW of wind energy will be in operation in 2010. If the target of the BLOW Covenant is fully realised, that would imply that 450 MW extra wind energy potential has been achieved. Electricity from modern gas plants is replaced and an additional maximum CO_2 emission reduction of 0.3 Mton is achieved. (Menkveld, 2002) estimates that the realisations of the policy plans will be much lower, with a CO_2 emission reduction of 0.05 Mton.

Fuel Tax (BSB)

This tax applies to a large range of fuels and any fuel consumption category and has been included in the energy prices for consumers in the Reference Projection 2002

Benchmarking Covenant

Agreements have been made with all electricity producers about striving to belong to the world's top in energy efficiency in 2012. The top is determined by means of a benchmark for coal and gas plants separately. Most refineries have signed the Benchmarking Covenant too. In case of an efficieny gap with the top, extra measures need to be taken before 2005. If by then the top has not been reached, other less profitable measures will have to be taken before 2008 or measures such as emission trade may be deployed. The establishment of the goals (i.e. the actual distance to the world top in 2012) and the translation into measures has not yet been completed. Therefore, the speed of emission reductions is uncertain. Since the agreements, no new measures have been proposed. This update is based on the effects that were determined earlier in the Reference Projection 2002.

CO_2 reduction plan

The CO_2 reduction plan focuses on all projects that reduce the emission of CO_2 and other greenhouse gases, among which electricity production with biomass and heat supply from power plants. The latter projects do not result in reductions that can be allocated to the energy sector. The effects on CO_2 emission are already part of the Reference Projection 2002. Since then a new tender was issued for proposals and the regulation was adjusted in 2002, such that the effectiveness of total governmental contribution will be the new criterion. All in all, there will be no change in emission reduction in 2010.

EIA/VAMIL

The Reference Projection 2002 assumed an increased EIA, as a result of which 55% (previously 40%) of investment costs is deductible from corporation tax, and VAMIL is also added. All in all, the regulations result in 24% lower investment costs for companies that pay corporation tax. It was decided in the Strategic Agreement to exclude energy investment from the VAMIL regulation and to reduce the number of facilities that are eligible for EIA. It was assumed that the shortening of the Senter list will not affect the options of the energy sector. Worth noting about the abolishment of the VAMIL regulation is the fact that investment decisions are also strongly determined by other instruments, such as Benchmarking and the Coal Covenants. The effect of both adjustments has been established at zero.

Coal Covenant

Since the last few years, co-firing of biomass and waste are taking place in coal-fired plants on a small scale. An agreement has been made about the reduction of CO_2 emissions. This should be achieved by increasing co-firing of biomass, the utilisation of coal residuals, adjustment of the fuel mix and efficiency improvement in coal and gas-fired plants. The Reference Projection

2002 did not include the effect of this agreement, because the agreement had not yet been signed at that time.

The Coal Covenant of April 2002 is one of the most important parts of the policy adjustments, with an estimated total emission reduction of 5.8 Mton. While estimating the extra CO_2 emission reduction, compared to the Reference Projection 2002, the reductions resulting from other (adjusted) policy measures need to be established first. This involves the Benchmarking Covenant, which was included in the Coal Covenant with a fixed effect of 2 Mton CO_2. The benchmarking will result in a more likely closure of a number of less efficient gas-fired plants as planned, i.e. their technical life span will not be extended. As for the remaining 3.8 Mton, the Coal Covenant is targeting biomass and waste utilisation. Outside the framework of the Coal Covenant, direct and indirect co-firing of biomass and waste in coal-fired plants is already increasing as a result of the extra compensation per kWh production. In the Reference Projection 2002 this compensation consists of the nil tariff for 'green' energy and the producer compensation. As a result, the percentage of direct and indirect co-firing is increasing to an average of 10%, leading to a CO_2 emission reduction of 2.3 Mton. Thus, the Coal Covenant should yield an extra emission reduction of 1.5 Mton. Menkveld (2002) assessed that a 0.7 Mton reduction was attainable. The remaining 0.8 Mton reduction depends to a large extent on developments in the market for biomass and waste and environmental permits. In the meantime, the REB regulations have been transferred into the MEP compensation and the final MEP rates have been established. It is assumed that the target for biomass will be realised, with an emission reduction of 1.5 Mton (3.8 Mton in total).

Keeping nuclear plant Borssele in operation
It was decided in the Strategic Agreement not to close the nuclear plant in Borssele in 2004, but to keep it in operation until 2013. Because electricity generation from nuclear energy does not result in direct CO_2 emissions and less electricity from fossil fuels is produced, this will result in an extra emission reduction of approximately 1.4 Mton in 2010 (Ybema, 2002b).

7.3.3 Oil refineries

Refinery belongs to the ITS Energy sector. Due to some specific developments, this part of the energy sector will be discussed here.

Determining factors
The trend in CO_2 emissions until 2010 is mainly determined by:
- the development of export of oil products,
- requirements with respect to the composition of oil products,
- policy measures (see previous overview).

National demand for oil products is determined by growth in the transport sector (Chapter 8) and in the chemical industry. As for foreign demand, it is assumed that no great changes will take place with respect to the position of 'Rotterdam' in international oil supply. Pragmatically speaking, the Reference Projection 2002 has chosen to utilise changes in national demand as indicator for the growth of the total throughput of the refinery sector (foreign demand and bunkers remain two third of the total market). It was also assumed that the capacity could be slightly expanded with some minor investments. This is not a substantial increase, however.

As for the composition of oil products, strict EU demands are laid down with respect to the sulphur content of petrol and diesel as well as more strict demands with respect to the benzene content of petrol and the aromatic content of diesel. This will increase the refineries' own energy consumption.

In many ways, the refinery sector is comparable to industrial sectors. More information on relevant policy measures can be found in Section 7.2.2.

Adjustments to Reference Projection
The Reference Projection 2002 assumed a growth of the throughput of 12% between 2000 and 2010 compared to the average in the period 1995-2000. Without any further developments this would result in a CO_2 emission of 14 Mton in 2010. The effect of the Benchmarking Covenant and the effect of more stringent requirements as to the sulphur content of motor fuels have already been assessed. It is estimated that both effects will neutralise each other. Moreover, the Reference Projection 2002 assumes an increase of electricity production from cogeneration, some shifts in the output mix (more diesel and kerosene, more hydro crackers) and on the average heavier crude oil. All in all, the expected emission would amount to 15 Mton CO_2 in 2010.

Compared to the previous projection, less expansion of primary capacity[18] and more expansion of secondary capacity are expected, based on information from the sector. This could result in more emissions. The plans for expansion of secondary capacity that are currently known are not so extensive as to result in substantially larger emissions in 2010. Recent developments in cogeneration have given cause for lowering the expected growth of industrial cogeneration. As a result, a part of electricity production and accompanying emissions (0.7 Mton) are transferred to the Electricity sector. As for the adjustments in energy and CO_2 policy, the effect on emissions of the refining sector is almost negligible.

Development of CO_2 emission
The resulting development of the emission is presented in Table 7.3 and Figure 7.2. Including the adjustments for cogeneration, the emission increases to 14.3 Mton in 2010. This increase is slightly larger than in the previous 10 years and occurs mainly in the period until 2005.

Uncertainties emissions
The most important uncertain factors are the increase in product demands, developments in secondary refining capacity and growth of cogeneration production. As of yet, it is still unclear what the effect will be of the quality standards with respect to vehicle fuels. Assuming that the 10 ppm sulphur standard for petrol and diesel is achieved in 2010, an increase in emissions is to be expected. As for capacity: a large expansion of primary capacity is not achievable before 2010. Increased energy consumption is assumed, though, because of extra secondary capacity. If this were not the case, CO_2 emissions of Dutch refineries could be much lower in 2010. With respect to cogeneration, it is important to know whether expansion will take place and if this will be 'own' cogeneration, the emissions of which belong to refining. This depends entirely on economic factors.

[18] Primary capacity involves processing of crude oil and other oil bas materials, secondary capacity involves the processing of heavier refining fractions into lighter products.

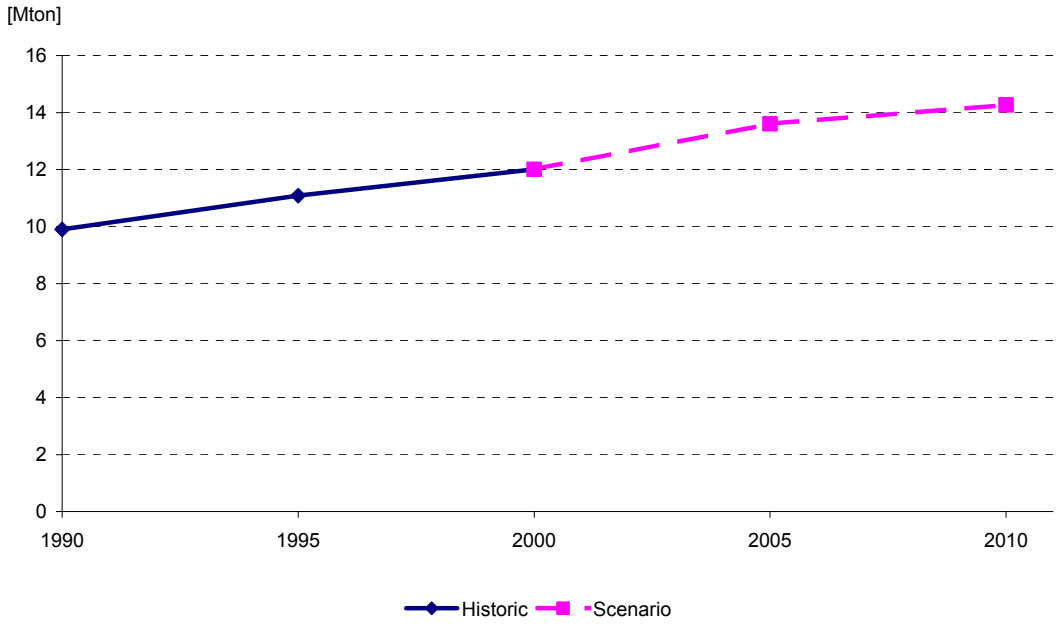

Figure 7.2 *Development of CO_2 emission refining sector 1990-2010*

7.3.4 Decentralised cogeneration

The total cogeneration capacity increases from 7400 MW_e in 2000 to 9400 MW_e in 2010 in the Reference Projection 2002. Beside district heating and gas engines for horticulture and offices, which are managed by distribution companies, this capacity is mainly constituted by large-scale gas turbine or STAG capacity for industrial process heat, i.e. the so-called joint venture cogeneration or decentralised generation.

Determining factors

In decentralised generation, future developments are mainly determined by:

- gas prices, which decrease slightly between 2000 and 2010,
- electricity prices, which have decreased in previous years and have stabilised in the Reference Projection 2002,
- changes in operational management, temporary stalling, varying heat/power ratio.
- policy stimulation.

The Reference Projection 2002 assumed that cogeneration operational management would not change much compared to the period until 2000. In the meantime, it has become clear that in part of the cogeneration plants input has been reduced and this is also expected to take place in 2010. This new perception has been taken into consideration and the production of electricity from cogeneration in 2010 has been estimated at 37 TWh instead of 42 TWh. This decrease in electricity production, compared to the Reference Projection 2002, will be compensated by conventional power plants. At the moment, the administration of a large part of cogeneration has been shifted from industry to joint venture. This involves a shift in emissions from industry to the energy sector, given the fact that joint ventures are allocated to the sector ITS Energy.

Some previously described policy instruments are important for cogeneration, such as BSB (fuel tax), EIA/VAMIL ant the Benchmarking Covenant. The fuel tax for cogeneration has been transferred from an input tax to an output tax. It is assumed that this transfer will not affect marginal costs. The termination of VAMIL does affect cogeneration with regard to profitability, but the adjustments for the EIA have no effect.

Adjustments Reference Projection
In the Reference Projection 2002 there was a specific tax reduction (REB) of 0.57 €ct/kWh for supply to the grid (article 36t of Act on Environment-based Taxation). In the Strategic Agreement, this regulation is replaced with the environmental quality of electricity production regulation (MEP). This is a transition from a generic stimulation to a performance-related subsidy, where the plants that save the most on CO_2 per kWh receive more subsidies. The new regulation has a long-term scope. Based on a preliminary tariff, the new MEP regulation will result in an increase of cogeneration capacity of approximately 400 MW compared tot the Reference Projection 2002 (Ybema, 2002b). The increase occurs predominantly with large-scale cogeneration in the industry that contributes to the grid, i.e. mainly decentralised capacity. The energy saving amounts to approximately 4 PJ, which corresponds with a decrease in CO_2 of 0.2 Mton. This reduction is allocated to the ITS Energy sector as decentralised production is included in this sector.

Development of CO_2 emission
The emissions of decentralised production are usually included as part of the total production in electricity supply (see Table 7.3).

7.3.5 Central electricity production

Central electricity production covers the electricity production excluding decentralised capacity (joint ventures with industry) and small-scale capacity of distribution companies. Large-scale district heating and waste incineration are included in this type of electricity generation.

Determining factors
The developments of CO_2 emissions are mainly determined by:
- the development of electricity use by consumption sectors,
- contribution of 'own' cogeneration production and joint venture cogeneration[19],
- development of import and export of electricity,
- fuel choice in power plants and share of renewable electricity,
- policy measures (see overview Energy sector).

The Reference Projection 2002 assumed an annual increase of electricity demand of 1.6%. This growth, which is smaller than in the 1990s, is based on further analysis of the historical electricity growth per sector, subsector and application. The penetration of domestic appliances, for example, is reaching a saturation degree of nearly 100% of households. In addition, the number of households is barely increasing. Despite the fact that there are more electricity-consuming appliances, the utilisation of these new appliances is limited. In the services sector, the growth of building volume will be smaller than in the 1990s. A new boost in new electricity-consuming applications, as occurred in the 1990s, is not expected.

The Reference Projection 2002 states that the balance of import and export of electricity in 2010 will resemble the net import in 2000 (see Figure 7.3). The net import is relatively uncertain and sensitive to developments in the market. When estimating the net import it is especially important that there are structural differences in the composition of the system for electricity production in the Netherlands and Germany/Belgium and that these differences will continue to exist. The Dutch production capacity has a much larger share of gas-fired units than surrounding countries and these gas-fired units have higher marginal production costs. A situation appears to develop, in which German and Belgian companies are offering less competitive prices on the Dutch market. An explanation could be that these companies, which also possess Dutch capacity, are avoiding heavy competition with their own subsidiaries. According to the Reference

[19] Heat from joint venture cogeneration for the industry contributes to CO_2 emission of the energy sector; this is not the case with cogeneration plants owned by the industry.

Projection 2002, this situation of less competition will be temporary. This does not imply that other visions are considered unlikely, however. This development is rather uncertain as explained earlier. The estimated 19-20 TWh net imports in 2010 is quite justifiable. The import could turn out to be lower, but at the same time it could also be that import in 2010 is much larger as transboundary capacity is being expanded.

The relative input of cogeneration, coal-fired plants, gas-fired plants, waste combustion or nuclear plants also influences CO_2 emissions. Until 2010, the Reference Projection does not foresee any new coal-fired plants, but the operating hours of existing gas-fired plants will increase. It is assumed that the new power plant Rijnmond Energy will be in operation in 2005, with an electricity generation of 4 TWh and an efficiency of 53%. The production of electricity from cogeneration will increase slightly and the contribution of electricity from inland renewable sources will increase significantly (see Figure 7.3). It is assumed that 1500 MW of onshore wind turbines and 600 MW of offshore wind turbines will be realised by 2010. As for the input of biomass in coal-fired plants, it is assumed that the agreements in the Coal Covenant and CO_2 reduction will be realised. It is assumed that the intended emission reduction in Mton, by means of the input of biomass and extra emission reduction, as mentioned in the Covenant, will be realised.

Adjustments - Reference Projection

A minor adjustment of the growth of electricity consumption of companies of 5 PJ_e results in an increase in emissions of 0.7 Mton. Moreover, domestic electricity demand has been adjusted due to a smaller growth in consumption, resulting in a 0.3 Mton reduction for power plants. The average growth of final electricity demand now amounts to 1.7% per year.

Given recent developments in the electricity sector, a number of adjustments have been made that will result in larger emissions. These adjustments involve the contribution of decentralised biomass (extra emission of +0.1 Mton), more input of blast furnace gas (+0.6 Mton), somewhat lower yields of power plants (+0.2 Mton)[20] and less co-production of heat (+0.4 Mton). In addition, extra electricity needs to be produced to compensate for the smaller growth in cogeneration (see industry and refining, total effect +1.6 Mton).

As for the most important policy effects, the following mutations with respect to emissions in the Reference Projection 2002 occur. The margin for the effect of the Coal Covenant of 0.7 to 1.5 Mton (part of pipeline policy) has been adjusted to the upper limit of 1.5 Mton due to recent MEP policy and based on the assumption that the Coal Covenant will be successful. Keeping the nuclear plant Borssele open will result in a 1.4 Mton reduction according to the Strategic Agreement. As for renewable energy, a total reduction of 0.5 Mton is estimated. Finally, domestic and services demand has been decreased as a result of the increase of the REB in the Framework Agreement. This results in a reduction of 0.1 Mton in power plants.

[20] The figures of the production of electricity (NEH and environmental annual report) point out that the yield of the total of gas-fired electricity production has decreased in the last few years. This is the result, among others, of the deployment of not very efficient plants and the method of operation, which is not optimal for the operational yield. According to expectation, this effect will also occur in 2010. Previously this was not taken into consideration during the formulating of the Reference Projection.

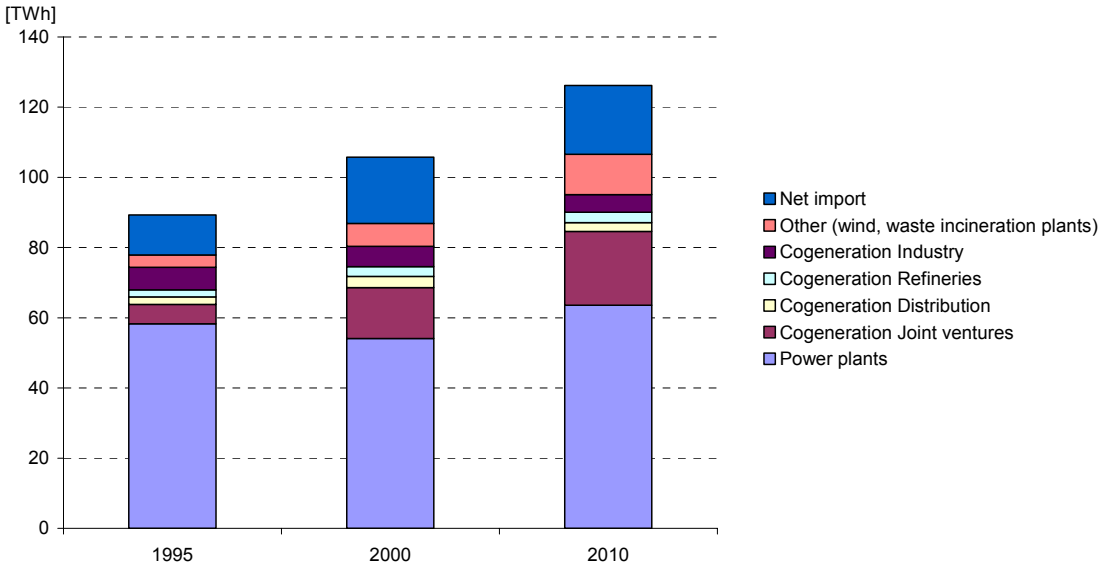

Figure 7.3 *Contribution of various options for electricity generation and import 1995-2010*

Development of emissions in power plants

All mutations together result in a policy effect of -3.7 Mton and a trend mutation of +3.3 Mton (see Table 7.3) compared to the Reference Projection 2002. The latter figure is partly the result of a shift in emissions from cogeneration to power plants. It is worth noting that the mutations in decentralised electricity production and distribution companies have been included here as a part of power plants. Table 7.3 divides emission developments according to power plants, decentralised and distribution companies (renewable energy).

7.3.6 Development of emissions in the energy sector until 2010

Figure 7.4 shows the CO_2 developments as of 1990 for the energy sector; next to the electricity supply (including decentralised capacity and cogeneration from distribution companies) refining, gas supply and oil and gas extraction are also included.

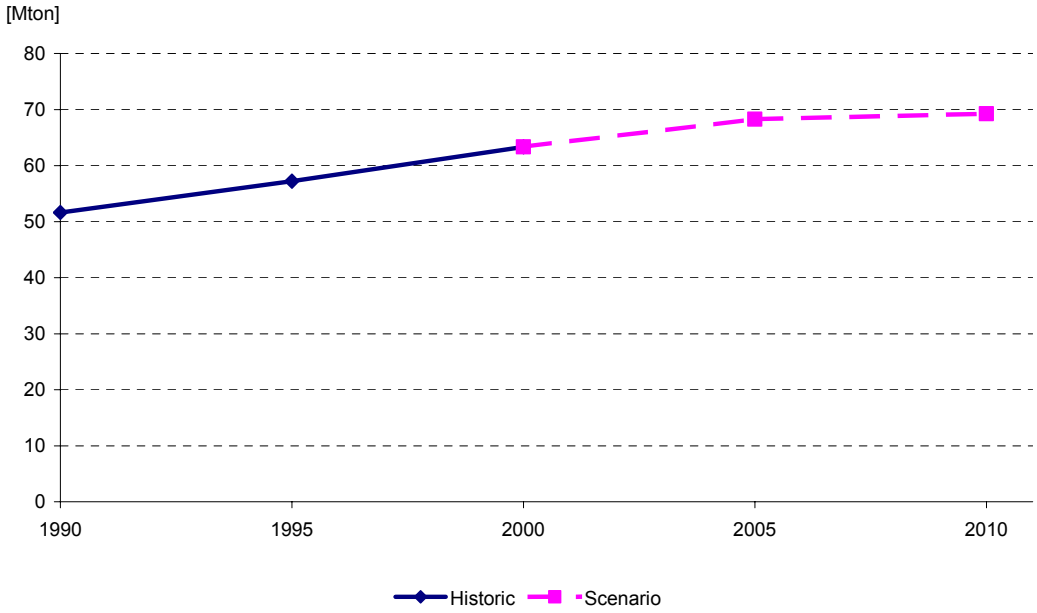

Figure 7.4 *Development of CO_2 emission sector ITS Energy 1990-2010*

The large increase as of 1990 is partly the result of a large growth in joint venture cogeneration capacity in the industry, as a result of which emissions are transferred from industry to the energy sector. The increase is tempered by the strong increase in import of electricity. Due to the continuing growth of electricity and oil consumption (for transport), the CO_2 emission of the sector continues to increase until 2010.

Table 7.3 *Emission ITS Energy 2000-2010 in the Reference Projection and Update [Mton]*

		Reference Projection 2002	Update policy	Update trend	Reference Projection update	
	2000*	2010*			2010	2005
Refineries	12.0	15.0	0	-0.7	14.3	13.6
Power plants	47.9	51.9	-3.0	+3.3	52.2	51.5
Waste combustion	1.6	1.6	0	0	1.6	1.6
Decentralised (mutation)	×	×	-0.2	0	-0.2	-0.1
Extraction oil/gas	1.8	1.9	0	0	1.9	1.9
Distribution companies	×	×	-0.5	0	-0.5	-0.2
ITS Energy	63.4	70.3			69.2	68.3

* Incl. update with improved figures for 2000- in the Emission Registration.

Uncertainties emission Energy sector in 2010

Uncertainty plays a large role in the emissions of the energy sector in 2010. The following factors are involved:

- whether or not large adjustments will occur with respect to the position of 'Rotterdam' in international oil supply,
- the amount of import of electricity in relation to price differences with abroad (among others as a result of the commodity price for gas, the operation of the electricity markets, transport capacity and stimulating policy for green electricity),
- the composition of production capacity and the operational deployment of power plants,
- the amount of renewable energy in relation to the development of techniques (offshore, direct co-firing of biomass in power plants), policy for renewable energy (harmonisation of policy of EU countries) and the market for renewable energy (number of consumers),
- the effect of policy adjustments on renewable energy. The net effect can be both positive and rather negative (2 TWh less national production and 0.8 Mton higher CO_2 emission compared to the Reference Projection 2002 and the pipeline policy.

7.4 Emissions Industry/Energy until 2010

The ITS Industry and ITS Energy are usually combined while formulating the Indicative Targets for CO_2 emission (see division of sectors, Chapter 2). Below, the developments for the ITS Industry/Energy will be discussed (see Table 7.4).

7.4.1 Adjustments to Reference Projection

The adjustments of the emission figures of the Reference Projection 2002 are the following:

- Correction of the emission in the base year, especially industrial emission (-3.8 Mton).
- Adjustment of emission due to other consumption and production trends. In industry this mainly involves base metal and chemical industry, in the energy sector power plants are involved.

- Policy adjustments with an effect on emission involve almost always power plants, among which keeping Borssele open, the Coal Covenant and an increase in renewable energy as a result of the introduction of the MEP arrangement.

7.4.2 Development of emission

The total emission increases by 11.3% in the period 2000-2010 according to the Reference Projection 2002. This hardly changes after the adjustments. Recent policy adjustments do influence the difference in growth between Industry (13-14%) and Energy (9%). As previously noted, there is a shift in emissions from industry to power plants as a result of the smaller growth in cogeneration.

Table 7.4 *Emission ITS Industry/Energy 2000-2010 in the Reference Projection 2002 and Update [Mton]*

		Reference Projection 2002	Update policy	Update trend	Reference Projection Update	
	2000*	2010*			2010	2005
ITS Industry	37.8	42.3	-0	+0.6	42.9	40.7
ITS Energy	63.4	70.3	-3.7	+2.6	69.2	68.3
ITS Industry/Energy	101.2	112.6			112.2	109.0

* Incl. update for improved figures for 2000 in the Emission Registration and split-off consumption for mobile equipment.

Figure 7.5 illustrates the CO_2 development as of 1990 for industry and the energy sector together. After stabilisation in the second half of the 1990s a slight increase in total emission in the future occurs.

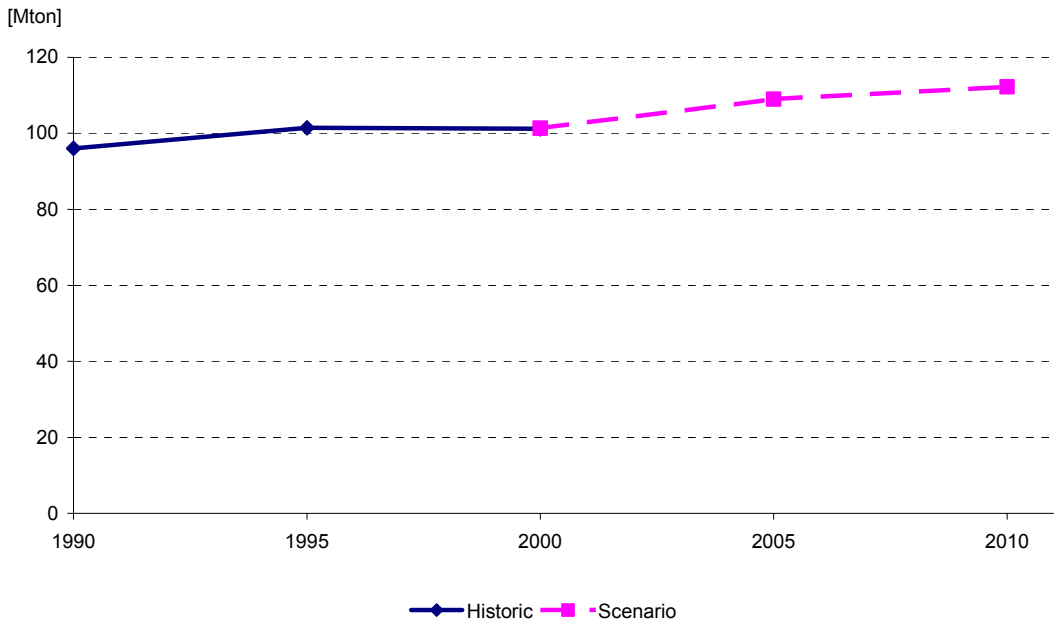

Figure 7.5 *Development of CO_2 emission ITS Industry/Energy 1990-2010*

8 TRANSPORT

8.1 Main determining factors

Energy consumption of transport entails all road traffic and rail transport, inland shipping, inland air traffic and mobile equipment. Road traffic dominates energy consumption, with a large share of private cars. In the Reference Projection Energy and CO_2, mobile equipment were included in other sectors. In the framework of Indicative Targets for CO_2 emissions, the consumption of mobile equipment is now included in the transport sector.

The developments of CO_2 emissions in transport are largely determined by:

- The increase in passenger traffic, which is caused by developments with respect to volume and composition of the population, disposable income, spatial planning, infrastructure, number of active persons in society and in leisure time.
- The strong increase in freight traffic. This depends on (sectoral) economic growth, the increase of foreign trade and the resulting logistic and spatial developments. In addition, there is a new trend of a more regular supply of smaller amounts (delivery vans).
- Favourable technological developments, especially in passenger traffic. An improvement in fuel efficiency and in increase in the share of diesel cars. On the other hand, the weight of the average passenger car is increasing, they are equipped with stronger engines and the use air conditioning increases.
- Policy for improvement of efficiency, such as the ACEA (Association of European Car Manufacturers) Covenant, the degree of seat occupancy or car load, driving style, fuel choice and possibly the transport need.

In the Reference Projection 2002 the CO_2 emission increases by 13% between 2000 and 2010.

8.2 Existing policy and recent adjustments

ACEA Covenant
The European manufacturers of passenger cars and the EU have signed a covenant for the promotion of the sale of more energy efficient cars. This is the so-called ACEA Covenant, which has been included in the Reference Projection 2002.

BANS
Contrary to the Reference Projection 2002, the Administrative Agreement New Style (BANS) is included in the adjusted policy. The BANS theme traffic and transport involves transport management by government organisations and a VPL study (Local traffic performance) for residential areas and business parks. The former has an important exemplary function, but its reduction potential is negligible. VPL aims to limit mobility through spatial planning and the designing of residential areas and business parks. The expected effect op VPL is relatively limited, as it only involves new construction locations. The maximal effect in 2010 is smaller than 1 PJ (Bos, 2002).

Kilometre tax
The kilometre tax was not included in the Reference Projection 2002, but was covered by the so-called pipeline policy. Primary target of the kilometre tax is the battle against congestion (queues). A side effect is a change (positive or negative) in energy consumption and thus in the CO_2 emissions of passenger cars. Based on a variant in which the weight of cars is also processed in the tax, the effect is estimated at 1.1 Mton extra reduction in (Menkveld, 2002). In the

Strategic Agreement, it was decided not to implement the kilometre tax. Thus, compared to the Reference Projection 2002, there has been no change.

Subsidy measure for energy efficient cars
In the Strategic Agreement it was decided to terminate the subsidy regulation for energy efficient cars. This will result in an extra emission reduction of 0.1 Mton.

Tax on petrol and diesel
The Reference Projection 2002 included a previous tax increase on petrol, known as 'Kok's quarter'. The Strategic Agreement removed 'Kok's quarter' from taxes, which would lead to more car mileage and have an estimated effect on CO_2 emissions of 0.3 Mton. The Framework Agreement, however, spends Kok's quarter' on investments in the infrastructure (railway, roads and water ways) and maintains the tax level. Compared to the Reference Projection 2002, the extra investments result in an extra emission of 0.1 Mton in 2010.

The new driving force
This programme aims at persuading drivers to adopt a more energy efficient driving style. Part of the measures, i.e. 'in car' instruments and optimal tire pressure, have already been included in the Reference Projection 2002. The pipeline policy includes some other parts of the programme. In (Menkveld, 2002) the effect of these measures is estimated at -0.2 Mton in 2010. The realisation of 'the new driving force 1' and the effect of the programme 'new driving force 2', as announced in the budget for 2004, will result in the same reduction of 0.2 Mton in 2010.

Fiscal measures
These measures are intended to discourage car use in commuter traffic. The Strategic Agreement is dropping various fiscal measures with regard to company cars and commuter traffic. This will result in an extra emission of 0.8 Mton. The Framework Agreement and the budget for 2004 partly contain the same fiscal measures. All in all, the adjustments lead to an extra emission of 0.2 Mton compared to the Reference Projection 2002.

Investments in roads
In the Strategic Agreement it was decided to construct 150 kilometres of extra traffic lanes to alleviate the congestion problem. This will result in an extra emission of 0.8 Mton, excluding the effect of the extra investments of the Framework Agreement, related to ending 'Kok's quarter' tax (see tax on petrol and diesel).

8.3 Other adjustments

Recently, there has been a small update of developments in transport (RIVM, 2003). The effect of the trend adjustment is amounting to -1.4 Mton and is mainly caused by a different composition of the fuel mix. More information can be found in Textbox 8.1.

8.4 Emissions of transport sector until 2010

Table 8.1 illustrates the development of emissions between 2000 and 2010. The total emission increases by 9% between 2001 and 2010. Compared to the Reference Projection 2002, the policy adjustments result in an extra emission of 0.3 Mton in 2010.

Table 8.1 *CO_2 emission ITS Transport 2000-2010 in the Reference Projection 2002 and Update [Mton]*

		Reference Projection 2002	Update policy	Update trend	Reference Projection-update	
	2000*	2010*			2010	2005
Transport	32.9	36.7	+0.3	-1.4	35.6	34,3
Mobile equipment	2.3	2.7	0	0	2.7	2.5
ITS Transport	35.2	39.4	+0.3	-1.4	38.3	36.8

* Incl. update for improved figures for 2000 in the Emission Registration and incorporation of the use of mobile equipment.

In Figure 8.1 shows the CO_2 development as of 1990 for the transport sector including mobile equipment. The total emission as of 1990 shows a continuing rise.

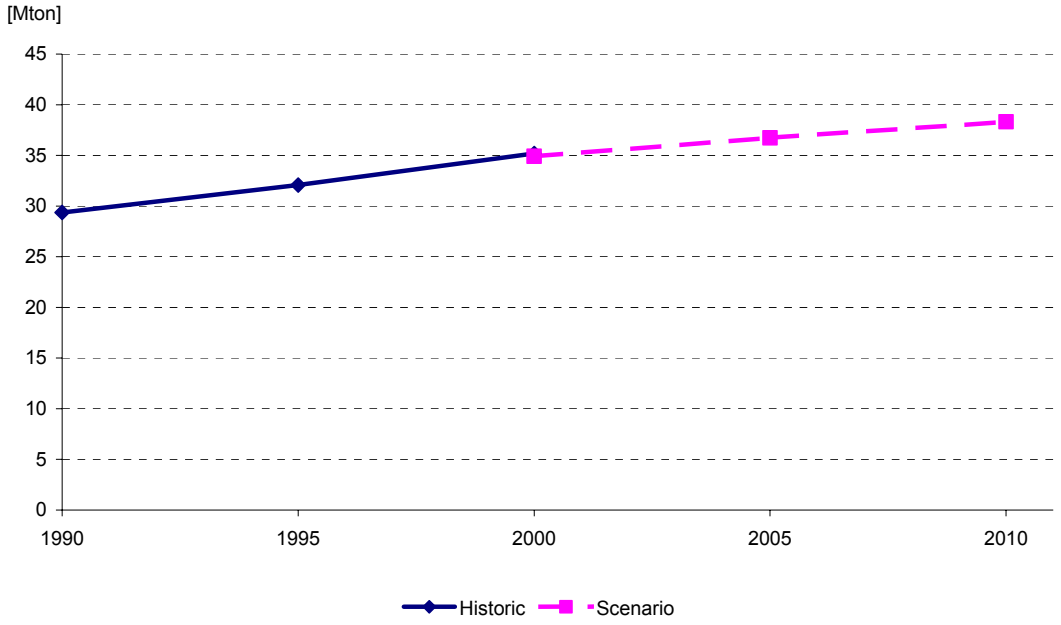

Figure 8.1 *Development of CO_2 emissions in sector ITS Transport 1990-2010*

Uncertainties transport emissions in 2010

Some major uncertain factors can be found in the international field, the structure of the economy, private consumption, the composition and technology of the car fleet and policy. On an international scale, foreign developments are especially important for the international transportation of goods and the oil price. The structure of the Dutch economy influences the composition of the truck fleet. The development of the ICT sector also has a specific influence on the transportation of goods and passenger traffic. As for the composition of the car fleet, especially the growth of the share of diesel cars is quite uncertain. Trend breaches in technology, such as climate neutral fuels and fuel cells, could lead to changes for new cars, even before 2010, but the bandwidth for the entire fleet remains limited. As for policy, there are some uncertain factors with respect to the behaviour of manufacturers and importers in reaction to the ACEA Covenant, the investments in roads and the degree of congestion ins 2010.

Text Box 8.1 *Update of CO_2 emission trends in traffic*

Introduction

The Netherlands Ministry of Spatial Planning, Housing and the Environment (VROM) is currently preparing an evaluation of the acidification policy with respect to the EU emission level ceiling of NO_x, SO_2, VOS and NH3 and the national target for fine particles. In support of this evaluation, RIVM has updated the Reference Projection 2002 with respect to the above-mentioned substances. The reasons for this update are recently improved perceptions in emission factors and energy-consuming processes. The update involved all sectors. The same volume developments in economic activities and energy consumption have been used as in the Reference Projection 2002. As a result, this update did not have any consequences for the CO_2 emission. This is not the case for the transport and traffic sector though. A separate update has been made for this sector (Van den Brink, 2003) by request of the Netherlands Ministry of Spatial Planning, Housing and the Environment (VROM) and the Ministry of Transport, Public Works and Water Management, which was also used for the Policy Document on Traffic Emissions. The reason for VROM's request was not only based on the changed emission factors of acidifying particles in the car fleet, but also new data that had become available with respect to the different current composition of the car fleet, especially the increase of the share of diesel as fuel for passenger cars and delivery vans. It is estimated that the share of diesel cars will further increase until 2010, which will also affect the CO_2 emission projection. Moreover, the economic development that was realised in recent years also gave cause for a revision of the projection for 2010. The same is the case for the remaining sectors of the economy (see below). The update of the traffic emissions also included the policy adjustments vis-à-vis the Reference Projection 2002. These adjustments are discussed elsewhere in this report.

Results

Adjustments in composition of the car fleet and the economy result in a decrease in CO_2 emissions in the projection for 2010 of -1.4 Mton compared to the Reference Projection 2002. This adjustment in the projection consists of approximately -0.4 Mton resulting from private consumption in the economy that fell behind expectations and -1.0 Mton that resulted from a different composition of the car fleet.

Partial adjustment of economic developments

The economic developments in the Reference Projection 2002 are based on the optimistic growth scenario in the medium term outlook of the Netherlands Bureau for Economic Policy Analysis (CPB, 2003). Two economic developments are of major importance for the projection of the traffic emissions, i.e. the private consumption is important for the development of passenger car mileage and the general economic growth (GDP) is important for the development of truck mileage. The realisations of the private consumption in 2001 and 2002 and the expectations for coming years (CPB) deviate significantly from the medium term outlook of 2000, which gave cause for adjusting the private consumption in the update of the traffic emissions. For this purpose, the realised private consumption in 2001 and 2002 has been used as a basis; the following years have been adjusted to the growing speed from the medium term outlook. The adjustment of the private consumption has also been calculated in domestic electricity demand, resulting in a downward adjustment of -0.3 Mton. The lower personal consumption also affects the energy consumption and CO_2 emissions of other sectors. These are hard to estimate without proper calculation of the economy by means of the CPB models. The realisation of the GDP of previous years has also lower than estimated in the medium term outlook of 2000. The deviation is not as large as the personal consumption deviation though. The average economic growth in the medium term outlook in the period 2001-2010 (2.5%) can still be achieved if the economy recuperates significantly. In comparison, attaining the average personal consumption of the medium term outlook seems less realistic. A new Reference Projection has been planned for 2004 for the evaluation of the second benchmark of the Climate Policy evaluation document. This projection will be based on a new economic scenario of the CPB.

9 COMPARISON WITH TRADE PARTICIPANTS EMISSIONS AND SECTOR REPRESENTATIVES EXPECTATIONS

This chapter will discuss the information provided by representatives from the sectors. Section 9.1 will compare the CO_2 emission from participants in the EU emissions trade in the Reference Projection 2002 update with the CO_2 allocation value formulated by the Verification Bureau Benchmarking Energy Efficiency. Section 9.2 will account for the manner in which comments of the sector representatives have been processed; these representatives were consulted on the results of the Reference Projection update. In some cases, comments have been adopted and processed in previous chapters without explicit mention. Here, comments that have not been adopted will be discussed.

9.1 Emissions from participants within the emission trading scheme

This section reflects the CO_2 emissions from the emission trade participants in the Reference Projection compared to the so-called CO_2 allocation value, determined by the VBE. The differences between the emissions from the Reference Projection update and the VBE will be explained as far as possible. The CO_2 allocation value has been defined by the VBE as the sum of the CO_2 emission credits needed each year to be able to continue production without having to face a shortage of emission credits. The VBE has determined the CO_2 allocation value on the request of VROM and the Federation of Netherlands Industry and Employers (VNO-NCW). This was done by means of a questionnaire distributed in the spring of 2003 to companies that have acceded to the Benchmarking Covenant. Establishment of the CO_2 allocation value is part of the process resulting in a system of CO_2 emission trading within the EU. Drafting the Dutch allocation plan for the European Commission is also part of this process.

The companies interviewed were asked to provide an estimate of the expected rate of growth of production for the years 2005-2007, in comparison to the base year, 2002. The same has been requested of the branch organisations.

9.1.1 Comparing the results of VBE with the Reference Projection update

CO_2 emission in the Reference Projection update

The CO_2 emissions from the industrial and energy sectors in 2000, 2005 and 2010 are provided in Table 9.1. An estimate of the CO_2 emission of participants in emission trade is also provided. Waste incineration plants are not included here because they were left out in the analysis of VBE. The share of 6% of small companies that do not participate in emission trade (plant capacity < 20 MW_{th}) is based on a Novem assessment from 2003.

CO_2 allocation value of the VBE

This CO_2 VBE allocation value is provided for three developments in growth:

- Growth as of 2002 in conformity with expectations of individual companies.
- Growth as of 2002 in conformity with expectations of branch organisations.
- Growth as of 2002 in conformity with the production growth rates for 2000-2010 in the update of the ECN/RIVM Reference Projection.

The expectations of individual companies, as well as those of branch organisations, are based on the results of the VBE questionnaire results for 2005 (with 2002 as base year).

Table 9.1 *CO_2 emission [21] total and participants in Reference Projection update, and allocation value participants according to VBE [Mton]*

	2000	2002	2005	2010
Reference Projection update - ECN/RIVM				
Industry & Energy sector	101.2		109.0	112.2
Participants in emission trade	94.8		102.0	105.1
CO_2 allocation value - VBE				
Growth in ECN/RIVM		99.3	105.8	115.1
Growth in company surveys		99.3	109.7	
Growth in survey branches		99.3	110.1	

Comparison for 2005

First the CO_2 emission of the participants in emission trade in the Reference Projection update is compared to the VBE allocation value in accordance with growth figure of ECN/RIVM. The VBE emissions are approximately 4 Mton higher than the CO_2 emission of the Reference Projection update. This difference can be mainly explained by VBE's double counting of CO_2 emissions from the Intergen power plant currently under construction, non-inclusion of the VBE prognoses for energy-saving up to 2005 (approximately 1 Mton) and not discounting additional indirect biomass co-firing (approximately 1 Mton). Different emission definitions and achievements in the starting years, 2000 and 2002, can also explain part of the difference.

Secondly, the three different VBE values are compared. The value that expresses the expectations of companies with respect to growth is higher than that on basis of ECN/RIVM growth expectations. This can be completely ascribed to the larger volume growth of VBE/companies. The same goes for figures from VBE/branches. The expectations of individual companies form part of an internal decision-making process with respect to investments and other strategic targets. This might be an explanation of the fact that sector representatives often produce more favourable growth figures for the future than the national approach of ECN/RIVM.

Finally, the VBE allocation values for companies (109.7 Mton) and branches (110.1 Mton) are compared to the CO_2 emission of participants in the emission trade in the Reference Projection update (102.0 Mton). The difference amounts to approximately 8 Mton. From the previous two comparisons it may be concluded that 4 Mton can be explained by differences in method. The remaining difference can be explained by the different growth figures of ECN/RIVM in comparison to companies and branches.

Comparison for 2010

The CO_2 emissions of the participants in emission trade in the Reference Projection update can only be compared to the VBE allocation value, based on growth figures of ECN/RIVM. The companies and branch organisations did not provide any growth figures until 2010. The difference amounts to 10 Mton in 2010. Next to the previously mentioned double counting, the energy saving of nearly 3 Mton that was not included by VBE explains part of the difference. The various emission reductions in power plants, also not included in the VBE accounts, explain another 3 Mton (see Chapter 7).

9.1.2 Conclusions

The VBE CO_2 allocation value in 2005, which is based on a questionnaire among companies and branch organisations, is approximately 8 Mton higher than the CO_2 emission of the participants in the emission trade in the Reference Projection update.

[21] The ECN/RIVM figures include so-called feedstock emissions; as for the VBE figures it is unclear to what extent feedstock emissions are included.

More than half of the difference is caused by an incorrect application of the method:

- double counting of the new Intergen power plant by VBE,
- not including energy-saving of consumers by VBE,
- not including the extra emission-reducing measures at power plants by VBE.

The remaining difference is caused by different growth rates for production in the industrial and the energy sector.

ECN and RIVM think that the interview method used by VBE is not suitable for the projection of future CO_2 emissions on a sectoral level. The individual expectations of companies usually do not allow for unfavourable developments or even a decrease in activities; these developments -used here in the macro approach - certainly do form part of the sector development

9.2 ECN/RIVM reaction to information from sector representatives

9.2.1 Introduction

The results of the Reference Projection update were presented to representatives of the sectors. This was followed by the exchange of information between researchers of ECN (and sometimes RIVM) and representatives of the sector. In some cases this led to an adjustment of the trend in production, consumption and/or emissions in the Update of the Reference Projection (see Chapter 7).

A number of differences in opinion and starting point continue to exist between the sectors and ECN/RIVM with respect to the trends until 2010. The remaining differences will be examined more closely in view of the importance for the discussion on sectoral Indicative Targets and the allocation of emission rights. First of all, Appendix 1 reflects the complete and final responses of the sectors; on the basis of these responses, a further justification of the update has been provided by ECN and RIVM below.

9.2.2 Paper industry

The difference in opinion with this sector lies in the expected growth in production (see Section A.1.2). The 2.2% production growth of ECN/RIVM indicated is mainly based on the demand for paper on the European market. The sector has not provided solid details on specific Dutch plans for expanding capacity. Moreover, ECN/RIVM have assumed a normal degree of occupancy and a gradual development as a result of expanding production capacity and closures.

9.2.3 Chemical industry

The main comments of the Association of the Dutch Chemical Industry (VNCI) focus on larger economic growth (see Section A.1.3). ECN/RIVM point out that the economic growth of the chemical industry is largely determined by the chemical products part and to a lesser extent by the base chemical industry. The physical capacity and the degree of occupancy are of factual importance to CO_2 emission. Based on the capacity of ethene and ammonia, the physical growth according to ECN/RIVM, is slightly larger between 2000 and 2005 than indicated by VNCI; after that the growth is smaller. After considerable expansion of the primary ethene production in the three main Dutch complexes between 1999 and 2004, the remaining period up to 2010 will be dedicated to the optimisation of the next steps in the process. Logically speaking, possible further expansion will not take place in the Netherlands. This is characteristic of the abrupt growth in large parts of the base chemical industry. The latter argument constitutes the largest difference with the opinion of the sector.

9.2.4 Base metal

The exchange of information with representatives of steel company, Corus, has resulted in some adjustments in the emission trend up to 2010 in the Reference Projection (see Chapter 7). The remaining issue is the steel production up to 2010. According to the sector this amounts to 7.3 Mton of steel compared to 7.1 Mton according to ECN/RIVM (see Section A.1.4). ECN/RIVM take into account the fact that the production capacity as indicated by Corus may not be fully utilised.

9.2.5 Refineries

The comments of the Netherlands Petroleum Industry Association (VNPI) focus on increased environmental demands with respect to the sulphur content of fuels and the growth of the so-called secondary production capacity (see Section A.1.5). As a result of extensive communication, ECN/RIVM arrives here at an upward adjustment for 2005 and a downward adjustment of the Reference Projection for 2010.

Environmental demands on sulphur levels in fuels

Referring to the Reference Projection, a number of new perceptions have been used in the calculations, such as the 10-ppm sulphur standard for petrol and diesel, the implementation of a 1.5% sulphur standard for part of the bunker oil, and 0.1% for gas oil. This can be considered a high-speed increase in quality demands with respect to products. The 10-ppm standard for petrol and diesel has a substantial CO_2 effect. As the ECN model is currently not suitable for calculating the effect of the increased quality demands, the effect has been taken from European correspondence on this issue. The CO_2 effect of the bunker oil and gas oil standards is less substantial than the quality demands for petrol and diesel, but they have been included in the latest calculations[22]. It can be concluded that the current quality demands have been properly included.

As for the sulphur level of bunker oil, the European Parliament indicated in June 2003 that it wants an adjustment to 0.5%. This would have a substantial effect on the refining sector. In August 2003, the European Commission decided to hold on to the 1.5% standard. If a lower percentage were to be adopted, or if the (sea) area to which the 1.5% demand would apply would be expanded, this would result in an additional CO_2 effect that has not been included. The same applies to further increased demands with respect to the sulphur content of gas oil (not for road traffic) or domestic fuel oil (i.e. on the German market). Because ECN/RIVM assumes the EU decision of August 2003, they estimate a lower CO_2 emission level than VNPI.

Capacity development

In the Reference Projection, ECN estimated some expansion in the Netherlands, given the expected shortage in refining capacity. In the light of recent developments and given the preparation time needed for a substantial expansion, ECN/RIVM agree with the sector that this is no longer a realistic development. The pressure to achieve expansion via minor adjustments (capacity creep) remains (i.e. the production of lighter products from heavy oil).[23] The most important difference in opinion involves the expansion of secondary capacity, which has been an international trend for the last ten years. If the secondary capacity grows even faster than assumed by ECN/RIVM, this will certainly lead to a larger CO_2 emission. There is no concrete evidence yet to back this up, e.g. large expansion projects [24] or a confidentially reported total of the various smaller expansion plans.

[22] ECN does not expect that the bunker oil demand will lead to a decrease of throughput in Dutch refineries; effects on the import of bunker oil are possible.

[23] This capacity expansion can not usually be found in the literature available to the public. However, in calculating the historical years, the ECN model does supply indications (including those for primary and vacuum distillation and for hydrocrackers).

[24] An example could be the construction of a new hycon, flexicoker or oil gassifier (less bunker oil production) or a new hydrocracker. In the latter case, is may be possible to import part of the fuel source.

Cogeneration development
Finally, it must be noted that the possession of cogeneration plants and the growth rate in capacity play a role in the CO_2 emissions from the sector. Currently, nearly all cogeneration is owned by the sector and is thus a contributing factor to the total emission; the same appears to be the case with the VNPI figures. ECN/RIVM assumes that the extra capacity will come from joint venture cogeneration. As a result of this, part of the CO_2 emission is transferred to the electricity sector. ECN/RIVM therefore show lower estimates of the CO_2 emission than VNPI.

9.2.6 Electricity production

According to EnergieNed, the ECN/RIVM estimate of CO_2 emission of electricity production is approximately 17 Mton too low. EnergieNed's arguments have been included in Appendix A.1.6. These are related to the expectations concerning an increase in electricity demand, import of electricity, the starting situation in 2000, the utilisation of gas-fired plants and the utilisation of biomass, which is considered in non-accordance with the conditions of the Coal Covenant.

The adjustments of ECN/RIVM compared to the Reference Projection 2002 will be discussed below, followed by the remaining difference between estimates of ECN/RIVM and EnergieNed.

With respect to electricity plants in 2005 and 2010, new perceptions - based on the perceived developments in 2001 and 2002 - have given cause for some significant adjustments in comparison to the Reference Projection 2002. These have been communicated to representatives of EnergieNed. The most important adjustments to the Reference Projection 2002 included in this ECN/RIVM report are:

1. Electricity demand has been estimated to be a bit higher. The demand is the sum of a higher industrial electricity demand and a lower domestic electricity demand. The latter corresponds with a downward adjustment of private consumption (see chapter on traffic).
2. The production of electricity from gas-fired plants has been estimated to be higher. This is because the production of electricity from cogeneration is expected to turn out lower, and also to cover the slightly increased demand.
3. The production of plants fuelled with blast-furnace gas is estimated to be higher. This is related to the higher estimate for blast-furnace gas production than previously assumed in the Reference Projection 2002.
4. New calculations were based on a slightly lower average efficiency of gas-fired plants. In line with the developments between 2000 and 2002, this average operational efficiency is lowered. This recent change is probably related to the way these plants are operated in the current market situation.

The adjustments result in a more than 3 Mton larger CO_2 emission; i.e. there is still a large difference between the estimates of EnergieNed and ECN/RIVM for CO_2 emissions of plants. These differences are to a large extent based on differences in starting points and in estimates, such as:

- *Inclusion of the effects of policy instruments*. For all sectors, ECN and RIVM have taken into account the expected effects of policy, such as the stimulation of cogeneration and the production of electricity from renewable energy sources. The significant growth in electricity production from wind energy and biomass, as well as the moderate growth in production from cogeneration, have led to a production of power plants that is lower than estimates by EnergieNed. As for the Coal Covenant both the effect of the 'harder' 3.2 Mton CO_2 emission reduction as well as the 'softer' (according to ECN/RIVM) more uncertain extra 0.6 Mton reduction have been fully included. EnergieNed does not include the effects of the Coal Covenant in their estimates.
- *The conversion factor to CO_2.* ECN/RIVM calculate the extra CO_2 emission reduction from changes in electricity production by taking the CO_2 emission factor of the marginal plants. These are the plants that one might expect to be making extra operational hours, based on

the order of utilisation. This will result in an emission factor of 400 g CO_2/kWh, which corresponds with the perceived relationship between the extra CO_2 emissions of power plants between 2001 and 2002 and the extra electricity production in this period. EnergieNed, however, calculates with a significantly higher factor, which appears to be based on the average CO_2 emission factor of the Dutch plants.

- *Emission Registration as basis*. For historical emissions, the starting point for the future, ECN/RIVM uses figures from the Emission Registration. However, historical figures from EnergieNed are higher. The ER, based on environmental reports from (electricity) companies, is also the basis for the Dutch reports on emissions to the secretariat of the FCCC.

The differences in estimates are listed below.

- *Growth in electricity demand*. ECN/RIVM project a lower growth than EnergieNed. The projected increase (over 1.7% per year) is lower than the average growth between 1990 and 2000. The lower growth is based on a further analysis of historical electricity growth per sector, subsector and application. On the basis of unravelled consumption figures and the expected development of the driving forces, it has been concluded that the growth will be considerably smaller than in the previous ten years. Per sector it can be indicated which developments are behind the growth. The penetration of domestic appliances, which are responsible for a large part of electricity consumption, is reaching a saturation point of nearly 100%. The number of households is barely increasing and, despite the fact that new electrical appliances are introduced, the total consumption of these new appliances is limited. In the service sector, the growth of building volume will also be less than in the 1990s and a new boost in new electrical applications, as in the 1990s, is not expected. It is a fact that other organisations arrive at higher projections of electricity demand. The method of analysis of others (especially econometric research) does not provide for an early inclusion of saturation effects. Apart from that, recent estimates of the EU[25] correspond with ECN's estimates.
- *Import of electricity*. The net import of electricity is relatively uncertain and sensitive to developments in markets, policy and interconnection capacity. EnergieNed expects an import of 16-17 TWh and ECN estimates an import of 19-20 TWh. For assessing import it is especially important to note that there are structural differences in the composition of the electricity production system in the Netherlands and that of Germany/Belgium, and that these differences will continue to exist. The Dutch production capacity has a much larger share of gas-fired units than surrounding countries. The gas-fired units have higher marginal costs than a nuclear or coal-fired plant, for example. EnergieNed has supplied figures with respect to forward prices to support their statement that the price difference between the Netherlands and Germany is decreasing. As a result, the import of electricity should also decrease. The price difference for 2005 and 2006 still amounts to 5% and is thus substantial enough to maintain the Dutch import levels. The assessed import in 2005 and 2010 is an average; the import could turn out smaller but it is just as likely that the import will be larger as the current transport capacity is not yet fully utilised (a net import of more than 25 TWh is possible) and the electricity transport capacity between countries will be expanded.

9.2.7 Agriculture and horticulture

The agriculture and horticulture organisation (LTO) considers ECN/RIVM's estimate of CO_2 emission for 2010 to be too low. Their comments focus on the development of the glasshouse cultivation area, the structure of the sector (the energy intensification, including illumination) and the heat supplied by third parties (see Section A.7.1)

The ECN/RIVM estimate of CO_2 emission for horticulture was based on the average compliance with the preliminary crop standards stated in the Dutch Order of Council. LTO has indi-

[25] http://europa.eu.int/comm/dgs/energy_transport/figures/trends_2030/index_en.htm.

cated that the compliance with the GLAMI target is currently not under discussion, while the crop standards are based on this target. ECN and RIVM consider the target to be very ambitious for this sector. The CO_2 emission to be achieved with this target will also depend on the following variables:

- *Structure of the sector* (including crop illumination). A structure with more energy-intensive crops will result in an increase in CO_2 emission. Especially the illuminated crops are barely able to comply with the crop standards. A larger share of these crops will render the achievement of the target improbable. On the other hand, a switch to energy-extensive cultivation is a process that will also lead to rearrangement and possibly to closure of business. It is of crucial importance to know if this will lead to energy-intensive cultivation of tomatoes and paprika, or to other new kinds of crops. ECN/RIVM have maintained the area division of 2002, in which the increase of these two crops is already considerable. Technology and different gas contracts can also curb the switch from extensive cultivation.
- *Share of heat from third parties*. This share has been considerably adjusted downwards, to a current 13%, in the update. Less heat supply from third parties will result in higher CO_2 emissions for the sector. An even lower share will make it very difficult to comply with the crop standards and impossible to realise the GLAMI target.
- *Share of green energy*. More green electricity as opposed to conventionally generated so-called 'grey' electricity allows for more CO_2 emissions within the standards. However, this option is not mentioned by the sector, nor has it utilised the green electricity options, as a result of which the ECN/RIVM assumption of 10% in 2010 seems too optimistic.

The expected growth in area for 2001 according to the LEI consultation was used as a basis for the ECN/RIVM estimates. There is no reason to assume that spatial barriers for new cultivation areas under glass will become less important.

9.2.8 Generic conclusions

The Reference Projection 2002 and this update describe an average trend over ten years. In general, such a description is difficult to compare to the expectations of the sector representatives, where short-term expectations and coincidental fluctuations in the starting year (or the previous years) dominate the view. Moreover, these expectations are usually that of individual companies and branch organisations, and form part of the internal decision-making process with respect to investments and other strategic targets. This could explain the fact that representatives usually provide relatively favourable expansion figures for the future (with respect to the paper and base chemical industries; refineries; electricity demand and glass cultivation). ECN/ RIVM, on the other hand, base their medium-term projections on long historical and long-term trends in a coherent and usually European context with respect to macro-economic developments.

Compared to the approach of ECN/RIVM, the sector representatives seem to cover policy effects differently in their expectations. This involves both policy with a direct influence on sector emissions, e.g. the Coal Covenant, and policy with an indirect influence through other sectors, e.g. the increase of the regulatory tax on energy (REB).

Finally, in some cases an incorrect method is used in sector analyses, as in the case for electricity production with the CO_2 emission factor and the CO_2 emission for the starting year.

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APPENDIX A SECTOR RESPONSES TO THE REFERENCE PROJECTION UPDATE

A.1 Introduction

The result of the Reference Projection 2001-2010 and the update of the so-called pipeline policy and the Strategic Agreement (see Chapter 3) have been presented to representatives of the consumption sectors at the beginning of 2003. The next step consisted of an exchange of information between the ECN/RIVM researchers and the representatives of a number of sectors. In some cases, this has resulted in the upward or downward adjustment of the trend in production, consumption and/or emission.

A number of differences in opinion continue to exist between the sectors and ECN/RIVM with respect to the trends until 2010. Given the importance for the discussion on sectoral Indicative Targets and the allocation of emission rights, this information will be included in the report. The remaining differences, as formulated by the representatives of the sectors in question, will be provided per sector hereafter.

Mentioning the differences in opinion does not imply that the sectors fully endorse other parts of ECN/RIVM's analyses. In addition, it has not been possible to exchange information with some industrial confederations. Therefore the following confederations have stated that they will not comply with the study:

- Association of Dutch glass manufacturers VNG.
- Association of Dutch food and drink industry VAI.

A.2 Paper industry

Final response Paper industry, E-mail 24 September 2003

The VNP has participated in the consultation with ECN with an extensive delegation. ECN has visited the VNP energy committee, which ensured the presence of sufficient expertise. VNP's statements in this consultation have also been based on input from the members with respect to the expected growth of production. An inventory has been made among members with respect to the planned growth in coming years that has already been included in investment plans. The note of 2 July 2003 (the overview of the results of the consultations, page 5, items 1-12) provides a good representation of our issues. ECN's conclusions, however, are incorrect.

The paper and cardboard industry expects an annual growth of 2.9% without the planned new paper machine and 3.9% with the planned new paper machine. Under item 3, ECN indicates that they can support this growth, but consider it unlikely. This has surprised us greatly. In those cases where the manufacturers' board of directors have provided a well-founded estimate on the basis of existing investment plans, ECN does not concur and establishes a growth of 2.2%.

ECN thus ignores three important characteristics of the paper industry:

- First of all, the sector is growing abruptly as a result of the large investment costs. The Dutch factories have grown 1% less than the European average in previous years. In the investment plans for the large concerns, our companies are given room to catch up in the coming years. The largest factory in the sector is currently working at maximum utilization rate and take-overs result in new expansion plans, both with respect to autonomous growth and by purchasing new machinery.

- ECN does not take into consideration the planned new paper machine, which will be a driving force for further growth of the sector, exceeding the European average. This effect has been visible in previous years in the surrounding countries. The European statistics for growth show this increase in growth rate for one country after another. The minimum ECN assumption should concur with the European growth rate of approximately 3%. Our estimate of 2.9% seems quite reasonable.
- Secondly, we are producing entirely for the international market. If estimates are made of expected paper consumption, this could never be based solely on the Dutch consumption. The Dutch paper and cardboard industry exports more than 70% of its production and is owned for more than 80% by international concerns. Therefore it is not a question of how much the Dutch economy grows, but how much the European market grows. The Netherlands lag behind in that respect, as we all know.

We find it unsatisfactory that such characteristics are not included. As a result we are confronted with an expansion figure in the ECN data that is too low, which directly affects the CAP[26] as proposed by the Ministry of VROM. The socio-economic climate in the Netherlands has clearly lagged behind the other European countries. We should be careful not to let CO_2 trade reinforce this development.

A.3 Chemical industry

Final response, E-mail H. Veenenbos, VNCI, 18-9-2003
In general, much is known about energy consumption and CO_2 emission of the chemical industry. Almost the entire branch has participated in the LTA-1, for which Novem has kept a good monitoring of the period 1989-2000. During the course of LTA-1, a total of 5,834 kton CO_2 emission has been avoided (compared to a situation without agreement efforts). With a reference emission of 17,000 kton in base year 1989, this means that the CO_2 emission in 2000 amounted to 23,134 kton. Altogether (including the non-participating small companies) it can be said that the total emission of the branch amounted to approximately 23,500 kton.

The chemical industry experiences a steady growth, which VNO-NCW projects at an average of 3.6% annually for the period 2003-2010. It has been established that the production index of the chemical industry increased by 3% annually in the period 1995-2002. According to CBS, the growth of the production volume in constant prices even amounted to 3.9% per year in 2001 and 2002. As for the first quarter of 2003, CBS states that the growth was even 7.7% higher compared to the first quarter of 2002. In 2002, CPB provided a short-term prognosis for volume growth in the chemical industry that amounted to a growth of over 3% per year. At the end of April 2003, CPB projected an average sectoral growth of over 2.75% in 2003 and 4.25% in 2004. Finally, the British research bureau BAK mentions average expansion figures for the Dutch chemical industry of 3.7% annually in the period 2001-2005 and 3.5% in the period 2006-2010. Some remarkable shifts in production are, among others, the closure of Kemira Rozenburg, the expansion of the cracking unit of DOW and the grassroots PO complex of Lyondell/Bayer at the Maasvlakte. As for the cracking capacity, when we responded to the ECN figures it became evident that ECN's projection for 2005 of 4000 kton capacity had to be adjusted upward as it was already surpassed.

With about 62% of CO_2 emissions stemming from energetic activities, the mentioned expansion figures will result in an expected increase of the total emission of CO_2 of the branch of:
- year 2000 = 23,500 kton CO_2 (2000-2002: 1.6% growth/yr),
- year 2005 = 25,760 kton CO_2 (2003-2005: 2% growth/yr),
- year 2010 = 28,440 kton CO_2 (2005-2010: 2% growth/yr).

[26] Author's comment: room for emissions in the future

ECN's Indicative Targets show the following figures:
- year 2000 = 22.300,
- year 2005 = 24.600 (2000-2005: 2% growth/yr).
- year 2010 = 25.600 (2006-2010: 0,8% growth/yr).

On the basis of the arguments and the above figures, we establish that the projected figures of ECN/RIVM, which are used as input for the Indicative Targets for the industry and E-sector, are too low. Therefore, VNCI does not agree with the conclusions that arise with respect to our sector.

A.4 Base metal industry

There has been an exchange of information between representatives of Corus and ECN on:
- the delimitation of the sector,
- the economic growth,
- the physical expansion figures (steel and aluminium),
- the cokes production,
- cogeneration developments,
- technological developments.

This has resulted in some adjustments to the emission trend until 2010 in the reference Projection (see Chapter 7).

Response CORUS on ECN figures Base metal industry 28-8-2003.
A remaining issue involves different perceptions with respect to the steel production in 2010. According to the sector, this amounts to 7.3 Mton compared to 7.1 Mton according to ECN/RIVM.

A.5 Refineries

Final response, E-mail J.C.D. Boot, VNPI, 30-9-2003
Although ECN acknowledges the fact that, at the moment, its models are not accurate enough in reflecting the relationship between product specifications and CO_2 emission, ECN's total emission is somewhat lower than calculated by experts in the sector.

In our opinion, the Indicative Target for the refining sector that is presented by ECN is too low, because the following factors have not been included, or insufficiently:

1. More stringent product specifications
- Decrease of the sulphur specification in diesel to 10 ppm maximally has been included in the ECN/RIVM projection, but the influence of additional specifications as for example the aromatic level have not been taken care of.
- Some proposals have been submitted to the European Parliament concerning the decrease of the sulphur specification in navy diesel. The resulting CO_2 emission in refineries has not been calculated in the Reference Projection by ECN/RIVM.
- Some proposals have been submitted to the European Parliament concerning the decrease of the sulphur specification in bunker fuel oil. The resulting CO_2 emission in refineries has not been calculated in the Reference Projection by ECN/RIVM. This could be a substantial additional CO_2 emission.

2. Increase of secondary capacity
The refineries have indicated that the greater demand for diesel will be met by increasing secondary capacity, respectively a larger utilisation of the secondary capacity. The increase of secondary capacity will generally lead to a greater increase in CO_2 emission (per unit of product)

than an increase of primary capacity. This larger emission increase has not been included in the Reference Projection by ECN/RIVM.

We trust that the above arguments will convince ECN/RIVM to increase the sectoral indicative target for the refining sector to 16 Mton, in correspondence with the estimate of our experts.

A.6 Electricity production

Summary response 8-10-2003 by EnergieNed
The Reference Projection has shortcomings for the electricity market with respect to six aspects. EnergieNed has the following remarks with respect to the Reference Projection:

- the division of the national production does not correspond with the market situation,
- fuel use relies too much on natural gas,
- market signals for growth in import lack,
- there is no reason for disconnecting economic growth and increased electricity demand,
- use of biomass does not correspond with the conditions of the Coal Covenant,
- assumed emissions in base year 2000 are lower than our own figures.

These critical notes remain valid, even after the adjustments that ECN and RIVM have made as a result of our comments. These adjustments meet our perceptions only partly. The adjustment of the projection amounts to 3.2 million tonnes for the energy sector, whereas we think that the following is needed to account for structural developments in the electricity market:

[Mton]	2000	2005	2010
Correction differences in base year	3.0	3.0	3.0
Lacking of MEP in implementation of Coal Covenant		1.0	3.2
Structurally less import		1.6	1.6
Market conformity national production (incl. fuel mix)		2.8	4.7
Larger demand growth 2005 - 2010			4.2
Total difference in structural market development	3.0	8.4	16.7

Indicative Target puts supply security and Dutch market development at risk
The establishment of an Indicative Target for the CO_2 emissions of industry and energy sector on the basis of the ECN's present figures has a large effect on the electricity market. In our opinion, the figures provide an insufficiently realistic representation of the electricity market. We establish a large gap with a market conform development, both in terms of growth of the market and the manner in which this market is supplied with electricity. The current figures result in the freezing of the production of the six largest Dutch producers at the current level. Not much room is left for other national producers either. A further increasing demand will increase our dependency on supply from abroad. The Indicative Target will thus draw heavily on supply security in our country. Whereas supply security has given cause for aiming at less dependency on import, an Indicative Target for CO_2 that is too low will have exactly the opposite effect. More import will occupy the room that is needed for expansion of capacity.

The proposed Indicative Target, based on the ECN figures, thus puts the desired supply security and the Dutch market development that is needed at risk. A further adjustment of the Indicative Target is not only desirable; it is an absolute necessity. Below we will explain what aspects require an adjustment in the substantiating projections for the Indicative Targets.

Division of national production does not correspond with the market situation
We are pleased that ECN shares our opinion that the original Reference Projection for national electricity generation does not do justice to the actual market situation. The adjusted projection for 2010 is drawing nearer to our previous comments, but to an insufficient extent in our opin-

ion. We have indicated earlier for example that the electricity production per group of power plants as of 2005 will amount to at least 65TWh, based on model calculations of the sector. This level is still not reached in the adjusted projection, where a production of 63 TWh for large production companies in 2010 is established. The motivation for this projection is not provided by ECN. EnergieNed establishes that the suggested level for 2010 corresponds with the expected production for 2003 and barely exceeds the realised production in 2002. The timing of the growth and the final level require further adjustment to the factual market situation in the Reference Projection: at least 65 TWh in 2005 and expansion with a base load unit in 2010.

Fuel input relies too heavily on natural gas

The use of coal and blast furnace gas in the Reference Projection lies far below the current average. ECN explains that there is little extra room in the deployment of coal-fired plants. In our opinion, that room does exist. Moreover, there will be a change in the use of coal as a result of the Coal Covenant. Even after adjustment by ECN, the deployment of blast furnace gas remains far below average. Our comments concerning the fuel deployment has consequences for the CO_2 effect as a result of a shift from production of other sectors to the energy sector, which ECN has put through after receiving our comment. The effect is significantly stronger than ECN is currently estimating, i.e. an emission resulting from the deployment of at least 10 PJ extra blast furnace gas and 65 PJ extra coal. The projection for blast furnace gas is significantly lower than the historical average. The larger coal use coheres with the increase of production in existing units as demand increases on the one hand, and with the expansion of base load capacity on the other hand. Moreover, in the current market situation, part of the coal capacity produces electricity in the weekend, evening or at night, because part of the cogeneration capacity is not in operation then. In our opinion, this effect amounts to at least 700 MW.

Lacking market signals for growth of import

The size of net imports depends on two factors: the available import capacity and price differences with neighbouring countries. ECN assumes the import capacity to be expanded at the Dutch border, and also (mostly) utilised. As for growth of Dutch import capacity, it has become clear that TenneT has postponed expansion plans indefinitely. Therefore, more capacity cannot be realised in that way.

As for the price difference, the general market expectation is that this difference will decrease. We have observed that the price difference between the Netherlands and the surrounding countries is becoming smaller as a result of increasing prices abroad; we note that this has developed in competition. This price increase results from structural changes in the market (such as the closure of nuclear plants and more gas in Germany). Based on the forward prices for 2006, the difference between the Netherlands and Germany appear to be only 1 €/MWh. The actual situation of import also shows a decrease since 2000. Independent analyses of TenneT in their capacity plans support this view, as their projections also show a decrease with an import of 16-17 TWh at the end of this decade, or even a shift to export. Thus, the price difference with neighbouring countries is not a plausible argument for an increasing net import.

No reason for disconnecting economic growth and an increasing electricity demand

Except for a minor adjustment with respect to an increased electricity demand in industry, ECN refutes our comments with respect to the growth rate figure for demand. ECN argues that especially saturation effects would flatten this growth and a new boom is not to be expected in electricity-consuming appliances. These assumptions also result in a major breach in trend with the past. We have observed that, beside us, CPB, IEA, TenneT and RIVM do not expect such a trend breach either, or certainly not to the same extent. All in all, we do not encounter ECN's prognosis with respect to the trend breach in a number of authoritative outlooks. We cannot imagine that others would overlook such a trend breach.

Deployment of biomass does not correspond with the Coal Covenant
The Reference Projection accounts for the deployment of biomass for electricity production. According to ECN/RIVM the total corresponds with the agreements in the Coal Covenant for 2010 and a growth trajectory in the period in between. In our opinion, the deployment of biomass in the projection for 2010 is much larger (3.8 mln ton CO_2) than agreed upon in the Coal Covenant for 2010 (3.2 mln ton CO_2). Moreover, there is no certainty whatsoever with respect to the co-firing of biomass, which is an essential condition in the Coal Covenant. The current MEP tariffs only apply until the end of 2005, while there is no view on the period after that date. New investments will not be done either for the time being. The projection also estimates a large contribution for 2005. We would like to remark that no binding agreements have been made for that period that could justify such a contribution.

Refraining from corrections in base year results in systematic underestimation
We have noted that the emissions in the base year in the Reference Projection are lower than our figures. We feel that the omission of these corrections may result in a structural underestimation of CO_2 emission in the Reference Projection (both for the total emission and for the emissions of the energy sector). All in all, a substantial amount is involved. These structural differences cannot be left unexplored for a correct establishment of the Indicative Targets.

A.7 Agriculture and horticulture

Letter and enclosures of LTO to VROM, 16-8-2003
Based on our conversations and available information we have established that these starting points are based on the state of affairs in 2001 and have been adjusted for the so-called pipeline policy and the Strategic Agreement of the Balkenende Cabinet. In our opinion, a number of specific and recent developments have been included insufficiently in the projection of the CO_2 emissions of glasshouse cultivation in 2010.

Development of glasshouse cultivation areas
ECN assumes a stabilisation in the existing glasshouse cultivation area (10,000 ha). LEI assumes a growth of the area of 8% in 2010. We expect a larger growth given the positive expectations for the sector regarding the future. The CBS statistics show that the area occupied by glasshouse cultivation has increased by 500 ha between 1997 and 2002. The LTO glasshouse cultivation section expects a significantly larger growth and considers a future area of 16,000 hectare quite possible.

Area and intensity of illuminated cultivation
ECN assumes an illuminated cultivation area of 15% in 2000 and 18% in 2010. The LEI assumes an increase of the illuminated cultivation to 22% in 2010[27]. We have serious doubt about these figures, however. The market for glasshouse cultivation products increasingly demands for clean and safe high-quality products all through the year. The utilisation of illumination to stimulate growth of plants is a very important tool for greenhouse growers. We estimate that the current illuminated area is 28% and that this will increase to approximately 50% in 2010 (Annex 1).

Intensification of the glasshouse cultivation sector as a result of increasing gas price for extensive companies
The gas prices in the liberalised market will increase significantly for extensive companies (gas consumption less than 25 m^3/m^2). In the liberalised markets there is a distinction between profile prices (annual consumption until 170,000 m^3) and prices based on peak capacity (more than 170,000 m^3). As for general gas prices in the Netherlands, we expect structurally higher prices than in the past as a result of stabilisation of oil prices on a higher level and higher prices for

[27] LEI report 'How to apply energy' (in Dutch) (2002).

peak demand and profile consumption. As a result we expect a shift from extensive to intensive cultivation, which will lead to an increase in energy consumption (Annex 2).

Heat from third parties
In the Reference Projection, ECN assumes a stabilisation of heat supply from third parties until 2010. LEI assumes a reduction in deployed cogeneration capacity of 25% until 2010 and a reduction in operating hours to 3000 hours annually. According to LEI, this will lead to an increase in energy consumption of 2.5% in 2010. We expect a larger decrease in the application of cogeneration than LEI. COGEN Projects assumes 2000 operating hours on a yearly basis for cogeneration with heat supply to gardeners, which seems realistic. Moreover, it can be concluded from data provided by COGEN Projects that a decrease of 20% of capacity in operation will already be visible in 2003. We expect a further decrease in cogeneration capacity managed by energy companies to 50% as a result of the liberalisation of the energy market and we assume that the large residual heat supply projects will have been terminated in 2010.

We conclude that the developments we have observed will result in a significant increase in energy consumption in the glasshouse cultivation sector compared to the Reference Projection of ECN. We urgently request ECN/RIVM to carefully include our arguments in the Reference Projection and its translation into the expected CO_2 emissions in glasshouse cultivation in 2010. The GLAMI Covenant and the sector target to arrive at an efficiency of 35% per unit of productiont, compared to 1980, is not under discussion as far as we are concerned. The glasshouse cultivation sector cooperates dynamically with the government with respect to the improvement of energy efficiency by means of research, information on and translation of policy into concrete results for companies. The results are visible every year in terms of improved sector figures.

Annex 1: Indication illuminated area in glasshouse cultivation

This overview has an indicative character and results from information of an illumination fitter, a consulting agency and an LTO Plant-growing Service. Currently, an illuminated area of approximately 2800 hectares is assumed, i.e. 28% of the total area is illuminated.

Cultivation [ha]	Area	Illuminated 2003 [%]	Illuminated area
Roses	900	95	855
Freesia	200	50	100
Alstroemeria	100	45	45
Flowering pot plants	700	60	420
Gerbera	250	40	100
Chrysanthemum	750	50	375
Orchid	200	100	200
Lily	300	50	150
Ornamental plant cultivation companies	200	100	200
Vegetable cultivation companies	150	100	150
Vegetable cultivation company illuminated area	50	100	50
Total			2645

Assessment
Information from intermediaries shows that 100% of the area of newly built greenhouses for the ornamental plant cultivation is equipped with assimilation illumination. Based on the modernity of 15 years in the glasshouse cultivation sector, it can be assumed that 50% of the currently non-illuminated area of ornamental plant cultivation (3200 ha) will be renewed and equipped with illumination before 2010. In 2003 this amounts to 50 hectares and the expectation is that it will further increase to 100 hectares in 2004. We expect an annual growth of 50 hectares, which will lead to an estimated illuminated area in glasshouse cultivation of 4,800 hectares in 2010, i.e. nearly 50% of the current area.

Annex 2: Area shifts and energy consumption as a result of the liberalisation of the energy market

An area of 2500 hectares of extensive companies is assumed. As a result of increasing gas prices, this area is expected to halve to 1250 hectares. An increase in gas consumption in this area of on average 20 m^3/m^2 to 35 m^3/m^2 is assumed. This is an increase in gas consumption of 187.5 m^3 per year, which is 5% of the projected energy consumption in glasshouse cultivation in 2010.

Current area of extensive glasshouse cultivation (<25 m^3/m^2):

Cultivation [ha]	Area
Alstroemeria	120
Freesia	200
Orchid	210
Flowerbed plants	500
Summer flowers	500
Strawberry	150
Chicory	80
Radish	165
Lettuce	300
Various	250
Total	2475

APPENDIX B OVERVIEW OF ALL EMISSION MUTATIONS

Table B.1 *Individual mutations of CO_2 emission in the Reference Projection before 2010*

Sector	Measure	Emission effect
Agriculture/ horticulture	Shift Mobile equipment/mutation ER	-1.0
	PL: decree in glasshouse cultivation (partly)	-0.1 à -0.8
	SA: abolishment of EIA/VAMIL	0
	Complete application of crop standards decree	-0.7 à 0
	TOTAL	-1.8
Transport	Difference in emission factors ECN and RIVM	+0.8*
	Shift Mobile equipment/mutation ER	+2.2
	PL: Introduction of kilometre tax	-1.1
	PL: The new driving force	-0.2
	PL: Programme short drives	0
	SA: quarter tax on petrol returned	+0.3
	SA: Creation of extra driving lanes	+0.1
	SA: Abolition of subsidy for energy efficient cars	+0.1
	SA: Fiscal adjustments	+0.1
	SA: Kilometre tax removed	+1.1
	HA: Quarter tax on petrol not returned	-0.3
	HA: Quarter tax for investments	+0.1
	HA: Simplification fiscal measure commuter traffic	+0.1
	Actualisation mobility/emission trend	-1.4
	(biofuels, optional)	(0 a 2.0)
	TOTAL	+1.9
Households	Mutation ER	-0.2
	PL: Intensification EPA	-0.1
	PL: BANS effect on EPC new housing	-0.1
	SA: abolition/transformation EPR	+0.1
	HA: increase REB	-0.1
	HA: EU Directive construction	0
	HA: Complete abolition EPR	+0.6
	Lower electricity demand	0
	TOTAL	+0.3
Services	Mutation ER/shift Mobile equipment	-1.6
	PL: EPC-U/BANS	-0.2
	PL: Intensification EPA-U	-0
	SA: Abolition EIA/ EINP/VAMIL	+0
	HA: Increase REB	-0
	HA: EU Directive construction	0
	TOTAL	-1.7

Sector	Measure	Emission effect
Industry	Shift decentralised cogeneration/mutation ER	- 13.5**
	PL: LTA-2	- 0.1
	PL: BANS	0
	SA: Abolition EIA/VAMIL	+0.1
	Correction for physical growth Chemical Industry	+0.5
	Correction physical for Base metal	+0.5
	Correction base year emission Base metal	+0.5
	Less expansion cogeneration production	- 0.9
	TOTAL	- 12.9
Energy	Shift decentralised cogeneration/mutation ER	+10.8**
	PL: Coal Covenant (extra reduction)	- 1.5
	PL: Extra renewable as a result of BLOW	- 0.1
	SA: Borssele remains open	- 1.4
	SA: Defiscalisation REB (more decentralised cogeneration)	- 0.2
	SA: Defiscalisation REB, effect on VV, DE	- 0.1
	HA: less demand due to higher REB	- 0.1
	HA: definitive MEP tariffs	- 0.3
	HA: 36i deleted, effect on RE (wind)	- 0.1
	Less decentralised biomass	+0.1
	Larger growth in electricity consumption companies	+0.7
	More utilisation cokes gas	+0.6
	Smaller yield plants	+0.2
	Smaller share cogeneration	+0.4
	Compensate for omitted cogeneration production	+1.6
	Less electricity consumption households	- 0.3
	Less growth in cogeneration production refineries	- 0.7
	TOTAL	+9.7

Note: PL = Policy in Pipeline; SA = Strategic Agreement, HA = Framework Agreement
(*) Mutation compared to ECN (Ybema, 2002), not compared to RIVM (Van den Wijngaart, 2002).
(**) Mutation compared to ECN (Ybema, 2002), partly compared to RIVM (Van den Wijngaart, 2002).

ABBREVIATIONS/GLOSSARY

ACEA	Association of European car manufacturers
AMvB	Orders in Council
BANS	Administrative Agreement, new-style: agreement between the government, IPO and VNG (see also below)
BLOW	Administrative Covenant on the National Development of Wind Energy
BSB	Fuel Tax
CAP	Common Agricultural Policy
CBS	Statistics Netherlands: responsible for collecting, processing and publishing statistics to be used in practice, by policymakers and for scientific research
EIA	Energy Investment Deduction
EINP	Energy Investment regulation Non-Profit
EnergieNed	A broad-based federation for all companies playing an active part in the production, transport, trade or supply of gas, electricity or heat in the Netherlands.
EPC	Energy Performance Coefficient
EPN	Energy Performance Standard
EPR	Energy Premium Scheme
GLAMI Covenant	Horticulture and Environment covenant
IPO	Umbrella organisation of the 12 Dutch provinces
ITS	Indicative Target Sector
LTA	Long-Term Agreement
MONIT	Monitoring National consumption, Information and Trend analysis
Novem	The Netherlands Agency for Energy and the Environment: promotes the sustainable development of society in the field of energy and the environment, both on a national and international level)
REB	Regulating Energy Tax
VAMIL	Early Depreciation Environment Investment
VNCI	The Association of the Dutch Chemical Industry
VNG	The Association of Netherlands Municipalities
VBE	Benchmarking Verification Agency for Energy Efficiency: an independent body that executes the homonymic covenant between local governments, verifies energy-intensive business and reports about this to the participating organisations)
VPL	Local Traffic Performance standard
VROM	The Netherlands Ministry of Spatial Planning, Housing and the Environment
WMB	Act on Environment-based Taxation