NEC reduction programme 2006

BELGIUM

Table of contents

1 Executive summary

This programme describes the measures that have been taken or planned in Belgium in order to meet the emission ceilings from the NEC directive. Belgium is a federated state and environmental legislation is mainly a regional competence. Product standards however are a federal competence. For this reason, Belgian emission ceilings have been split up into 4 sub ceilings: a national figure for emissions from non-stationary sources and three ceilings for the other sources of each of the regions. These ceilings are shown in Table 1.

Table 1: Emission ceilings for the three regions and non-stationary sources (in ktonnes) - 2010

	Non-stationary sources	Flanders	Wallonia	Brussels	Total
SO_2	2	65.8	29	1.4	**99**
NO_x	68	58.3	46	3	**176**
VOC	35.6	70.9	28	4	**139**
NH_3	-	45	28.7	-	**74**

Having regard to this division, this reduction programme consists of the following:

- a reduction programme for non-stationary sources;
- a reduction programme for stationary sources consisting of:
    - a federal part, describing the measures that have been taken or planned by the federal government;
    - a contribution from each of the regions, taking account of the federal measures alongside the measures that have been taken or planned within the relevant region.

In the projections for non-stationary sources, account has been taken of technological measures that are or have to be taken at a European level. On the other hand, also in Belgium measures are taken. These aim at influencing the evolution of mobility (limiting the growth of road traffic and presenting alternatives for car or truck traffic) and stimulating environmental friendly vehicles and fuels (both by fiscal incentives and by sensitization).

The federal government has established a Royal Decree limiting NO_x and CO emissions from heating installations on gaseous and liquid fuels with a thermal power up to 400 kW. This Decree is being reviewed in order to widen its scope. A Royal Decree regulating the efficiency of heating installations fired with solid fuels is soon to be notified to the European Commission. A lot of effort has been done to sensitize installers of heating appliances and good practices have been drawn up. Liquid fuels with low sulphur content are given fiscal incentives.

In Flanders, measures have been selected based on an extensive study programme. In this programme, the major industrial sectors, their emissions, possible measures and their reduction potential have been mapped. A weighing between sectors taking into account socio-economic characteristics has been elaborated. Sectors have been involved when working out measures. These measures are often very specific and are being described in this programme. Often, they are imposed through sectorial conditions in Vlarem (the Flemish environmental legislation) or the companies' individual environmental permits. Major measures that have been taken are:

- environmental policy agreement with electricity producers (SO_2 and NO_x);
- adaptation of Vlarem conditions for: combustion plants and stationary engines (SO_2 and NO_x), ceramics industry (SO_2), refineries (SO_2 and NO_x), waste combustion (NO_x), storage and handling (VOC), vehicle refinishing (VOC), phase II vapour recovery (VOC) and car assembly (VOC);
- company specific measures in the chemical industry (VOC) and in the production of paints and inks (VOC)

- measures in the agriculture and horticulture for reduction of NH_3 emissions: livestock reduction, low-emission use of manure, feed-related measures, low-emission stables and manure processing.

Possible additional measures are:

- imposing the NO_x target value from the EPA with electricity producers (NO_x);
- adaptation of Vlarem conditions for refineries (SO_2 and NO_x);
- in the chemical industry (SO_2 and NO_x), iron and steel production (SO_2 and NO_x), non ferrous sector (SO_2 and VOC), other industrial sectors (NO_x), plastics processing (VOC), storage and handling (VOC), and printing (VOC) additional, mostly company specific measures are being considered.

The way in which these measures will be introduced depends on the ongoing consultation of the target groups. Possibilities are through Vlarem legislation, the individual environmental permit or a covenant. For NO_x the introduction of an economic instrument has been chosen, more specifically a levy with recycling of revenues, unless in the consultation with the target groups a consensus is reached on another instrument (being either another economic instrument or specific measures for companies or sectors).

In the Walloon Region, major reductions are to be achieved through the implementation of the LCP and the IPPC directive. In the sector of the iron and steel production, SO_2 will be reduced through desulphurisation of cokes oven gas and the use of low sulphur fuels, while goethite is used as an additive for reduction of NO_x. In the production of lime, cement and glass, scrubbers will be used to reduce SO_2, while SCR and/or SNCR are being considered to reduce NO_x. For VOC, the implementation of the solvent directive will result in major emission reductions; additional measures will be imposed through the implementation of the IPPC directive.

Measures for stationary sources in Brussels mainly aim at reducing energy consumption, both in industry and in the residential and tertiary sector, which of course also has a positive influence on NO_x and SO_2 emissions. An SCR has been installed on the waste incineration plant. For VOC, reductions have been achieved through implementation of European Directives 1999/13/EG and 2004/42/EG. Awareness raising campaigns aim at reducing the use of solvent containing products.

These measures lead to the emission projections from Table 2, in which a distinction has been made between a “with measures” scenario, taking into account measures that have already been taken or that will certainly be taken, and a “with additional measures” scenario, taking into account possible additional measures. These measures are discussed in detail in the chapter on the concerned sector or company.

Table 2: Emission projections in Belgium for the year 2010

(in ktonnes)		Non-stationary sources	Stationary sources			**Total**	**NEC**
			Flanders	Wallonia	Brussels		
SO_2	2010 w.m.	0.3	58.0	30.5	0.9	89.8	**99**
	2010 w.a.m.	0.3	49.5-53.2	24.4	0.5	74.7-78.4	
NO_x	2010 w.m.	75.9	63.4	53.7	3.1	196.2	**176**
	2010 w.a.m.	70.4	57.3-60.2	44.6	3.0	175.4-178.3	
VOC	2010 w.m.	27.7	67.4	29.1	4.9	129.2	**139**
	2010 w.a.m.	27.7	62.6	26.9	4.7	121.9	
NH_3	2010 w.m.	0.6	43.8	25.7	<0.1	70.2	**74**
	2010 w.a.m.	0.6	43.8	25.7	<0.1	70.2	

For SO_2, VOC and NH_3 the measures selected are sufficient to reach the ceilings. For NO_x, even when all possible addional measures are implemented, the ceiling is barely attainable. Since these measures have not been discussed in detail yet with the target group, in some cases question marks remain on the technical and economical achievability. In Flanders, the introduction of a NO_x levy with recycling of revenues is the subject of an ongoing consultation of the target groups.

The analysis above does not take account of the new emission factors for mobile sources and the off road sources that have not been taken into account when establishing the NEC ceilings. In the programme itself, further explanation on this point is given.

The fact that the NO_x ceiling might not be met is compensated by the fact that other pollutants (mainly SO_2 and VOC) are reduced well below the ceiling. Whereas total acidifying emissions would be 11,273 in case the NEC ceilings would be met exactly, these amount to 11,196 million acid equivalents in the “with measures” scenario, which is less than the level associated with the NEC ceilings, and in the “with additional measures” scenario this drops to 10,273 million acidifying equivalents.

In the case of photochemical ozone formation, the breaching of the NO_x-ceiling is compensated by the fact that VOC emissions will be well below the NEC ceiling. Moreover, Belgium is situated in a VOC sensitive area for the formation of ozone, which means that lowering the VOC emissions certainly leads to a drop in the ozone formation, whereas due to the complex ozone formation mechanism, lowering the NO_x emissions might lead to a rise in ozone formation.

2 Political and administrative adoption procedure

2.1 Belgium

2.1.1 Division of competences in Belgium

The transboundary nature of environmental problems calls for an international approach to environmental policy. On the one hand, the guiding principles, main thrusts and standards are laid down at supranational, usually European, level. A good example of this is European Directive 2001/81/EC on national emission ceilings (NEC Directive). On the other hand, the European framework is also based on the subsidiarity principle meaning that general rules should be further worked out at local level and that the authorities operating at the local level have to flesh out the general rules and provide an impetus to the higher authorities. In the Belgian context, this means that the federal and regional authorities become actively engaged. In order to attain the national emission levels imposed, an effort is required from authorities operating at various administrative and political levels. It is therefore indispensable first to provide a description of the way the Belgian state's structures are organised.

Through four state reforms (1970, 1980, 1988-1989 and 1993), Belgium developed a federal state structure. Under the latest state reform, the division of competencies between the federal government, the regions and the communities was regulated. The communities have no powers that are relevant in the framework of the NEC Directive.

With regard to the environment and water policy, the regions (the Flemish Region, the Walloon Region and the Brussels Capital Region) are competent for the following:

- protection of the environment, including the soil, subsoil, water and air, against pollution and contamination, and noise abatement;
- waste policy;
- monitoring dangerous, unsanitary and hazardous undertakings except for internal monitoring measures relating to protection of workers;
- water production and supply, including technical regulation of drinking water quality, sewage and waste water treatment.

Compiling emission inventories is also the responsibility of the regions.

However, the federal government is responsible for:
- establishing product standards;
- protection against ionising radiation, including radioactive waste;
- transit of waste.

In the light of this division of responsibilities within the Belgian State, the federal government's contribution to the reduction programme is focused on product standards while that of the regions is concentrated on the overall coordination of the programme within the region and on the stationary sources.

2.1.2 The NEC Directive

On 27 November 2001, Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants was published. This Directive, known as the National Emission Ceilings Directive (NEC Directive), imposes absolute NO_x, SO_2, VOC[1] and NH_3 emission ceilings on the Member States of the European Union which have to be complied with from 2010 on. Moreover, the Member States should draw up a programme indicating how these ceilings will be attained. Each year, the emissions of the four pollutants have to be reported at sectorial level and forecasts for 2010 have to be notified to the European Commission. The reduction programme has to be transmitted to the European Commission by the end of 2002 and an updated version before 31 December 2006. In accordance with Annex I to Directive 2001/81/EC, the national emission limits for Belgium in 2010 are as follows (in ktonnes):

[1] When spoken of VOC in this programme, this does not include methane

Table 3: Belgian 2010 emission ceilings (in ktonnes)

VOC	NO_x	SO_2	NH_3
139	176	99	74

As attaining the national emission ceilings requires measures by the federal government and the three regions, the Belgian emission ceilings are in each case split up into four sub ceilings: a national figure for emissions from non-stationary sources and three ceilings for the other sources of each of the regions. These sub ceilings are shown in Table 2.

Table 4: Emission ceilings for the three regions and non-stationary sources (in ktonnes)

	Non-stationary sources	Flanders	Wallonia	Brussels	Total
SO_2	2	65.8	29	1.4	**99**
NO_x	68	58.3	46	3	**176**
VOC	35.6	70.9	28	4	**139**
NH_3	-	45	28.7	-	**74**

Each region is responsible for its own ceilings. The figure for non-stationary sources should primarily be attained through federal product-related measures. The regions can take supporting measures regarding mobility policy.

The emission ceilings were determined at the Interministerial Conference on the Environment (ICE) of 16 June 2000. This conference brings together all ministers of the various governments whose responsibilities are relevant for environmental policy. The burden sharing with regard to the emission ceilings is thus the result of a political agreement between the authorities concerned.

The final Belgian emission ceilings are the results of negotiations between the European Commission and Belgium. In 1999 the European Commission published a first proposal for the Directive which included different, stricter emission ceilings. On the basis of these ceilings, the regional authorities held consultations with sectors with a major share in the emissions. On the basis of this round of consultations, the available studies and limited enquires from neighbouring countries, the regions proposed ceilings they deemed attainable. The combination of the regional ceilings and the ceiling that appeared attainable for mobile resources served as the basis for negotiations on Belgian emission ceilings with the European Commission, eventually leading to the emission ceilings shown in Table 1.

2.1.3 Structure of the reduction programme

Having regard to the sharing of responsibilities with regard to the environment and concomitant division of emission ceilings, the Belgian reduction programme consists of the following:

- a reduction programme for non-stationary sources;
- a reduction programme for stationary sources consisting of:
    - a federal part, describing the measures that have been taken or planned by the federal government;
    - a contribution from each of the regions, taking account of the federal measures alongside the measures that have been taken or planned within the relevant region.

Arrangements have been agreed among the regions on the federal measures taken into account by each of them and the way in which this will be done in order to ensure that the procedure is the same throughout. The energy scenario underlying the emission forecasts is also the same in the three regions, namely the energy scenario reported under the UNFCCC. The calculations of the forecasts, the measures taken into account and the other assumptions may differ from one region to another. More details will be provided in each of the regional contributions.

For the structure and contents of this programme, due account has been taken of the recommendations issued by the *Working Group on Implementation* of the CAFE[2] programme (2006).

2.2 Federal government

At federal level, the policy on the combating of air pollution is essentially set forth in the Federal Plan drawn up to combat acidification and ground-level ozone, approved by the Council of Ministers of 5 December 2003. The plan has been drawn up at a political level (with the support of experts belonging to the different administrations concerned), by a working party consisting of representatives of the Vice-Prime Ministers, and of the Ministers responsible for the Environment, Finance, Mobility Policy, Energy and Scientific Policy. It sets out a whole range of structural measures, listed per sector, as well as procedures for implementing and assessment.

The actions put forward have been prepared in consultation with the stakeholders and have been formulated essentially with a view to implementing the measures recommended by the governmental agreement, or have been built upon the previous Federal Plan to combat acidification and ground-level ozone (2000-2003).

The plan states that each Federal Public Service or Programmatory Public Service concerned (Foreign Affairs, Communications, Energy, Agriculture, Environment, Finance and Scientific Research) is fully responsible for the implementation of the measures lying within its competence.

2.3 Flanders

2.3.1 Before the NEC ceilings

The reduction programme for Flanders has been drawn up by the Department for Air, Nuisance, Risk Management, Environment and Health of the Ministry of the Environment, Nature and Energy in collaboration with the Flemish Land Agency and the office of the Flemish Minister of the Environment.

Upon the publication of the European Commission's first NEC proposal in 1999, all sectors with relevant emissions were consulted. At the time, the sectors were asked to comment on the sector-specific data of the RAINS[3] model. The initial set of indicative sectorial emission ceilings was drawn up on the basis of these consultations and the studies available at the time. Together with similar data for the other regions and mobile sources, this serves as the basis for negotiations with the European Commission on emission ceilings.

2.3.2 Sectorial studies

During the short period prior to negotiations on NEC ceilings, it was not possible to gather highly detailed information on the reduction potential of the sectors. However, this was done in a subsequent stage. In 2000 a study programme was initiated to map the reduction potential and concomitant cost in Flanders for the main (industrial) sectors. Within this programme, a study was conducted for each sector with a significant share in emissions. The study includes a description of the sector, an outline of its socio-economic characteristics and an overview of past emissions of the sector. Emission forecasts up to 2010 are compiled on the basis of the expected changes in what and how much will be produced, knowledge about planned closures, expansions or new branches and planned reduction measures. Sectorial cost curves have been drawn up for each of the relevant pollutants on the basis of a description of possible additional reduction measures and their reduction potential and costs. These cost curves summarise all possible reduction measures and their reductions, arranged from low to high marginal costs. The marginal cost is the ratio of the annual cost of a measure and the annual reduction it achieves (additionally), expressed in euro/kg pollutant.

Sector studies are available for the following sectors: electricity production, oil refineries, iron and steel production, non ferrous industry, chemical industry (three parts: basic chemicals, parachemicals and fine

[2] CAFE: Clean Air For Europe, programme of the European Commission

[3] RAINS = Regional Acidification Information and Simulation Model. This model is managed by the European IIASA research institute and enables simulation calculations concerning the impact of various scenarios regarding activities and implementation of measures on acidifying and eutrophying deposits and ozone and fine dust concentrations.

chemicals), car assembly, printing sector, metal degreasing and surface cleaning, production and industrial use of coatings, ink and glue, and various sectors with significant VOC emissions.

Each of these studies was compiled in collaboration with the relevant sector (represented by the sectorial federation or federations, possibly together with one or more firms) and with other government departments (including the energy administration and the Flemish Environment Agency which is responsible for the emission inventory). The steering group was a forum for discussions on the various subjects addressed in the study, focusing in particular on the feasibility of measures and their possible impact, intended to underpin the results of the study.

When the first NEC reduction programme was drawn up, part of the sectorial studies had not yet been completed. For the present programme, however, the results of all sectorial studies, and the intersectorial weighing (see 2.3.3) were available. This means that since 2003, important steps to underpin this programme with technical and scientific data have been included.

Accordingly, in the energy baseline used for emission forecasts, account is taken of measures taken in the framework of climate policy. Furthermore, the production forecasts that have been developed in the sectorial studies have been used in compiling energy forecasts.

All studies are available on www.vlaanderen.be/lucht (click on acidification - studies).

2.3.3 Intersectorial weighing

In order to attain, for all the sectors for which a sector study is available, the required emission reduction most cost-effectively[4] the cost curves from the sectorial studies determined for each pollutant can be combined into a single overall cost curve. For this purpose, account is taken only of the costs and emission reductions of possible measures and not of the distinctive characteristics of the various sectors. The Flemish government has commissioned the design of a method which can take this into account. Under this method, the sectorial cost curves are "corrected" on the basis of two parameters:

- the sector's **relative environmental impact**. For this purpose, a distinction is made between SO_2 and NO_x on the one hand and VOC on the other. The relative environmental impact is the quotient of the external costs of the emissions of the sector and the sector's added value. Because of the great uncertainty in determining external costs, this criterion may be used only to compare sectors and therefore cannot be construed as an absolute value per sector.

- the sector's **financial-economic power** clarifies the capacity of sectors to bear additional costs and is determined on the basis of ten key ratios which are related to added value, profitability, solvency and liquidity of the undertakings.

The possibilities of passing on additional costs are not quantified in the study but are discussed qualatively per sector.

These criteria and the weighting of these criteria lead to a somewhat different optimal apportionment of the emission reductions. In determining this optimal apportionment, account is taken of the fact that some measures have an effect on several pollutants.

It appears from the study that on the basis of the reduction costs alone (disregarding the above criteria), all measures should be taken with a maximum marginal cost of:

- 2.5 €/kg for SO_2;
- 6.6 €/kg for NO_x;
- 3.1 €/kg for VOC.

In determining the most cost-effective measures for the various sectors, the model[5] used employs emission forecasts up to 2010 from the sectorial studies as a basis. However, it may well be that in actual fact the emissions turn out to be higher than these forecasts or that measures that are cost-effective cannot be implemented for practical or organisational reasons. In order to allow for this, analyses have also been

[4] Meaning that the emission reduction is achieved at the lowest possible cost for all these sectors together.

carried out for stricter emission ceilings which are 5% to 20% lower than the actual ceilings. These stricter ceilings indicate what measures can additionally be taken to attain the most cost-effective emission reduction, taking account of the changed circumstances.

For similar reasons, analyses were also carried out with less stringent emission ceilings (5% and 10%).

The results of this study may be consulted on www.vlaanderen.be/lucht.

This is discussed in more detail in Chapter 6.1.

2.3.4 Further consultation with the sectors

The various sectors were not only involved in the sectorial studies and designing the method for intersectorial comparison. The sector or sectors concerned or companies are also consulted whenever specific measures are contemplated. If the measure agreed requires a decision by the Flemish government, SERV and MINA (see 2.3.7) are once again consulted on this point.

After the previous NEC programme was approved by the Flemish government in December 2003, a brochure was produced. In addition to the programme itself this brochure also contained additional information on various aspects, including the objectives and background of the Directive and its impact on the quality of the environment in Flanders. The publication of this brochure was accompanied by a symposium in the Flemish parliament (on 12 March 2004) to which all stakeholders were invited.

2.3.5 Consultation with the agricultural sector

To assist the NH_3 reduction policy, a number of scientific studies were carried out or initiated in recent years focusing on low-emission use, low-emission stables, emission from stored manure and emission from manure processing. In each case, the sector was involved as a member of the steering group for guiding and evaluating these projects.

The ammonia reduction policy forms part of the general manure policy. During the preparation of a new action programme under the Nitrate Directive and the new Manure Decree, there was extensive consultation with the sector. Specifically for low-ammonia-emission stables, feedback from the sector was requested in a number of hearings before the list of permissible low-emission stable systems was published. Moreover, the VLM (Manure Bank Department) holds consultations with the sector at least every two months in the course of which all relevant policy developments regarding manure legislation and its implementation are discussed.

2.3.6 Procedure and consultation under the policy on non-stationary sources

The 2003 national reduction programme consisted of three regional contributions, each with a transport part. As the emission ceilings for the transport sector have been determined at national level, only one transport component is incorporated in this progress report. The transport sector's analysis is based on the "Sustainability assessment of technologies and modes in the transport sector in Belgium (SUSATRANS)", commissioned by the government department for science policy and on a study of emissions from off-road mobile machines in the framework of international reporting, commissioned by the Flemish government department for the Environment, Nature and Energy.

The Flemish government carried out the analysis and processing of data and coordination with the other regions. The three regions agreed to use the results from SUSATRANS so as to ensure that differences in regional models do not affect the analyses, after which each region worked out the details of the regional measures and ensured consultation with those responsible for mobility policy within each region. Within the Flemish government, the mobility forecasts were coordinated with the draft Flanders Mobility Plan and with an analysis of mobility developments conducted by the Flemish Traffic Centre.

2.3.7 Opinions of SERV and MINA

Prior to the approval by the Flemish government, the Social and Economic Council for Flanders (SERV) and the Environment and Nature Council (MINA) were consulted about the first NEC programme. SERV is the advisory body of the Flemish social partners and is composed of representatives of employers' and

---

[5] The Environmental Costs Model for Flanders (MKM).

employees' organisations. MINA consists of representatives of nature and environment movements and social and economic organisations.

An opinion was received from SERV on 10 September 2003 and from MINA on 2 October 2003.

The key points of SERV's opinion were as follows:

- importance of properly balancing intersectorial reduction efforts;
- including the necessary flexibility and the need for regular programme evaluation;
- attention to indirect costs and derived effects in the social and economic fields;
- attention to alternative policy instruments;
- importance of consultation within the community.

To enable balancing of intersectorial reduction efforts, the method described at 2.3.3 above was developed. Effects in the social and economic fields are taken into account through the added value of the sector, and indirect costs were described qualitatively. Considerable attention has been paid to the importance of consulting the community throughout the procedure (see also below). The way in which progress within this programme is monitored is described in Chapter 7.2. To explore alternative policy instruments, a study was carried out into ways and means of using economic instruments in the reduction policy in Flanders. This is discussed in more detail in Chapter 3.3.7.

The MINA Council:

- pointed out that the 2003 programme was only provisional;
- expressed regret that the study of the usability of economic instruments was started only in 2003;
- noted that the possibility of newcomers to the environmental policy agreement (MBO) with the electricity sector had to be kept in mind;
- pointed to interaction with other policy fields such as energy policy;
- highlighted the potential of a charge per kilometre;
- asked that the federal authorities be pressed to take urgent legislative initiatives to make it compulsory for car manufacturers to place zero-emission vehicles on the market;
- asked that reduction possibilities for railways and shipping be examined further.

It is true that the 2003 programme was provisional as at that time not all sectorial studies were as yet available but they are now. The results of a large number of these studies was required to analyse the possible use of economic instruments, as a result of which that study was not begun until 2003. The MINA Council's observations concerning the MBO environmental policy agreement with the electricity sector were taken into account in the discussions on this issue. Interaction with other policy fields, e.g. energy and agriculture policy, is acknowledged and will receive additional emphasis in the course of the programme. The introduction of a differentiated charge per kilometre is hampered by a number of social and economic conditions, as a result of which it will not be introduced in the short term. The imposition of obligations on car manufacturers is a matter for the European institutions. In this context, Flanders advocates strict vehicle standards. However, action is taken to promote the use of environmentally friendly vehicles in Flanders. The recommendation to investigate possible action regarding railways and shipping is also carried out.

2.3.8 The present NEC programme

This programme is largely based on the findings of the sectorial studies. Reference is made to the different studies for the emission forecasts and the description of possible additional measures.

The measures and cost curves identified in the sectorial studies were also the point of departure for negotiations on, for instance, the measures taken in the electricity production and oil refinery sectors.

2.3.9 2006 approval procedure

As for the previous version of the reduction programme, opinions were invited from the SERV and the MINA on this programme. The opinions were received on 25 January 2007.

After the MINA and SERV opinions had been taken into account in the programme, it was submitted to the Flemish government which approved it on March 9th 2007.

2.4 Wallonia

Le programme de réduction pour la Wallonie a été élaboré en collaboration avec la Cellule Air de l'administration de l'Environnement (DGRNE) et la Division de l'Energie de l'administration de l'Energie (DGTRE) et leurs cabinets respectifs.

En 1999, pour l'élaboration de la première proposition NEC de la Commission européenne, tous les secteurs avaient été consultés sur leurs émissions respectives. Des informations et commentaires précis sur les données spécifiques au modèle RAINS ont également été demandés. Sur base de ces entretiens sectoriels, une première salve de mesures a été générée.

2.5 Brussels

In order to fulfil the regional obligations set by the "Air Quality" Framework Directive (1996/62/EC currently under revision), the daughter Directives, the NEC Directive and the Kyoto Protocol, the government of the Brussels Region approved on 13 November 2002, the Structural Improvement Plan relating to Air Quality and Global Warming 2002-2010[6], also known as the Air-Climate Plan[7].

This Plan was prepared by the Brussels Institute for Management of the Environment (*Institut Bruxellois pour la Gestion de l'Environnement*, IBGE), the Administration of Equipment and mobility (*Administration des Equipements et Déplacements* , AED), the Brussels public transport company (*Société des Transports Intercommunaux de Bruxelles* , STIB), the Administration of land-use planning and housing (*Administration de l'Aménagement du Territoire et du Logement* , AATL) and the cabinets of the competent Brussels Ministers and Secretaries of State.

In designing the Plan, IBGE followed, among others, the sectorial working groups set up by the Flemish Region. Additional consultations, within the Brussels Region, were conducted with persons responsible for the waste incinerator and sectors emitting volatile organic compounds (VOC), such as car body shops and printers. Lastly, the services sector and industry were consulted via the Environment Council.

This Plan entails 81 prescriptions and measures distributed over the following areas:

- The reduction of emissions from transport, a major source of urban pollution, by improving the technology of vehicles, and a policy to reduce motor traffic, including parking regulations, company mobility plans, improvements in public transport, etc.
- The reduction of emissions caused by energy consumption of buildings, which are major emitters of greenhouse gases, via an environmental policy for the rational use of energy (RUE);
- The promotion of renewable energy;
- The reduction of emissions from industrial activities via a policy for technological progress and the use of products generating less pollution, including regulations on the use of solvents-based products for companies emitting volatile organic compounds (VOC);
- The reduction of emissions from individual incineration and household consumption of solvents (uncontrolled emissions);

Improvements in exposure to the population, i.e. improvements in the quality of the air to which we are exposed on a daily basis (pollution and health, interior pollution, eco-construction, etc.).

A technical and economic analysis[8] of these prescriptions was conducted in 2004. The decrease in emissions and their cost were defined for each prescription. The study led to the establishment of priorities, budgeting and programming for the various measures.

---

[6] Government Decision: G*-31.55.0

[7] The Plan can be downloaded in French on http://www.ibgebim.be/francais/pdf/Air/PLANAC_complet.pdf ; and in Dutch on http://www.ibgebim.be/nederlands/pdf/Air/PLANAC_complet_nl.pdf

[8] http://www.ibgebim.be/francais/contenu/content.asp?ref=2004

This Air-Climate Plan is subject to assessment and may be amended every two years. It was recently evaluated in mid-2006 and must be submitted to the Brussels parliament. This evaluation reviews the additional measures adopted since the establishment of the Plan and stresses that priority must be given to reducing energy consumption by 2010 (the Kyoto Protocol) and, on the longer term, to the establishment of a "No Carbon Region". It is to be noted that the energy and the environment responsabilities lie now with a single Minister.

The environmental targets of the Air-Climate Plan were strengthened by other regional plans. The Regional Development Plan calls for a 20% reduction in traffic in relation to 1999 levels by the year 2010.

3 Policies and measures

In this chapter an overview is provided, per pollutant and per sector, of measures that have already been taken to reduce emissions and a description of measures that can or will be taken. The chapter also includes an estimate of emissions per sector in 2010 (for the figures, please see Chapter 4). Three scenarios are considered:

- 2010 without measures: these are the quantities that would be emitted if no more policy measures had been taken since 2000;
- 2010 with measures: takes account of policy already decided, with known developments (e.g. plant closures) and measures on which an agreement has already been reached with the sector (even though not yet laid down by law or in the environmental permit);
- 2010 with additional measures: also takes account of measures of which it is not certain that they are feasible, e.g. if the sector concerned deems the measure economically difficultly attainable, the sector asks for longer transition periods, discussions with the sector are still in progress or still have to get off the ground, it is difficult to enforce the measures in practice, etc.

In accordance with the division of NEC ceilings by the ICE (see 2.1.2 above), the measures are discussed separately for the stationary sources in the three regions and the non-stationary sources. At the beginning of each chapter, an overview per sector is given for the measures considered, their impact on the emissions and an indication of under which of the above scenarios the measure is classified. Finally, there is a reference to the information sheet in which this measure is described. These sheets can be consulted in Annex I. In the rest of the chapter, the measures are discussed in more detail, in each case with references to the information sheets.

3.1 Non-stationary sources

3.1.1 Overview

Table 5: Measures for non-stationary resources

Measure	Pollutant	Reduction (ktonnes)	With measures	With additional measures	Info sheet
Set of measures from the draft Flanders Mobility Plan	NO_x	3.7	v	v	VT1
Extra mobility measures Flanders	NO_x	1.2	-	v	VT2
Measures eco-friendly vehicles and driving behaviour Flanders	NO_x	1.6	-	v	VT3
Plan Wallon de l'air	NO_x	1.5	-	v	WT1
Futur plan air-climat	NO_x	1	-	v	WT2
Plan Air Climat Bruxelles, Measures Bruxell'Air	NO_x	0.2	v	v	BS1
Federal ozone plan	NO_x	NE	-	v	FT

3.1.2 Demarcation of the sector

The NEC Directive covers all emissions resulting from human activities from any sources on the territory of the member states and their exclusive economic zones. It does not cover emissions from international shipping and emissions from aircraft other than those resulting from landing and takeoff. The directive therefore does cover all other non-stationary sources. Apart from road transport, non-stationary sources therefore also include off-road emissions. In the determination of the emission ceilings, energy consumption of the off-road sector was fixed at 14.9 PJ which corresponds to the energy consumption of railways, inland shipping and agricultural tractors. Accordingly, non-stationary sources comprise the following sectors:

- road transport
- rail transport
- inland water navigation
- agricultural tractors

3.1.3 Measures

All the measures included in the model calculations in the technical preparation of the NEC Directive are, for the transport sector, technological measures. These technological measures also form the basis of the link between the vehicle emission rules and regulations and the stricter requirements for combustion properties at European level and must in Belgium be transposed into federal policy. Establishing emission standards is the most efficient measure to reduce traffic-generated air pollution and is one of the aspects considered in the discussions on European measures. The extent to which these vehicle standards lead to reduced emissions in the transport sector depends on developments in mobility and on the composition of the vehicle fleet. Both of these factors can be influenced at federal, regional and local level.

3.1.3.1 European measures

Attaining the emission ceilings requires the following action at European level:

- The standards should be made more stringent to further reduce emissions of road transport and the off-road sector so that eventually the current emission ceilings can be attained even if account is taken of the new emission factors (see below). The effect will not be discernable until after 2010.
- The European emission standards should be adjusted to prevent the emission factors from being increased again in the future. Test cycles should be adapted by European legislation in such a way that actual emissions approximate those laid down in the emission standards. Reporting under the present programme is based on the same emission factors as those with which the ceiling was determined.

3.1.3.2 Federal measures

The federal ozone programme contains measures to reduce emissions from transport. The state of the art of these measures are described in this chapter.

Mobilité durable en général

Du point de vue de la mobilité durable, un arrêté royal du 9 mai 2006 ainsi que l'arrêté ministériel du 26/04/2006 visent à assouplir la réglementation sur les bandes de circulation pour les bus et sur les sites franchissables. Les gestionnaires de voiries sont ainsi autorisés à créer des infrastructures pour les bus et les cyclistes afin d'augmenter la vitesse commerciale des transports en commun sans pour autant obliger les cyclistes à faire de grands détours.

Par l'application de la loi-programme du 8 avril 2003, notamment en ses articles 161 à 170, les entreprises et les institutions publiques comptant en moyenne 100 travailleurs ont dressé un premier

diagnostic des déplacements de leurs travailleurs entre le domicile et le lieu de travail pour la situation existant au 30 juin 2005. Les renseignements fournis jusqu'au 30 avril 2006 ont fait l'objet d'un premier rapport. La banque des données concernant ces déplacements pourra servir de base à l'établissement de plans de transport d'entreprise pour les employeurs, et à améliorer la connaissance concernant les problèmes de mobilité pour les différents niveaux de pouvoir.

L'enquête démontre que beaucoup d'entreprises et institutions ont déjà pris des mesures pour faire pencher les déplacements domicile-travail de leurs employés dans la direction d'une Mobilité plus durable. D'ailleurs, nous pouvons constater qu'aux endroits où une politique de Mobilité active est menée, cela ne reste pas sans résultat. Il faut tout de même encore souligner qu'encore beaucoup trop d'entreprises et institutions ne mènent pas de réelle politique de Mobilité. Avec une moyenne de 72,3% d'utilisateurs de la voiture, il y a encore beaucoup de travail à fournir. Le diagnostic du trafic domicile-maison est un instrument utile à cet effet. Ce document sert de base pour les concertations entre les partenaires sociaux dans les entreprises. L'utilisation de la banque de données trafic domicile-travail ainsi que les résultats de ces concertations sociales seront évalués.

Mesures en faveur des cyclistes

Conformément aux mesures de stimulation d'une mobilité durable telles que prévues dans l'accord du gouvernement fédéral, une première série de mesures en faveur des cyclistes a été implémentée dans un arrêté royal. Les mesures cyclistes ont entre autres pour objet l'affinement de certaines définitions, la signalisation, l'éclairage des vélos, les remorques et les passagers de vélos.

Driving behaviour

Concernant les aspects relatifs à la sécurité sur nos routes, la loi du 20 juillet 2005 (MB du 11 août 2005) avait pour objectif de combattre l'insécurité sur la route d'au moins 33 % pour 2006 et de 50 % pour 2010. Pour y parvenir, l'IBSR a conduit en 2006 des campagnes adaptées suivant une approche spécifique des groupes cibles. La sensibilisation a porté sur la nouvelle loi relative à la circulation routière, sur la catégorisation des infractions de la route et sur l'adaptation des montants des amendes.

Le Code de la Route a aussi été adapté pour appliquer intégralement les dispositions de l'arrêté royal du 11 mai 2004. Cette réglementation garantit une procédure d'agrément des écoles de conduite plus transparente et simplifiée. En outre, la formation à la conduite et la procédure en vue de l'obtention du permis de conduire ont été améliorées de telle sorte que l'attention est portée non seulement sur l'apprentissage des aptitudes techniques de base (maîtrise du véhicule et ecodriving) et du code de la route, mais également sur le traitement de l'information sur la route, sur l'évaluation correcte des risques, sur un bon comportement dans le trafic en général, et sur la capacité d'autocontrôle en particulier.

Vehicle inspection

Directive 2000/30/EC has been transposed in Belgian law in 2001. It has been decided afterwards to implement this directive entirely (including facultative measures). An agreement was concluded between the federal government, FIA, GOCA and 10 recognized vehicle inspection centres to organise and finance these extended road side inspections. GOCA and the vehicle inspection centres will assist the federal inspectors to control vehicle emissions. The Royal Decree has been published on September 6th 2006. The extended road side controls are implemented from September 8th onwards.

A study on the technical and financial feasibility to extend the regular vehicle inspection to measure standardised emissions (CO, NO_x, PM_{10}, VOC) has been started. An evaluation of available techniques and there technical, practical and financial specifications will be conducted. A report is expected by the end of April 2007.

Inland navigation

Quant à la navigation intérieure, au niveau international et européen, le gouvernement fédéral a exprimé clairement et formellement son soutien au programme NAIADES de la Commission européenne promouvant la navigation fluviale. Le Programme d'action «NAIADES» est valable pour 2006-2013 et comprend des mesures dans cinq domaines stratégiques pour la navigation fluviale : marché, flotte, emploi et compétences, image et infrastructure. Les mesures sont clôturées par un certain nombre de considérations sur une structure organisationnelle adaptée.

Un dossier important qui répond directement à ce programme concerne l'exonération fiscale de l'impôt sur les plus-values réalisées sur les bateaux fluviaux destinés à la navigation commerciale. Grâce à cette mesure, le gouvernement veut donner plus d'espace financier au secteur, composé principalement de petites entreprises, afin de moderniser la flotte. En y couplant en outre des conditions écologiques, la mesure contribue également à une amélioration des prestations écologiques du transport fluvial. Un projet de loi jouit déjà d'un accord de principe et un projet d'arrêté royal fixant les normes écologiques a été élaboré. Le dossier a été notifié à la Commission européenne. Sur une base annuelle, 2.000.000 EUR sont attribués potentiellement de cette façon en soutien direct au secteur.

Une autre initiative concerne la révision de l'accord de coopération, conclu entre l'État fédéral et les Régions, concernant l'exécution de la politique européenne de capacité, constituant actuellement le sujet du Règlement 718/99 du Conseil de l'Europe du 29 mars 1999 concernant la politique à l'égard de la capacité des flottes de navigation intérieure communautaires. Ce règlement offre également l'espace pour prendre des mesures incitantes, par exemple au niveau de la formation, de l'éducation, de la rénovation scientifique, etc.

Transport de marchandises par rail

L'État fédéral ayant reçu l'accord de la Commission européenne a octroyé, sur la base de l'arrêté royal du 30 septembre 2005, une enveloppe de 15 millions d'euros pour 2005 afin de soutenir le transport combiné en Belgique. En 2006 et 2007, 30 millions d'euros sont inscrits au budget par an.

Le mécanisme d'aide intervient au bénéfice des opérateurs de transport combiné de marchandises utilisant le mode ferroviaire pour les distances inférieures à 300 km. En effet, dans ces cas, les coûts excèdent les prix du marché, en raison notamment des charges de transbordement propres à ce type de transport. Les 300 000 unités de transport intermodales (UTI) transportées par voies ferrées et envois opérés par le train risquaient d'être reportées sur la route s'il n'y avait pas d'intervention publique pour rééquilibrer les coûts des offres ferroviaires. L'aide du fédéral est destinée précisément à consolider et à redéployer les navettes entre terminaux intérieurs.

Environmental friendly vehicles (Ecoscore)

En 2006, il a été décidé de reprendre la méthodologie «ecoscore», développée par le Gouvernement flamand, en tant que modèle pour la définition du caractère écologique des véhicules. Un score est donné à un véhicule, il est calculé à l'aide de l'influence sur différents aspects (effet de serre, santé, pluie acide, nuisance sonore). L'ecoscore donne la qualité écologique totale d'un véhicule sur une échelle de 0 à 100. Plus le score est élevé, plus le véhicule est écologique.

The reduction potential of above mentioned measures is included in the reduction potential of the measures in the three regions.

3.1.3.3 Measures of the Flemish Region

3.1.3.3.1 Measures affecting mobility developments

On 17 October 2003, the Flemish government gave its approval in principle to the policy intentions under the draft Flanders Mobility Plan, which contains recommendations to the Flemish government on mobility policy. The focus is on earth-bound mobility. The main criterion is "sustainability" which is translated into five challenges for the future: reachability, safety, access, quality of life and impact on nature and the environment. The draft Flanders Mobility Plan highlights five packages of measures which should make it possible to attain sustainability.

The sustainable scenario strives for a reduction in the number of car journeys by about 10% in relation to current mobility trends. The number of journeys by public transport would go up by 20% and the number of journeys by bicycle by 35%. Expressed in terms of traveller kilometres, the number of car kilometres would drop by 17% and the number of traveller kilometres in public transport would rise by 16%. In freight transports, the number of tonnes kilometres would further increase by 35%. In relation to current mobility trends, this growth is largely accommodated by rail and inland shipping. Consequently, the number of tonne kilometres by road decreases by 7% in the sustainable scenario.

In recent years, a number of the measures in the draft Flanders Mobility Plan have been worked out in more detail. They should make it possible to attain about half the targets from the sustainable scenario. It is beyond the scope of this document to provide a full overview of what has been achieved under the mobility policy and in the present study the focus will be on measures through which attempts are made to control the demand for mobility or bring about a module shift.

Measures taken to date

Control of the growth of road transport on roads in Flanders:

- e-government: A Flemish e-government coordination unit (CORVE) has been set up, charged with conceiving and supporting ICT projects for accessible, demand-led, simplified and integrated public services;
- promoting teleworking and home working within Flemish government departments: home working is encouraged by providing staff with a laptop and home connection; moreover, four telecentres have been set up where employees can link up their laptop and get access to personal and shared hard discs and the internet;
- carpooling: the Flemish government supports two systems:
  - ✧ Cambio is a professional organisation which makes a car fleet available comprising various models and assumes responsibility for maintenance, insurance, inspection, etc.
  - ✧ Autopia supports private carpooling in which people can arrange with friends, acquaintances or neighbours to jointly purchase and share a car.
- Sustainable mobility for the staff of the Flemish government:
  - ✧ Since 1 April 2000, journeys to and from work are free of charge for all Flemish government civil servants
  - ✧ Persons who cycle to work very frequently (at least four days a week, every week of a month) or cycle part of the way qualify for a generous kilometre allowance (0.15€/km)

Provision of more and better forms of **alternative transport** as a valid alternative to car and lorry transport:

- high-quality mobility agreements: these agreements, introduced in 1996, have grown into a high-quality instrument in which agreement is reached between the local authorities, the Flemish Region and the De Lijn public transport corporation on the supply of public transport services, dedicated tram and bus lanes, provision of information, etc.
- network standards and basic mobility: a network has been developed with various levels of service provision regarding speed and distances between stops;

- upgrading of public transport
- attractive, simple season ticket formulas:
    - children under the age of six and adults above 65 travel free of charge by tram and bus;
    - youngsters between ages 6 and 11 travel free of charge if accompanied by a season ticket holder;
    - a season ticket is valid throughout the network; there are three age categories;
    - people who return the number plate of their vehicle get a three-year free season ticket for trams and buses;
- measures to promote inland waterway navigation:
    - subsidies for loading and unloading quays;
    - automation of locks, widening of canals;
    - reduction of navigation charges;
    - electronic payments;
- company transport plans:
    - transport between home and work: cheap season tickets offered to companies for their personnel.
    - freight transport: fifteen companies in Flanders were studied. On the basis of the analysis of their logistics structure, the goods streams that are potentially eligible for alternative transport will be selected.
- expanding cycling infrastructure and enhancing safety.

Measures planned

In addition to the continuation of the measures listed above, a number of additional focal points are being worked out.

The Commuter Plan (2005) details the actions required with regard to **journeys to and from work**:

- upgrading of public transport:
    - developing tram and rapid bus projects in urban areas as highlighted in the Pegasus and Spartacus Plan (2004);
    - improving public transport services to and from industrial estates;
- promoting bicycle transport:
    - expanding bicycle infrastructure on the supra-local functional cycling route network;
    - improving cycle path maintenance;
    - improving pedestrian crossing safety;
    - eliminating dangerous roads for cyclists;
- improving support for carpooling:
    - constructing carpool car parks at motorway access points;
    - conducting targeted promotional and awareness-raising campaigns;
- continuing improvements of transport management:
    - enhancing collaboration between provincial mobility desks and the mobility consultants of the De Lijn transport corporation;
- expanding car sharing projects:
    - establishing car sharing projects in most urban areas by 2009;
    - carrying out research into existing car sharing projects in Flemish companies;
- co-funding of rail passenger transport:
    - part-funding by the Flemish government for the GEN Regional Express Network and the Zaventem airport shuttle link;

Optimising **freight transport** by enhancing transport efficiency:

- waterborne freight transport:
    - modernising the network of major waterways (Albert Canal, Brussels-Scheldt Sea Canal);

  - public-private collaboration for investment in the construction of quay walls and developing business zones along waterways;
  - in collaboration with VOKA, Unizo (the employers' organisations) and waterway managers, appointing transport experts from 2006 to investigate the optimisation of freight flows in companies;
- freight transport by rail:
  - public-private collaboration for the Liefkenshoek railway tunnel, endowing the railway companies with the requisite capacity to substantially expand their market share in container transport by rail to and from Antwerp;
- road haulage: a number of options need to be considered in more detail:
  - extending loading and unloading times;
  - preventing empty journeys as much as possible by making use of telematics, by making arrangements between transport operators on particular routes and by combining cargoes;
  - expanding vehicle capacity;
  - carrying out an analysis to study the causes of the lower loading degrees in transport under own management
  - establishing a benchmark agreement for the transport sector.

Horizontal measures

- Long-term analysis of the possible effects of a mobility-oriented localisation policy on the sustainable development of mobility;
- environmental impact assessment (EIA) for (new) infrastructure projects.

Effect of these measures

The implementation of measures under the draft Flanders Mobility Plan marked a break with past trends from 2000. Further progress towards the sustainable scenario means that this break will further continue in the years to come. Current and planned policy will mean that about 50% of the targets of the sustainable scenario regarding vehicle kilometres by road will be obtained. In this context, account is taken of the fact that part of the instruments and measures from the sustainable mobility scenario do not come under the responsibility of the Flemish government but under that of federal and local authorities. Attaining 50% of the targets in 2010 means continuing the trend in mobility developments in Flanders of the past five years.

The following table contains an overview of the emissions of road transport, rail transport (diesel locomotives) and inland shipping with (BAU) and without (REF) mobility policy.

Table 6: Impact of mobility policy on non-stationary source emissions

(in ktonnes)	road transport			rail transport			inland shipping		
	NO_x	VOC	SO_2	NO_x	VOC	SO_2	NO_x	VOC	SO_2
REF	42.82	13.04	0.11	1.35	0.20	0.002	3.66	0.14	0.11
BAU	38.62	11.96	0.10	1.52	0.23	0.003	3.99	0.15	0.12

The above table shows that current Flemish mobility policy results in a 3.7 ktonne NO_x and a 1 ktonne VOC reduction and that SO_2 emissions have remained virtually unchanged. This reduction has been taken into account in the "with measures" scenario.

A number of additional mobility measures may result in an additional reduction potential:

- Additional railway projects (Liefkenshoek tunnel, GEN and the airport shuttle);
- Promote cycling (Total Cycling Plan);
- Promote teleworking (included in the Commuter Plan).

These measures have also been included in the 2006-2012 Flemish Climate Plan as measures with an extra reduction potential. This is because they are measures whose reduction potential was not taken into account in the sustainable mobility scenario (teleworking) or measures which do not come under the competence of the Flemish government which can be achieved through Flemish efforts (local authorities are responsible for cycling, the federal authorities are responsible for railway projects).

A rough estimate of the NO_x reduction potential of these measures is 1.2 ktonnes. This potential is incorporated in the scenario with additional measures.

3.1.3.3.2 Measures to stimulate the use of eco-friendly vehicles and combustions

The conversion of the vehicle fleet should enhance the energy efficiency and eco-friendliness of the vehicle fleet. Efforts are also made to change people's mentality to ensure more eco-friendly behaviour on the roads. Instruments that can be used by the Flemish authorities concern the provision of information, raising awareness, financial measures, eco-friendly government vehicle fleets and drivers' behaviour.

Measures already taken

The Flemish government is implementing a number of instruments to expand the **government's fleets** in an eco-friendly manner:

- Cooperation agreement with municipal authorities (2005-2007):
    - The cooperation agreement is a voluntary agreement concerning the environment which a municipality or province concludes with the Flemish government. In exchange for discharging a number of tasks, they receive financial and practical support from the Flemish government. Local action benefiting the environment and mobility can be subsidised through this agreement. Possible action includes the purchase of eco-friendly vehicles, awareness-raising campaigns and local projects to tackle traffic-related environmental problems.
    - Within the context of the cooperation agreements with the municipalities, an instrument has been developed which enables municipalities to evaluate their own fleet. The Vehicle Fleet Environmental Assessment programme provides an indication of which vehicles in the existing fleet are the least eco-friendly. Moreover, advice is provided on how vehicles can be used in such a way as to optimally reduce the discharge of harmful emissions.
- Internal environmental management within the Flemish government:
    - In the framework of internal environmental management within the Flemish government, environmental aspects are systematically included in centralised contracts for the purchase and maintenance of service vehicles of the Flemish government. The Ecoscore of vehicles has been taken into account since 2005.
    - A pilot project has been set up focused on combustion consumption and energy-efficient driving within the Flemish government. About ten drivers are following a course on energy-efficient driving; they will be followed up for a period of one year. Consideration is being given as to how this training course can be established within the departments of the Flemish government.
- Expansion of eco-friendly public transport:
    - Various demonstration projects have been and are being implemented concerning eco-friendly buses:
        - Scientific evaluation of soot-treatment systems for buses (2000-2003);
        - Scientific evaluation of combined NO_x catalyst and soot filter systems for buses (2003-2005);

        - Comparative measurements of emissions and consumption on a De Lijn bus running on PVO[9], biodiesel and diesel (2006-2007) in order to ascertain whether the use of biocombustions leads to higher NO_x emissions and whether or not deNOx installations are necessary;
    - Following the good results attained from the demonstration projects, it has been decided in addition to installing soot filters on Euro II buses, to gradually install combined systems (soot filter and deNOx installation) and also on all Euro III buses where technically possible.

Raising awareness and providing information are an important first step towards persuading individuals to buy an environmentally friendly vehicle. The Ecoscore of each vehicle (new and second hand) can be consulted on the following website www.milieuvriendelijkvoertuig.be. An Ecoscore is allocated to all vehicles representative of their impact on the environment, taking account of various harmful effects, greenhouse effect, air quality (impact on health and on ecosystems) and noise. This environmental evaluation makes it possible to combine these various impacts into one single indicator. The website also provides information on the environmental impact of vehicles. This Ecoscore is also recognised by the other regions and the federal government, thus ensuring wider support (see also measures planned).

A number of **financial measures** should encourage private individuals and companies to purchase more environmentally friendly vehicles.

- Vehicles running on LPG benefit from tax reduction when taken into service;
- Since 1 august 2006, an ecology bonus is granted to companies for installing soot filters and for the purchase of heavy vehicles that already comply with the Euro V standard. The ecology bonus is intended as a financial incentive for companies which make environmental investments in Flanders. Companies which install soot filters on their lorries appearing on the certified VERT list or which buy Euro V vehicles may from 1 august 2006 claim 25% or 35% (depending on the size of the company) as a refund on the investment support.

A number of projects seek to attain adapted driving behaviour by car and lorry drivers:

- The ROB campaign was started in 2002. ROB stands for Rustig Op de Baan (Good Road Behaviour). In this campaign, stickers and folders are issued containing advice on eco-friendly driving. There is also a website: www.ikbenrob.be . The ROB campaign is mainly conducted through urban and municipal authorities.
- In 2006 the ROB campaign was extended to lorries. A key ring and folder with tips are made available. This campaign is conducted through road managers in connection with road checks.
- The "Wijs op weg" (sensible road behaviour) project is a pilot project conducted in Flanders which started in 2005 at 11 driving schools and examination centres. Through professional training at the driving school, future car drivers found out how to use their car in a sustainable manner. For this purpose, driving instructors and examiners follow a 'Train de trainer' course in the Netherlands which focuses on energy-efficient driving.
- The "Efficiënter vlootbeheer" (Greater fleet management efficiency) project started in 2006 and is addressed to companies. The project provides eco driving training for employees and free tailor-made guidance (registration methods and communication to efficiently control the costs of operating the fleet). Ready-made methods are worked out which can be used by other companies.

Measures planned

The above-mentioned measures will be continued in the years to come. There is also a number of new projects in the pipeline.

[9] PPO: pure vegetable oil

Raising awareness and providing information:

- Developing a bilingual Ecoscore website in collaboration with the Brussels and Walloon regions;
- Providing clearer information on CO_2 emissions of vehicles (CO_2 guide) and all aspects of eco-friendly vehicles (Ecoscore);
- Disseminating a guide for the general public containing information on the Ecoscore and the eco-friendliness of vehicles;
- Enhancing the visibility of high-Ecoscore vehicles being used by the Flemish government by putting a sticker on these vehicles including a reference to the Ecoscore website.

Financial measures:

- Working out an adjustment of the tax on new vehicles and the annual road tax for private cars. The vehicle's Ecoscore is used as the criterion for evaluating the vehicle's eco-friendliness. The vehicle's Ecoscore will be used in calculating the tax on new vehicles and annual road tax.
- Working out an adjustment of the annual road tax due on lorries. A reduced road tax rate will be allocated to vehicles which meet a future standard at an early date. This rate will be gradually reduced as the introduction of the Euro V standard and the Euro VI standard, still to be approved, draws nearer. As an additional incentive for installing soot filters, a reduction is granted for the basic amount for vehicles fitted with such a filter. Moreover, the basic amounts are differentiated per category according to the Euro standard of the vehicle's engine. In this context, account should in each case be taken of the fact that road tax should not be reduced below the minimum rate laid down at European level and that there is no flagging out.

Driver behaviour:

- Coordinating the various initiatives and developing an umbrella project along the lines of Het Nieuwe Rijden (new driving style) in the Netherlands in cooperation with Flemish Transport Studies Foundation (VSV), the Bond Beter Leefmilieu (Association for improvement of the environment) (BBL) and the Flemish Network of Companies (VOKA);
- Temporary speed limits on motorways along where the NO_2 limit values are exceeded where people live at 300m or less from the motorway;
- Gradual extension and optimised regulation of dynamic traffic control in relation to reducing instances in which the limit values for fine dust and NO_2 are exceeded.

Attention is also being given to measures to reduce emissions in **inland waterway navigation**. Here, too, the main measures are in line with international requirements regarding emission standards. Financial incentives may ensure more rapid renewal of the fleet. Under the first successful programme implemented, the replacement of old engines by CCR I engines was stimulated (CCR I engines are engines with stage I emission standards of the Central Commission for Navigation on the Rhine). As a result, most vessels of the inland shipping fleet in Flanders are fitted CCR I engines. As CCR II engines will be obligatory for new ships from the middle of 2007, it no longer makes sense to conduct a large-scale programme for this purpose. However, consideration is being given to granting financial incentives as soon as the new CCR III emission standards are known and the technology to obtain them is available.

Evaluation of the effect of the measures

It is estimated that through measures stimulating the use of eco-friendly vehicles, NO_x emissions can be reduced with between 2% and 10%. It appears from the study on the evaluation of the reduction potential of possible additional measures for eco-friendly motor vehicles and combustibles that a policy to stimulate the use of eco-friendly vehicles has a reduction potential of 7% for NO_x and 8% for VOC. However, this potential is based on the introduction of all measures in 2000.

Adapted driving behaviour may lead to a 55% NO_x reduction per vehicle. The study on the influence of driving style on transport emissions indicates a 3% reduction potential for NO_x through a more eco-friendly driving style. However, the effect of adopted driving style has so far not been included in the emission inventory.

The effect of the total package of measures is estimated at 1.6 ktonnes (4%). This potential is taken into account in the scenario with additional measures.

3.1.3.4 Measures of the Walloon Region

3.1.3.4.1 Contexte général

Les mesures de réduction décrites dans l'arrêté du Gouvernement wallon portant programme de réduction progressive des émissions de SO_2, NO_x, COV et NH_3 (Moniteur belge du 28/08/2004) ont été décidées dans le cadre du Plan wallon de l'air, lequel a été acté par le Gouvernement wallon en date du 18 décembre 2003.

Le 17 juillet 2006, le Gouvernement wallon a pris acte de la note d'orientation et des grandes lignes du Plan air-climat, qui a pour objet de proposer un nouveau Plan wallon de l'air, notamment afin de tenir compte de l'évolution du contexte international. Ce nouveau Plan se voudra plus ambitieux, proposant entre autre plus d'actions concrètes.

Le Gouvernement wallon a alors décidé de constituer, à l'initiative du Ministre de l'Environnement, un groupe de travail Ministériel qui a pour mission de proposer, en octobre 2006, un Plan air-climat.

Etant donné que les projections réalisées à l'horizon 2010 mettent en évidence un dépassement du "plafond belge relatif aux transports", des mesures complémentaires seront définies dans le nouveau "Plan air-climat". Il convient de signaler que les initiatives décidées dans le secteur des transports participeront en outre à la mise en œuvre de la politique wallonne en matière d'amélioration de la qualité de l'air et à la réduction des émissions de gaz à effet de serre.

3.1.3.4.2 Le Plan wallon de l'air (2003) – les mesures décidées

3.1.3.4.2.1 Description des mesures

Un des objectifs principaux du Plan wallon de l'air 2003 visait la contribution de la Région wallonne au respect des engagements de la Belgique en matière de plafonds d'émission à l'horizon 2010.

Les mesures de ce plan, relatives aux transports routiers, ont été regroupées en cinq catégories différentes:

I. Mesures d'aménagement du territoire en vue de diminuer le besoin de mobilité :

a) en densifiant les centres urbains autour des gares et en y favorisant la mixité des fonctions ;

b) en identifiant la nécessité de nouveaux tracés ferroviaires ;

c) en planifiant la localisation des entreprises en fonction de l'accessibilité des marchandises et des travailleurs ;

d) en prenant en compte les autres modes de transport dans les travaux d'infrastructure routière.

II. Mesures ayant pour objectif de diminuer le besoin de mobilité en favorisant l'utilisation des nouvelles technologies :

a. en favorisant le recours au télétravail à domicile ;

b. en agissant afin de rompre le lien existant entre l'accès à l'information et la mobilité, via le développement des technologies de l'information et de la communication (au sein des écoles et des services publics locaux et communaux).

III. Mesures ayant pour objectif de favoriser le choix d'autres modes de transport, moins polluants que la voiture, et le passage d'un type de transport à l'autre :

a. en favorisant les transferts modaux dans les transports de marchandises (en favorisant la construction de plates-formes multimodales, en remplaçant le régime de l'eurovignette appliquée aux poids lourds, par un régime de redevance kilométrique) ;
b. en développant les plans de transport dans les entreprises, les administrations, les écoles ;
c. en réalisant des fiches d'accessibilité ;
d. en rendant financièrement plus attrayante l'utilisation d'autres modes de transport que la voiture (taux d'intervention élevé de l'employeur publique dans le remboursement des frais de déplacement des fonctionnaires wallons, en accordant une indemnité kilométrique attrayante aux fonctionnaires wallons pour les déplacements domicile/travail en vélo).

IV. Mesures favorisant l'utilisation de véhicules et de carburants moins polluants :

a. en soutenant le développement du moteur à hydrogène ;
b. en choisissant des véhicules moins polluants pour le parc mobile des services de la Région wallonne (cahiers de charge) ;
c. en agissant sur la fiscalité des véhicules.

V. Mesures de sensibilisation, permettant les changements culturels :

a. mesures d'information au citoyen des incidences de l'usage de l'automobile sur les émissions de polluants atmosphériques, avec pour objectif d'agir sur ses comportements individuels.

A l'horizon 2010, l'objectif de réduction des émissions de NO_x en Région wallonne par mise en œuvre des mesures précitées est de 1,5 kt.

3.1.3.4.2.2 Mise en œuvre des mesures

Suivant leurs compétences respectives, les différents Ministres wallons ont la responsabilité de mettre en œuvre les mesures définies dans le Plan wallon de l'air. Ci-dessous sont présentés quelques exemples d'initiatives prises afin de mettre en œuvre de mesures décrites ci-dessus. La relation avec les mesures du Plan air 2003 est signalée entre parenthèses.

Certaines mesures préconisées dans le Plan wallon de l'air 2003 doivent néanmoins encore être mises en œuvre. L'élaboration du nouveau Plan air-climat (voir ci-dessous) permettra de s'assurer, auprès des différents Ministres compétents, de la mise en œuvre effective des mesures déjà définies dans le Plan wallon de l'air 2003, afin que leurs effets attendus soient effectivement obtenus à l'horizon 2010.

- *Méthode Ecoscore* (Va et IVc)
  Tel que déjà expliqué au point 1.4.3.2, des discussions sont actuellement en cours entre les Régions et l'autorité fédérale afin que la méthode Ecoscore soit reconnue par l'ensemble des partenaires. Pour ce qui concerne la Région wallonne, la reconnaissance d'Ecoscore fournira tout d'abord un outil très intéressant en matière de sensibilisation, celle-ci étant à la base d'une modification des comportements individuels. Ensuite, l'Ecoscore des véhicules fournira au législateur wallon un outil de quantification des performances environnementales des véhicules, ce qui lui permettra, entre autre, de moduler sur base environnementale la taxe annuelle liée à la possession d'un véhicule; ainsi que et la taxe de mise en circulation. Une telle modulation pourrait être calculée en prévoyant un maintient au niveau actuel des recettes de ces taxes ou en dégageant

des recettes complémentaires. Dans ce second cas de figure, les moyens dégagés devront être affectés directement à l'amélioration de l'offre de transport.

- *Projet de remplacement du régime de l'eurovignette par un régime de redevance kilométrique (transport de marchandises)* (IIIa et IVc)
  Le Gouvernement wallon s'est engagé, dans le cadre de sa Déclaration de Politique Régionale Actualisée, à remplacer l'actuel régime de l'eurovignette appliqué aux poids lourds, par un régime de redevance kilométrique. Celle-ci pourrait également remplacer en tout ou partie, la taxe de circulation appliquée aux mêmes poids lourds. Le régime fiscal envisagé applicable à tous les poids lourds circulant sur le territoire wallon a l'avantage, comparé à la taxe de circulation forfaitaire appliquée aux seuls véhicules immatriculés en Wallonie et à l'eurovignette, également largement forfaitaire, d'instaurer une plus grande équité entre transporteurs locaux et étrangers ainsi qu'entre exploitants effectuant peu de kilomètres et grands rouleurs.

  La redevance kilométrique en instaurant une plus grande vérité des coûts permettra de favoriser le recours au transport par la voie ferrée et la voie d'eau, réduisant ainsi le trafic routier et en conséquence le niveau des émissions atmosphériques dont il est responsable.

- *Mesures ayant pour objectif de favoriser le transfert modal de la route vers la voie d'eau* (III a)
  • Régime d'aide au transport combiné. Ce régime d'aide a été adopté par le Gouvernement wallon le 25 août 2005 . Il finance une série d'investissements à hauteur de 21%.

  • Plan d'aide 2004-2007 au transport par voies navigables. Ce Plan est destiné aux bateliers et aux entreprises. Il comporte une aide pour l'exploitation de navettes fluviales transportant des conteneurs et un programme de 21 mesures de promotion de la voie d'eau et de la multimodalité liée à ce mode de transport. Selon l'OPVN[10] (2005), les aides octroyées aux entreprises wallonnes, depuis 10 ans, permettent chaque année le report vers la voie d'eau de 3,4 millions de tonnes.

  • Mise à zéro des droits de navigation perçus sur l'ensemble des voies navigables gérées par la Région wallonne. Cette mesure est effective depuis le 7 mars 2006. Elle permet de doper la compétitivité du transport par voie d'eau vis-à-vis du transport routier.

  • Construction de plates-formes multimodales. Cinq plates-formes multimodales sont présentes sur le territoire wallon[11]. A cette liste, on peut ajouter deux projets trimodaux : Liège TriLogiPort : (Hermalle, trimodal eau route rail) et Garocentre (La Louvière, trimodal, route et eau et rail).

  • Amélioration du réseau des voies navigables. Divers travaux ont été réalisées ou ont débuté ces dernières années afin de le rendre le réseau des voies navigables plus attractif et fiable, notamment via la suppression de points de saturation (ascenseur de Strépy-Thieu, écluse complémentaire à Lanaye, modernisation de la Haute-Meuse et de la Basse-Meuse, meilleure prise en compte de la problématique des boues de draguage, etc.).

- *Mise en œuvre des plans communaux de mobilité (PCM), plans de déplacements scolaires (PDS), plans de mobilité pour les entreprises (PMZA), et exploitation du logiciel MOBILPOL (IIIb)*
  Ces plans et logiciel permettent mieux identifier et gérer les besoins de mobilité.

---

[10] Office de Promotion des Voies Naviguables.

[11] Athus : (bimodal rail route), Liège Renory (trimodal route rail eau), Liège Logistics Intermodal (Bierset, trimodal air rail route), Centre Logistique de Charleroi (Chatelet, trimodal rail route eau), Dry Port Mousron Lille (bimodal rail route).

• Le plans communaux de mobilité (PCM). Ces plans visent à gérer de manière cohérente la mobilité dans les communes, quelles que soient leur taille et leurs caractéristiques, urbaines ou rurales. En juin 2006, on comptait pas moins de 85 communes wallonnes qui étaient entrées dans le processus des plans communaux de mobilité parmi lesquelles 82 avaient déjà adopté leur plan.

• Déplacements en relation avec les entreprises (IIIb, Ic). La Région wallonne, en partenariat avec le conseil Economique et Social auquel sont associés l'Union wallonne des entreprises et les organisations syndicales, étudie actuellement des formules qui permettraient de réduire l'usage de la voiture au bénéfice du transport public dans le cadre de tels déplacements. De nouveaux services de desserte souples et rapides à destination des entreprises pourraient par exemple être envisagés, testés pendant plusieurs mois et pérennisés en cas de succès.

Par ailleurs, une collaboration entre la Région wallonne et la SNCB (Société nationale des chemins de fer belges) a abouti au développement d'un logiciel, baptisé MOBILPOL, qui permettra aux entreprises wallonnes de mieux gérer la mobilité des travailleurs. Ce logiciel a été établi dans le cadre d'une mesure décidée par l'autorité fédérale imposant aux employeurs, tant privés que publics, d'établir un diagnostic de la mobilité dans les entreprises de plus de 100 travailleurs et également pour chaque site comptant en moyenne au moins 30 travailleurs. Le diagnostique, dont le coût sera entièrement pris en charge par la Région wallonne permettra aux entreprises d'identifier leurs problèmes de mobilité et d'y apporter une réponse alternative à l'utilisation systématique de la voiture individuelle.

Enfin, les PMZA (Plans de mobilité sur les zones d'activité) sont destinés à assurer l'accès et une mobilité suffisante au départ et vers les zonings. Des moyens vont être dégagés pour la mise en œuvre de ces plans. Il s'agit de définir une méthodologie générale pouvant être appliquée à leur mise en œuvre et pouvant fournir des recommandations par rapport aux nouvelles ZAE (zone d'activité économique) retenues de manière à leur permettre d'anticiper d'éventuels problèmes de mobilité.

• Le plans de déplacement scolaires (PDS). Ces plans visent à améliorer la sécurité et la mobilité sur le chemin et aux abords des écoles dans une perspective de développement durable. La mise en place d'un Plan de déplacements scolaires (PDS) est soutenue par la Région wallonne. Cette action favorise une mobilité durable à travers l'utilisation optimale des infrastructures existantes.

- *Le passeport mobilité* (V)
  Cet instrument promotionnel a été développé afin de fournir une vitrine des solutions existantes en matière de mobilité. Il permet aux citoyens de tester des alternatives comme le covoiturage, le carsharing (voitures partagées), le bus, le train, le vélo, les parcs relais, les itinéraires piétons, etc.

  Concrètement, le passeport mobilité détaille les alternatives promues et comprend des avantages exclusifs offerts aux utilisateurs. Ces avantages sont d'une part régionaux par des partenaires tels que les TEC, Taxistop, Cambio, Pro Vélo,... et d'autre part "locaux", portant sur des services de proximité.

- *Programme d'échange plaques-abonnement TEC* (V, III)
  Depuis le 1er juillet 2006, la société wallonne de transports en commun (TEC), offre un abonnement gratuit d'un an valable sur son réseau à toute personne résident en Wallonie qui, en rentrant sa plaque d'immatriculation, renonce à l'utilisation d'une voiture. En contrepartie, chaque membre de la famille du demandeur s'engage, pendant l'année de validité de l'abonnement gratuit, à ne pas demander un nouveau numéro de plaque.

- *Mesures rendant financièrement plus attrayante l'utilisation d'autres modes de transport que la voiture par les fonctionnaires wallons* (IIId)
  Depuis le 1er janvier 2006, l'intervention de la Région wallonne dans les titres de transports en commun (train et autobus) est passée de 88% à 100% pour les déplacements domicile- travail (Circulaire SG/2006/2).

  Depuis 2003, les agents de la fonction publique wallonne qui utilisent leur bicyclette pour effectuer un déplacement de leur résidence à leur lieu de travail, et vice-versa, ont droit, lorsqu'ils parcourent au moins un kilomètre à une indemnité de 0,15 € par kilomètre parcouru. Ce montant a été indexé au 1er septembre 2005, il s'élève à 0,21 €.

- *Travaux réalisés par la CPDT (Conférence Permanente de Développement Territorial)*
  Dans le cadre de la CPDT, des chercheurs universitaires ont travaillé pendant plusieurs années à la définition de mesures relatives à l'aménagement du territoire, la mobilité et l'urbanisme pour faciliter l'adhésion de la Région wallonne au Protocole de Kyoto. Il va de soi que la toute grande majorité des mesures destinées à réduire les émissions de CO_2 permettent également une réduction des émissions des polluants visés par la Directive relative aux plafonds d'émission.

  Les mesures sélectionnées par ce groupe d'experts font l'objet d'une publication de la CPDT, qui est scindée en trois parties :

  - 1ère partie : Limiter la croissance de la mobilité – voiture
  - 2ème partie : Améliorer les performances énergétiques en matière d'urbanisme
  - 3ème partie : Limiter les effets de la modification des régimes hydriques

  La partie qui nous intéresse dans le cadre de la réduction des émissions liées aux transports est la première partie, qui propose la sélection des mesures suivantes :

  - Restreindre le nombre de places de stationnement sur le lieu de travail (III) ;
  - Réaliser des plans de transport d'entreprises (IIIb) ;
  - Restructurer les transports en commun (III) ;
  - Aménager les voiries pour favoriser les modes lents (Id) ;
  - Assurer la mixité des fonctions (Ia) ;
  - Mesurer l'accessibilité des lieux (I) ;
  - Créer des centres de distribution urbaine (I) ;
  - Favoriser le télétravail (IIa).

  Chaque mesure fait entre autre l'objet d'une présentation, d'une discussion relative à l'applicabilité en Région wallon, d'un potentiel de réduction des émissions de CO_2 lié à la mise en œuvre de la mesure (lorsque c'est possible).

3.1.3.4.3 Le futur Plan air-climat – les mesures complémentaires

Contexte général

Pour ce qui concerne les transports, outre le fait que ce nouveau plan permettra de s'assurer de la mise en œuvre des mesures définies dans le Plan wallon de l'air 2003, l'élaboration de ce nouveau plan air-climat fournira aux pouvoirs publics wallons l'occasion de définir un ensemble de mesures complémentaires, qui pourraient être mises en œuvre à court terme, et permettant une réduction supplémentaire des émissions de NO_x.

Il convient d'attirer l'attention sur le fait que l'objectif de ce nouveau Plan air va au delà des objectifs liés au respect des plafonds d'émission à l'horizon 2010. Les objectifs temporels vont évidemment au delà de 2010 et l'ensemble des polluants atmosphériques sont pris en compte. Par conséquent, les mesures dont les effets attendus à l'horizon 2010 sont nuls ou dont l'effet sur les émissions des polluants visés par la directive sur les plafonds d'émission est négligeable ne sont pas présentés dans ce rapport. Il faut citer notamment l'utilisation de biocarburants qui permettent une réduction des

émissions de CO_2 mais dont l'impact sur les émissions des polluants visés par la directive sur les plafonds d'émission est marginal. Il convient néanmoins d'être attentif au fait que, chaque mesure prise isolément, ne pourra probablement pas produire ses effets. Seule une combinaison d'instruments permettra une évolution des mentalités et d'atteindre les objectifs de réduction poursuivis. En conséquence, les mesures non reprises dans ce rapport participent indirectement à la bonne réalisation des mesures qui y sont reprises.

Les nouvelles mesures envisagées, ayant un impact direct à l'horizon 2010 sur les polluants visés par la Directive sur les plafonds d'émission sont les suivantes :

- *Soutien accru à l'utilisation des transports publics*
  L'objectif est d'améliorer l'attractivité du transport public par rapport aux autres déplacements motorisés. Sur la durée du Contrat de gestion (2005-2010), le Groupe TEC a pour objectif d'augmenter à l'horizon 2010 la fréquentation d'au moins 10 % par rapport au niveau de 2004.

  Pour ce faire, les actions suivantes seront poursuivies :

  a. Accroissement de la capacité du transport public (nombre de bus) et le volume de l'offre
  b. Augmentation de l'attractivité du transport public via une amélioration de la qualité du service, de la sécurité, du confort, de la régularité, de la vitesse commerciale
     Ces critères ont été énoncés par le Gouvernement wallon comme étant prioritaires en matière de transport en commun lors de sa dernière Déclaration de Politique Générale (DPR).

     Le Groupe TEC a pour objectif de généraliser et pérenniser la démarche qualité entreprise précédemment. La SRWT et les TEC ont pour objectif d'améliorer l'indice de satisfaction perçu par sa clientèle, une première fois de 2 % en 2006 et une deuxième fois de 2 % en 2008.

     • Concernant la sécurisation du réseau, un ensemble de mesures sera mis en œuvre, elles consistent principalement en :

       · l'organisation de programmes de formation de gestion de l'agressivité pour le personnel de conduite et les contrôleurs, ainsi qu'à la formation des contrôleurs à l'encadrement de personnes agressées ;

       · la création et au renforcement des cellules de sécurité des TEC ;

       · la promotion du TEC, l'organisation de campagnes d'information et l'accompagnement des parcours difficiles ;

       · le renforcement des contrôles.

     • Concernant la continuité du service, toute solution en la matière doit résulter de la conclusion d'un pacte social par lequel tous les acteurs du secteur reconnaissent la nécessité d'assurer un service qui répond aux attentes des clients. Les mesures concrètes programmées en matière de gestion des ressources humaines et de sécurisation du réseau doivent permettre d'améliorer le bien être au travail, de faciliter le dialogue social et de régler en amont la plupart des conflits potentiels.

     • L'augmentation de la vittesse commerciale des autobus sera rendue possible par le financement par la Région d'investissements d'infrastructures poursuivant cet objectif (sites propres, commandes des feux, …).

     • L'amélioration du confort sera rendu obtenue par le biais d'aménagements accessoires tels les abribus ou les aménagements pour personnes à mobilité réduite (PMR).

  c. Adaptation de l'offre à l'évolution des déplacements et aux besoins nouveaux

  Les TEC s'engagent à améliorer et à diversifier leur offre de transport. Cela consiste à effectuer les choix modaux les plus adéquats (lignes rapides, personnes à mobilité réduite, bus locaux…) en privilégiant les solutions qui maximisent l'effet retour sur les dépenses publiques.

- *Recours aux nouvelles technologies dans le secteur du transport public*
  a. Accélération de l'acquisition de matériel roulant à faible consommation de carburant et répondant aux normes les plus sévères en matière d'émissions de polluants.
     Le groupe TEC poursuivra l'acquisition de matériel neuf présentant les émissions spécifiques les plus faibles, tel que déjà réalisé par le passé[12]. Dès à présent, la SRWT (Société régionale wallonne des transports) négocie l'achat de bus répondant pratiquement aux niveaux prévus pour la norme Euro V.

  b. Bus hybrides.
     Au TEC Liège-Verviers, un bus hybride diesel-électricité sera testé sur une ligne reliant le centre de la ville de Liège au Centre Universitaire du Sart-Tilman. Une commande a été passée par la Société régionale wallonne des transports (SRWT). Dès la fin de l'année 2006, et jusqu'à la fin de l'année 2007, une phase de test de ce bus permettra à ses concepteurs et son exploitant de vérifier ses performances, sa consommation, le niveau de ses émissions, ainsi que la résistance de ses composants. La réduction de consommation devrait être comprise entre 25% et 35%.

  c. Post-équipement de certains autobus.
     La possibilité technique et financière de post-équiper certains autobus des transports en commun wallon (TEC) de systèmes de dénitrification/filtres à particules sera examinée.

- *Développement de l'intermodalité en faisant évoluer le groupe TEC vers un rôle de manager de la mobilité*
  En réponse à la croissance importante de la circulation automobile et à la diversification de la demande de déplacements de ces dernières années, la Région a progressivement développé une panoplie d'outils de mobilité en complément à l'offre de transport public des TEC.

  Pour assurer son attractivité, il est essentiel que l'offre de transport en public réponde à des critères quantitatifs et qualitatifs et s'inscrive dans un contexte global où l'efficacité de la chaîne complète du déplacement est maximisée. Dans ce contexte, les nouveaux contrats de gestion ont pour objectif de définir un contrat de mobilité qui positionne au centre de la réflexion les TEC, acteurs essentiels d'une mobilité alternative à l'autosolisme, tandis que les autres acteurs de la mobilité en Région wallonne viennent se raccorder à cet élément central et fédérateur.

  Cet objectif d'articulation/d'intégration de l'ensemble des acteurs de la mobilité autour du TEC est défini dans le contrat de gestion de Mobilité 2005-2010 entre la Région la SRWT (Société régionale wallonne du transport) et les TEC (Transports en Commun). Le groupe TEC devient un manager de la mobilité qui est capable de fournir aux utilisateurs un service de déplacement complet et intégré depuis le point de départ jusqu'au point d'arrivée, il est alors amené à devenir l' élément fort de la mobilité alternative à la voiture individuelle.

  Dans ce schéma, la mission d'organisateur et de prestataire de service classique d'autobus du TEC est élargie à la diffusion de l'information la plus large sur la mobilité et à la fourniture de solutions globales aux problèmes de mobilité des citoyens. Ce faisant le TEC devient le manager de la mobilité. Le TEC devra être à même de fournir aux utilisateurs un service complet du départ à l'arrivée. Ces outils peuvent être le développement de parking-relais, de parking-vélos, le car-sharing,…

  La SRWT et les TEC doivent établir en concertation avec la Région pour le 31 décembre 2006, un plan d'action global et un plan d'action spécifique à chaque TEC[13].

---

[12] Alors que la norme Euro 3 était d'application, le groupe TEC a acquis des autobus présentant des niveaux d'émission inférieurs à ceux imposés par cette norme.

[13] Il y a 5 TEC en Région wallonne : " TEC Brabant Wallon, TEC Charleroi, TEC Hainaut, TEC Liège-Verviers, TEC Namur-Luxembourg ".

- *Mesures d'encouragement à l'utilisation des modes de transport doux*
  a. Projets relatifs à l'infrastructure.
     En la matière, le Gouvernement wallon a pour objectif de mettre l'accent sur les réalisations concrètes de projets d'infrastructure qui participent au développement de la mobilité piétonne et cycliste, en toute sécurité : cheminements piétons et pistes cyclables, aménagements de sécurité ou mise en place de chemins de liaison en site propre pour vélos.

  b. Soutien aux initiatives relatives à l'utilisation des modes doux.
     La Région soutiendra des initiatives dont l'objectif est de permettre aux écoliers et étudiants de rejoindre, en toute sécurité, leurs classes ainsi que les lieux d'activités scolaires complémentaires centres sportifs, piscine, … en utilisant des modes de transport dits " doux " tels que la marche à pied, le vélo, le bus, … Un grand potentiel existe également pour l'utilisation du vélo dans le cadre de déplacements domicile – travail, ainsi que pour les déplacements vers les lieux de commerce et de loisirs. Des mesures d'encouragement à l'utilisation du vélo pour ces motifs et pour des distances jusque 5 km seront également mises en place. Ceci peut se faire en s'appuyant sur certains outils existants (Plans de déplacements scolaires, plans de déplacements d'entreprise), qui méritent d'être développés à plus grande échelle.

  c. Réalisation de « Plans globaux vélo ».
     A l'heure actuelle, la politique visant à promouvoir l'utilisation du vélo en Région wallonne repose surtout sur les infrastructures. Bien que cet aspect soit de première importance, les expériences menées dans les pays ou régions qui ont enregistré des résultats favorables en matière d'utilisation du vélo sont celles où une analyse rigoureuse de la situation a été conduite afin d'identifier les zones où le potentiel est le plus élevé, suivi du choix d'objectifs chiffrés et d'un calendrier d'exécution précis.

     Il apparaît que ce sont les programmes ciblés sur les besoins réels des cyclistes qui permettent les meilleurs résultats. D'une manière générale, ce sont dans les territoires à forte concentration d'activité (habitat, travail, école, commerce, loisirs) et dans les zones où il est possible d'accéder en moins de 5 km à une gamme étendue d'activités génératrices ou réceptrices de mobilité que le vélo trouve son créneau le plus naturel. Il s'agit de zones urbaines ou de noyaux ruraux.

     Pour atteindre l'objectif de la mesure « Plan globaux vélo », il est nécessaire, en partant du centre des zones présentant le potentiel d'utilisation le plus él vé du vélo, de définir des zones concentriques. On se préoccupe ensuite prioritairement des zones à fort potentiel d'utilisation du vélo, où des aménagements légers de modération des vitesses et de la pression motorisée (type « zones 30 étendues » conviennent souvent. Ensuite on identifie des itinéraires offrant la possibilité de parcourir des plus longues distances, et les aménagements éventuels nécessaires pour y offrir un niveau de qualité et de sécurité adapté à convaincre les cyclistes débutants. L'ensemble des actions nécessaires sont regroupé dans un « Plan global vélo wallon ». Les mesures de sensibilisation et de « mise à vélo » sont partie intégrante du Plan, car l'expérience montre que si des conditions de circulation améliorées sont nécessaires, elles ne sont pas suffisantes à vaincre l'obstacle culturel qui, aujourd'hui, s'oppose encore trop souvent à l'utilisation du vélo en Wallonie.

     Étant donné que la majorité des voiries concernées sont communales et que chaque zone doit faire l'objet d'une analyse spécifique, les communes ont certainement un rôle clef à jouer en matière de promotion de l'utilisation du vélo, via la mise en place de Plans vélo communaux.

     Le rôle des autorités régionales est également très important. Elles doivent notamment assurer la coordination des Plans vélos communaux au sein d'un même Plan global vélo. Les autorités régionales assureront la promotion/l'incitation des communes à réaliser de tes plans. Les autorités régionales peuvent aussi fournir un soutien financier et technique à l'élaboration de ces plans.

Enfin, les autorités régionales proposeront des mesures plus globales de promotion de l'utilisation du vélo (comme par exemple des incitants financiers). Ces mesures viendraient alors en soutien aux plans évoqués ci-dessus.

- *Examen des possibilités de favoriser le covoiturage et le transfert modal accru de la voiture vers le train dans le cadre de trajets de longue distance*

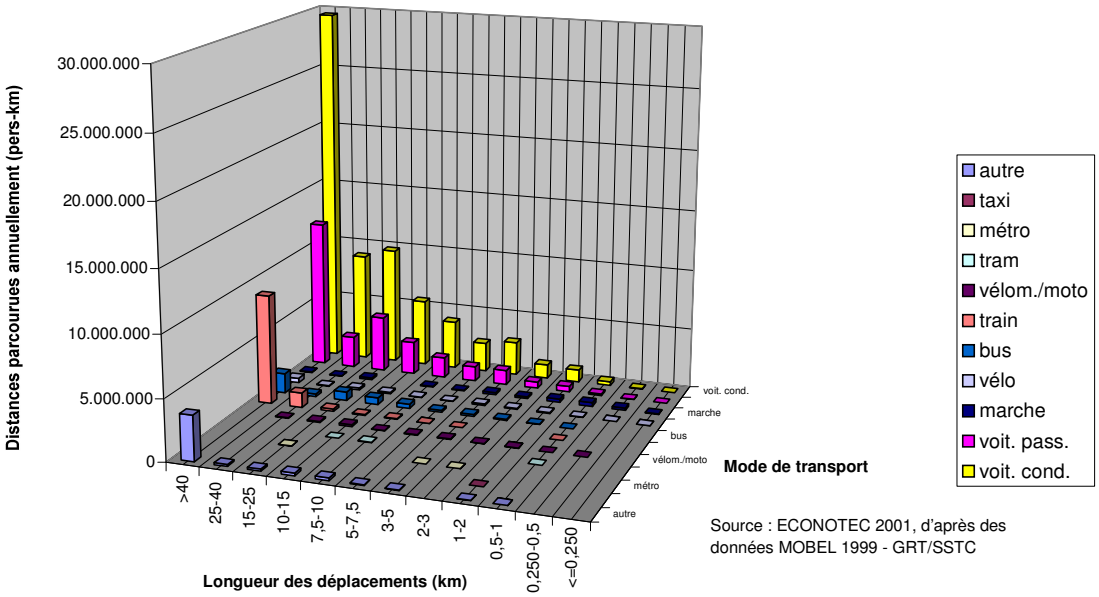
La figure suivante présente la répartition de la mobilité routière selon le type de véhicule et la distance moyenne parcourue pour effectuer le déplacement.

La figure présentée ci-dessous met très clairement en évidence l'impact significatif des trajets longue distance (> 40 km) sur la mobilité globale des voitures en Région wallonne (et donc des émissions atmosphériques). Cette même figure permet de distinguer clairement les alternatives principales qui s'offrent au conducteur qui voudrait abandonner son véhicule sur ces trajets « longue distance » :

- soit il acquiert le statut de passager (covoiturage) ;
- soit il prend le train.

Il conviendrait dés lors de pouvoir définir les mesures les plus adéquates permettant d'induire une telle modification de comportement. Pour cela, il conviendra d'obtenir des informations complémentaires relatives à ces déplacements longs (qui les effectue principalement ?, pour quelles raisons ?, le covoiturage ou le transfert modal vers le train est-il possible ?, …). Il serait donc proposé de réaliser une étude préalable permettant de répondre à ces questions. Sur base des résultats de cette étude, les mesures les plus adéquates permettant de favoriser le covoiturage ou le train lors de ces « déplacements longue distance » seraient décidées.

Répartition des déplacements d'un jour moyen en Région wallonne, en fonction de leur longueur des déplacements et du mode de transport



Source : ECONOTEC 2001, d'après des données MOBEL 1999 - GRT/SSTC

- *Favoriser le remplacement des voitures les plus polluantes*

L'age moyen des véhicules du parc automobile belge ne cesse d'augmenter. Il est passé de 6 ans et 5 mois en 1993 à 7 ans et 11 mois en 2005.

Certains des véhicules qui circulent en Belgique n'ont été soumis à aucune norme, d'autres ne respectent que la norme EURO 1.

Parfois, ces véhicules ne circulent que très peu. Cependant, ce n'est pas toujours le cas et le poids des émissions de ces véhicules est disproportionné par rapport aux émissions moyennes du parc automobile.

La Région wallonne encouragera par une prime de remplacement des véhicules les plus polluants au regard de leur Ecoscore et de leur utilisation, par des véhicules neufs répondant au meilleur score dans la méthode Ecoscore.

Il conviendra donc de développer ou renforcer des incitants. A cette fin il faudra étudier avec l'autorité fédérale les pistes possibles pour octroyer une prime au remplacement des véhicules les plus polluants, proposer des prêts à 0% pour le remplacement des véhicules les plus polluants par des véhicules propres et enfin conclure un accord de coopération avec le secteur pour co-financer la mesure

- *Véhicules propres dans les services publics*

A l'heure actuelle, deux directives (dont une est un projet) visent l'utilisation de véhicules propres dans les services publics :

• La directive 2006/32/CE relative à l'efficacité énergétique dans les utilisations finales et aux services énergétiques et abrogeant la directive 93/76/CE.

L'article 5 de cette directive vise spécifiquement le secteur public, qui doit veiller à prendre des mesures propres à améliorer l'efficacité énergétique, en privilégiant les mesures présentant un bon rapport coût/efficacité qui produisent les économies les plus importantes dans les délais les plus courts. Différentes mesures sont proposées à l'annexe VI, les États membres doivent s'assurer que le secteur public met en œuvre au moins deux des mesures visées dans cette liste. Deux des mesures de cette annexe VI visent entre autre l'acquisition par les pouvoirs publics de véhicules économes en énergie.

• Le projet de directive relative à la promotion de véhicules de transport routier propres (COM(2005) 634 final).

L'objectif de cette directive visera l'acquisition par les autorités publiques d'un quota de véhicules propres (sur base des émissions de CO, HC, NO_x, particules, fumées).

Au vu de la nécessité de définir des mesures complémentaires permettant de réduire les émissions de NOx issues des transports routiers dans le cadre du respect des plafonds NEC et des objectifs complémentaires des (projet de) directives sur les flottes publiques, il serait justifié de prévoir les dispositions réglementaires adéquates permettant, dans un même texte, de transposer cet aspect de la Directive 2006/32, en tenant compte des éléments présents dans le projet de directive relatif à la promotion des véhicules de transport routier propres.

Cette réglementation permettrait une réduction simultanée des émissions visées par la Directive NEC, mais aussi des émissions de CO_2 provenant du parc des véhicules de la Région wallonne.

- *Comportement des conducteurs*

L'amélioration du comportement des conducteurs permet de réduire les consommations et les émissions de polluants atmosphériques. Adopter un style de conduite économe peut entraîner des réductions de consommations significatives. Si il convient de définir un ensemble de mesures destinées à améliorer le comportement des conducteurs de l'ensemble des véhicules, dans le cadre du respect des plafonds d'émissions à l'horizon 2010, étant donné qu'il paraît peu réaliste de vouloir former en un temps restreint toutes les personnes possédant un permis de conduire, il serait certainement important de cibler le public. Une telle mesure aurait dès lors un impact plus important à l'horizon 2010 si la formation s'adressait en priorité aux conducteurs de poids lourds.

En effet :

• si dans le cadre de l'obtention du permis de conduire B (voitures et utilitaires légers), à partir de 2007, une formation obligatoire à la conduite douce était prévue, moins de 5% de la population possédant un permis aurait suivi la formation et pourrait adopter un mode de conduite économe.

• par contre, si une formation était ciblée vers les conducteurs de véhicules lourds, à l'horizon 2010, une partie importante des chauffeurs pourrait avoir suivi la formation et pourrait donc adopter un mode de conduite économe.

- *Respect des limitations de vitesse*
  La consommation moyenne d'une voiture est minimale entre 50 et 90 km/h. Au delà elle augmente avec le carré de la vitesse. Un meilleur respect des limites de vitesse devrait donc permettre de réduire les consommations, et par conséquent les émissions à l'échappement. La réduction ciblée des vitesses moyennes sur autoroute constituerait une première étape plus facile à réaliser. Une étude conduite par Econotec en 2001 a permis d'évaluer que, si la limite de 120 km/h était respectée sur autoroute, cela permettrait d'obtenir une réduction de 1,8 % des émissions totales de CO_2 issues des transports routiers. Le niveau de réduction des émissions de NO_x devrait être assez proche.

  Un meilleur respect des limitations de vitesse sur autoroute pourrait être obtenu via une intensification des contrôles de vitesse, notamment via l'installation d'un plus grand nombre de radars fixes. La mise en œuvre de cette mesure dans de brefs délais permettrait en outre à la Région wallonne de récupérer le retard qu'elle a pris par rapport à la Région flamande en la matière. Une telle réduction aurait également un impact positif sur la sécurité, notamment parce que le différentiel de vitesse entre les véhicules serait réduit (notamment avec les camions).

- *Mesures relatives à la pression des pneumatiques*
  Il est bien connu que bon nombre de véhicules circulent avec des pneumatiques sous-gonflés (le chiffre de 50% étant fréquemment avancé). Une conséquence directe est une augmentation de la consommation spécifique des véhicules concernés, et donc de leur émissions de NO_x. Sur les véhicules neufs, des indicateurs de pression des pneumatiques sont de plus en plus fréquents. Néanmoins, en 2010, la majorité des véhicules ne sera pas équipé de tels dispositifs. Une mesure qui pourrait être appliquée dans un bref délai à l'ensemble du parc de véhicules consisterait à favoriser, voir imposer si c'est légalement et techniquement envisageable, l'utilisation d'azote en lieu et place d'air pour le gonflage des pneumatiques. Les molécules d'azote étant plus grosses que la majorité des constituants de l'air, elles diffusent moins rapidement au travers des pneumatiques, une pression adéquate est alors maintenue plus longtemps. A l'heure actuelle il est possible de faire gonfler ses pneumatiques pour un forfait compris entre 10 et 15 €, les appoints nécessaires pouvant être effectués gratuitement durant toute la durée de vie du pneu (ou le remplacement complet du gaz si un appoint en air a été nécessaire). Selon les fournisseurs, le gonflage à l'azote permet de contrôler la pression des pneumatiques 3 à 4 fois moins souvent et d'économiser jusqu'à 10% de carburant en ne roulant plus "sous gonflé".

  Selon une étude réalisée par Econotec[14], une augmentation de la pression des pneumatiques permettrait une réduction supplémentaire de consommation (par réduction de la friction de la route). Une telle mesure présenterait également des avantages en matière de sécurité. La faisabilité de cette mesure complémentaire nécessite des vérifications supplémentaires. Elle pourrait constituer un complément intéressant à la mesure précitée.

- *Modulation des réglementations relatives aux véhicules de société afin de favoriser les véhicules les plus propres*
  En Belgique, le nombre de véhicules de société est élevé. Il s'agit fréquemment de véhicules de cylindrée élevée, parcourant annuellement des distances importantes.

  Deux réglementations fédérales ont un impact direct sur la rentabilité financière des véhicules de société :

[14] Econotec (2001), Analyse prévisionnelle des émissions atmosphériques liées au secteur du transport en Région wallonne, Etude réalisée pour le Ministère de la Région wallonne/DGRNE, Rapport final.

• la cotisation « de solidarité » forfaitaire sur les véhicules de société. Cette cotisation est à charge de l'employeur qui met à la disposition de son travailleur, de manière directe ou indirecte, un véhicule destiné à un usage autre que strictement personnel. A l'heure actuelle cette taxe est modulée sur base du taux d'émission de CO_2 des véhicules ;

• un avantage fiscal calculé en fonction des chevaux fiscaux et du nombre de kilomètres parcourus à des fins privées, évalué forfaitairement à 5 000 ou 7 500 km par an suivant que la distance entre le domicile et le lieu de travail est inférieure ou supérieure à 25 km.

Il conviendrait de voir, en concertation avec les autorités fédérales, si il serait possible de moduler cette cotisation et cet avantage fiscal en tenant compte des émissions visées par les plafonds NEC, en ayant recours à l'Ecoscore.

Une telle démarche pourrait se dérouler dans le cadre d'une mesure prônée par l'autorité fédérale, dans le cadre de la quatrième communication nationale sur les changements climatiques (p. 55 : *« Le gouvernement fédéral entend conclure avec les régions un accord de coopération en vue de moduler les taxes fixes qu'elles perçoivent - à savoir la taxe de circulation et la taxe de mise en circulation - en fonction des qualités environnementales des véhicules »*. Etant donné qu'il ne s'agit pas de taxes, un élargissement de cette mesure à l'ensemble des instruments financiers dont disposent les pouvoirs publics devrait néanmoins être opéré.

L'objectif de réduction des émissions de NO_x par la mise en œuvre de ces mesures complémentaires est de 1 kt à l'horizon 2010.

Il est néanmoins important de préciser que ces mesures complémentaires doivent encore faire l'objet d'un débat au sein du Gouvernement wallon.

3.1.3.5 Measures of the Brussels Region

3.1.3.5.1 Introduction

The Brussels Capital Region is limited to the Brussels metropolitan area, which is characterised by a dominant services sector and a strong desire on the part of the Brussels and federal governments to maintain its role as an international city with a large host capacity (official headquarters of international organizations, many congress centres, a large hotel infrastructure, etc.) Brussels' economic fabric consists of small companies and a broad range of activities. SMEs and SMIs are well established in the cityscape.

The Brussels Capital Region has drawn up a regional mobility plan, a regional development plan and a structural improvement plan relating to air quality and global warming. All three strive to limit road traffic.

These plans are logically dependent on other, broader inter-regional and federal plans. Indeed, the Brussels Capital Region receives many commuters from Belgium's other two regions. According to data from the 2004 annual workforce survey, employment in the Brussels Region amounts to nearly 654,000 jobs, only 47% of which are filled by Brussels inhabitants. The remaining jobs are filled by workers who live in the Flemish Region (34%) and in the Walloon Region (19%).

3.1.3.5.2 Measures already taken

3.1.3.5.2.1 The Regional mobility plan

This regional mobility plan, also called the IRIS I Plan, was approved on 1 October 1998, and is currently being revised. Its leading objective is to slow the growth in traffic. More specifically, this target was to maintain in 2005 rush hour traffic at 1991 levels.

These goals were based on the following strategies:

- land-use planning
- actions on car traffic: road specialization
- actions on parking
- actions relating to two-wheeled vehicles; bike paths
- action for pedestrians
- fitting-out of public areas
- actions on public transport:
    - The STIB (the regional public transport company of buses, trams and metro) stepped up its services. As a result, customers increased by 50% between 1999 and 2005.
    - Improvements in the services of the SNCB, the Belgian national railway, have led to an 8% increase in the number of people travelling by train bound for Brussels.
    - Travel passes: one ticket enables the holder to travel by train and by tram, metro or bus throughout Brussels.

3.1.3.5.2.2 The Regional development plan

This plan[15], approved on 12 September 2002, commits the region to a sustainable development policy. One of its targets is to reduce by 2010 road traffic by 20% in relation to 1999 levels.

In order to reach this target, the plan must be backed by a new Mobility Plan. This plan, called IRIS II, is now under study.

3.1.3.5.2.3 The structural improvement plan relating to air quality and global warming

This plan, also known as the Air-Climate Plan[16], was approved on 13 November 2002, by the government of the Brussels Capital Region. It is the outcome of cooperation among administrations active in the fields of the environment (IBGE), transport (AED), land-use planning (AATL) and public transport (STIB).

The Plan is the direct application of the Air Ordinance[17] of 25 March 1999, on the evaluation and improvement of ambient air quality, which in turn is a transposition of EU Directive on the evaluation and management of ambient air quality (1996/62/EC). The aim of the "Air" part of the Plan is to fulfil all related European and international obligations concerning air quality and air pollution emissions. The air quality thresholds were set by the Air Quality Framework Directive (1996/62/CE), currently being revised, and its daughter Directives. The emission ceilings for SO_2, NO_X, VOC and NH_3 were established by the NEC Directive, whose aim was to set *national emission ceilings* for these pollutants (2001/81/CE). A technical and economic analysis[18] of this plan's prescriptions was conducted in 2004.

---

[15] http://www.prd.irisnet.be/Fr/arrete_complet1.pdf

[16] http://www.ibgebim.be/francais/pdf/Air/PLANAC_complet.pdf

[17] http://www.ibgebim.be/DbDroit/download/19990325_O_QualAir.pdf

[18] http://www.ibgebim.be/francais/contenu/content.asp?ref=2004

The Air-Climate Plan seeks a decrease in pollutants emitted by road transport via a road traffic reduction policy and improvements in vehicle technology. It comprises 22 measures concerning transport that can be subdivided into 5 themes. These objectives must be attained by 2010. The five themes are:

- promote inter-modal transfers and improve public transport,
- regional measures to reduce the use of cars by regional planning of street and off-street parking,
- application of company mobility plans,
- information about and support for clean vehicles; the STIB (regional transport company, bus-tram-metro) is currently modifying its bus fleet to reach a quota of nearly 80% of clean vehicles by 2007,
- decrease road traffic emissions; manage traffic and promote environmentally-friendly driving.

The Air Ordinance was also followed by a "clean vehicle" decree[19] of 3 July 2003, which sets up a 20% quota of clean vehicles for the fleets of Brussels administrations. This target must be met no later than October 2008.

The "Transport" part of the Air-Climate Plan was strengthened in 2006, by the introduction of "Bruxell'Air" [20], which was the result of cooperation between the Environment and Energy ministry and the Mobility ministry. The purpose of these measures is to turn Brussels into a low-emission zone mainly by working with structural and permanent measures. More specifically, this plan supports most of the prescriptions contained in the Air-Climate Plan, i.e. the company commute plans and the mobility plans for large events, inter-modal transport and increased public transport, and introduces regional planning for street and off-street parking, which would help to improve coordination of this type of deterrence instrument.

Furthermore, "Bruxell'Air" introduces premiums for the withdrawal and destruction of vehicles prior to Euro II (the regional decree of 7 September 2006) and emergency plans in the event of pollution peaks. This latter measure should be implemented starting in 2007.

All these plans have already led to slower growth in traffic and a downward revision of growth projections. Any additional impact of the Air-Climate Plan's prescriptions is difficult to quantify. An initial estimate predicts a 10% reduction in NO_x (0.2 kton) and VOC emissions (0.06 kton). Half of the reduction of NO_x would be achieved from an additional reduction in mobility, by means of company commute plans and a parking policy, and the other half from improvements in the public transport fleet (STIB).

Railways and naval emissions in Brussels are limited and were not the subject of measures.

3.1.3.5.3 Additional measures

The region, in working towards its goal to improve air quality and reduce greenhouse gases, is trying to reduce further the pressure from road transport and, to that end, is studying a new mobility plan, called IRIS II, that will reduce traffic levels by 20% in 2010, compared to 1999 levels.

Measures will be taken to reach this target by no later than 2015. The plan will focus on managing transport via land-use planning (prioritization of roads), the internalization of external transport costs and an adapted public transport offer. The IRIS II plan is not yet finalized and it is therefore impossible to quantify its impact at mid-term, i.e. 2010.

---

[19] http://www.ibgebim.be/DbDroit/download/20030703_agb_IntroVehPropre.pdf

[20] http://evelyne.huytebroeck.be/IMG/doc/20060512_dossier_presse_final_plan_Air.doc,

3.2 Stationary sources: Federal government

3.2.1 Widening the scope of the regulation on reducing NO_x and CO emissions in the heating appliances sector

A Royal Decree was enacted in 2004, which took effect on 30 January 2005, with a view to reducing the NO_x and CO emissions of heating installations with an effective rated output not exceeding 400 kW[21].

In the residential (households) and tertiary (commercial buildings) sectors however, this regulation only affects certain types of heating devices. For the time being, it does not apply to hot-air heating generators, stoves and radiant heaters, as well as to heat generators for space heating and the production of hot water.

Which means that the scope of the above-mentioned regulation has to be widened in order to prevent unfair competition between those different heating systems on the one hand, and to gradually reduce the emission levels, on the other.

The procedures set out in order to achieve the aforesaid extension of the regulation in force, have been prolonged to allow the opening of new negotiations on the implementation of an Energy Efficiency Label and an Eco-design Label[22] (meaning that the environmental impact reducing objective is being taken into account from the design stage onwards); In the present case, the goal consists in minimizing NO_x and CO emissions for gaseous fuels, and in addressing the emissions of the same pollutants as well as fine particulate pollution in the case of solid fuels and heating oil.

The present discussion in which the sector concerned as well as the federal and regional authorities are taking part, is specifically aiming at a definition of emission and efficiency standards for pollutants and particulates.

3.2.2 Draft Royal Decree regulating efficiency and CO emission levels of heating devices fired with solid fuels

Household heating appliances fired with solid fuels will be regulated regarding the reduction of pollutant emissions with particular attention for the quality of the solid fuel that is used (as opposed to that of non-solid fuels, the quality of solid fuels varies widely). Links to manufacturers of recycled or non-recycled biomass will be necessary in order to guarantee optimal use of resources and appliances.

The conclusions of the initial activities advocated an approach similar to the one that has been described above (Energy Efficiency Label and Eco-Design).

The participants in the discussions with the sector and the federal and regional authorities insisted upon the importance of accrediting a laboratory competent for testing and measurements.

A draft Royal Decree has been prepared and discussed with the sector. It is at present following the legislative procedure and will soon be notified to the European Commission.

---

[21] Royal Decree of 8 January 2004 regulating the emission levels of nitrogen oxide (NO_x) and carbon monoxide (CO) produced by central heating boilers, and burning units fired by liquid or gaseous fuels of nominal heat input not exceeding 400 kW. It took effect 12 month after its publication in the Official Gazette.

[22] Any increase in energy efficiency is followed by a reduction in the amount of energy consumed. As a parallel to the aforementioned evolution, there is a subsequent decrease in the quantity of resources used for generating the energy and the related emissions are reduced as well.

3.2.3 Draft Royal Decree introducing the use of standard EN442 for dimensioning radiators and convectors

The dimensioning of radiators and convectors is still based upon standard NBN D13-001 which generates an incompatibility with the boilers subject to the Royal Decree on heating devices with low NO_x and CO emissions. Introducing a mandatory EN442 standard shall optimize the dimensioning of radiators and convectors and introduce a market adequacy between boilers and radiators/convectors.

The draft Royal Decree introducing the standard EN442 for dimensioning radiators and convectors is being prepared by the Federal Public Service of the Environment.

3.2.4 Sensitization of professional heating appliances installers

Good Practice Guides will be drawn up and distributed in collaboration with manufacturers and importers of heating appliances (boilers and radiators) on the one hand, and the sector representing the installers of these products on the other hand.

A yearly workshop on good practice in installing and maintenance will be organized in collaboration with the sector, within the scope of a campaign called « automne-hiver ça chauffe ».

A site focusing on «Sustainable Construction» is also currently being developed.

Information regarding energy efficiency qualities (thermal insulation capacity,) will be provided for about ten thematic categories of construction materials. Information will also be provided concerning the various incentives and subsidies that are available, and regarding existing labels.

Another site is also under construction, essentially dealing with a «CO_2 calculator»; it will provide information regarding certain energy-intensive products in order to allow the consumer to choose the most interesting product from the point of view of energy consumption.

However, the products the aforementioned tool takes into account do not exclusively belong to the field of heating (boilers but also electro-domestic equipment).

The information provided for will calculate the energy saving that can be made thanks to the different products. The calculations will take into account the purchase price, any government interventions, and working costs. As a result, it will be possible to determine the duration of the investment return.

The different steps in this sensitization effort will be carried out once the site is operational and will be based on the information displayed on the site.

Even though the site is aimed directly at a large audience, it also answers a demand of the sector itself.

3.2.5 Measures related to the efficiency requirements and to CO_2, NO_x and CO emissions of boilers and burners

Within the context of European Directive 1992/42/EC (efficiency requirements for heating appliances), the federal energy administration has worked out a procedure in consultation with gas distributors in order to set up a surveillance system of energy efficiency and CO_2 emissions by gas-fuelled burners to be put on the market.

In the future, the following measures will be taken:

- Extension of the monitoring system for gas boilers
- Development of a monitoring system for liquid fuel fired burners.
- Encouraging initiatives by the European Commission in order to update directive 1992/42/EC.

As far as the latter directive is concerned, the Energy Administration also controls the products concerned. All these measures can be used afterwards to reinforce the control of the compliance with

CO and NO_x emission standards as laid down by the Royal Decree of 8 January 2004 (mentioned earlier). Collaboration between the FPS Environment and the FPS Economy has been strengthened in 2005 in order to analyse possible monitoring synergies (monitoring the implementation of measures imposed by both FPS during one single control action).

3.2.6 Measure related to the sulphur content of fuels

Most of the measures undertaken in Belgium to limit the sulphur content of fuels follow the European regulation.

It's not allowed to undertake legally binding dispositions which go beyond European legislation without having the agreement of other member states.

Thus, the actions whom goal it is to reduce sulphur content of fuels below the European limit values are financial incentives. Such incentives aim to close the price gap between on the one hand fuels that respect the legal limits and on the other hand fuels that have a lower sulphur content and are more expensive due to the additional processes needed for the lower sulphur content.

These measures depend of budget possibilities and oil market prices.

For now, it's foreseen to apply such incentives on two fuels categories.

- Household gas-oil: Its maximal sulphur content allowed is currently 2000ppm (until 2008). The "EXTRA" gas-oil contains less than 50 ppm of sulphur. It is foreseen to nullify the price difference in four steps by lowering the energy contribution. Whereas this was foreseen by 2007, only the first step has been taken in 2004.
- It is expected that road fuels will also diminish their sulphur content. The sulphur content to be obtained is 10 ppm for gasoline and diesel as the directive 2003/17 imposes by 2009. The financial incentive is in this case a revision of the price structure of oil products. Law currently under development (close to publishing in the Belgian offical jounal) will also give a fiscal definition of 10ppm fuels and thus will allow those fuels to be specifically taxed. Anyway, a price structure is already defined[23]. This sets an identical price limit for 10ppm and 50ppm road fuels.

When negotiating the division of the Belgian NEC-ceiling between the regions in Belgium, the federal authority committed itself in the context of the federal plan on tropospheric ozon and acidification 2000 – 2003 to lower the sulphur content in heavy fuel oil used in Belgium to a maximum of 0,6% (in stead of the 1% that is the standard in Europe). This commitment has been taken into account in the NEC programme from 2003. This measure has not been introduced since this would prohibit the import of fuels that comply with the European standards which is in conflict with the free traffic of goods between member states of the European Union. Even if the low sulphur heavy fuel oil would be introduced, it would be impossible to limit import of other heavy fuel oil which would be cheaper, thus limiting the effect of the low sulphur heavy fuel oil. Since there exists no commercial heavy fuel oil with less than 1% S it is also impossible to used financial instruments to stimulate its use and thus achieve an equivalent emission reduction than would the 0,6% S standard be introduced in Belgium.

3.3 Stationary sources: Flanders

3.3.1 Overview

[23] Contrat de programme relatif au régime des prix de vente maxima des produits pétroliers / programma-overeenkomst betreffende de regeling van de maximumverkoopprijzen der olieproducten

3.3.1.1 Horizontal measures

Table 7: Horizontal measures for stationary sources in Flanders

Sector	Measure	Pollutant	Reduction (ktonnes)	Source	With measures	With additional measures	Info sheet
All	Implementation of the IPPC Directive	All	n.q.[1]		ν	ν	VS61
	Follow-up of environmental impact assessments	All	n.q.		ν	ν	VS62
	Measures concerning climate policy	All	n.q.		ν	ν	VS63
	Raising awareness	All	n.q.		ν	ν	VS64
	Use of economic instruments	NO_x (SO_2)	n.q.[2]		-	ν	VS65

[1] n.q.: not quantified

[2] the reduction achieved through an economic instrument depends on the nature of the instrument and the implementing conditions. These elements are established in relation to the instrument's objectives.

3.3.1.2 SO_2 and NO_x

Table 8: Measures for reducing SO_2 and NO_x emissions of stationary sources in Flanders

Sector	Measure	Pollutant	Reduction (ktonnes)	Source[1]	With measures	With additional measures	Info sheet
Electricity production	Environmental policy agreement	SO_2 NO_x	28.1 16.5	EPA	ν	ν	VS2
	Environmental policy agreement: NO_x target value	NO_x	1.5	EPA	-	ν	VS3
Chemical industry	Strengthening conditions for combustion plants	SO_2 NO_x	0.2[2] 1.8[2]	OC	ν	ν	VS1
	Company-specific measures – already taken	SO_2 NO_x	2.8 2.0	OC/SS	ν	ν	VS5
	Company-specific measures – planned or certain to be carried out	SO_2	0.3	OC/SS	ν	ν	VS6
	Company-specific measures – still uncertain	SO_2 NO_x	0.5 0.8	OC/SS	-	ν	VS7
Iron and steel industry	Strengthening conditions for combustion plants	SO_2 NO_x	0.2[2] 1.8[2]	OC	ν	ν	VS1
	Company-specific measures – planned	SO_2 NO_x	1.2 0.8	OC/CS/SS	ν	ν	VS8
	Company-specific measures – still uncertain	SO_2 NO_x	3.7 2.9	OC/SS	-	ν	VS9
Non-ferrous	Strengthening conditions for combustion plants	SO_2 NO_x	0.2[2] 1.8[2]	OC	ν	ν	VS1

	Company-specific measures – already taken	SO_2	1.5	OC/SS	ν	ν	VS10
	Company-specific measures – still uncertain	SO_2	1.4	OC/SS	-	ν	VS11
Oil refineries	Strengthening bubble emission limit values	SO_2 NOx	13.7 3.2	CS/OC	ν	ν	VS12
	Adaptation bubble concept	SO_2 NOx	2.9 0.2	OC	-	ν	VS13
Ceramic sector	Strengthening sectorial standards	SO_2	5.5	OC/SS	ν	ν	VS14
Other industrial emissions	Strengthening conditions for combustion plants	SO_2 NO_x	0.2[2] 1.8[2]	OC	ν	ν	VS1
	Strengthening sectorial standards waste incineration	NO_x	0.6	OC	ν	ν	VS15
	Company-specific measures	NO_x	0.5	OC	-	ν	VS16
Non-industrial sectors	Royal Decree on oil-and gas-fired installations ≤ 400 kW	NO_x	0.3	OC	ν	ν	FS1
	Stricter provisions in Royal Decree on oil-and gas-fired installations ≤ 400 kW	NO_x	0.1	OC	-	ν	FS2
	Product standards: sulphur content of gas oil	SO_2	3.2[3]	OC	-	ν	FS3
	Product standards: sulphur content of heavy fuel oil	SO_2	0.4	OC	-	ν	FS4

[1] EPA: Environmental Policy Agreement
OC: own calculations
CS: calculations by the sector
SS: sectorial study

[2] This is the expected reduction for this measure for all the sectors combined.

[3] A small part of this reduction potential (<0.3 ktonnes SO_2) comes under the industrial sectors.

3.3.1.3 VOC

Table 9: Measures for reducing VOC emissions of stationary sources in Flanders

Sector	Measure	Pollutant	Reduction (ktonnes)	Source[1]	With measures	With additional measures	Info sheet
Chemical industry	Company-specific measures	VOC	2.3	SS	v	v	VS20
	Cost-effective measures in plastics processing	VOC	1.8	SS	-	v	VS21
	Cost-effective measures in storage and loading activities	VOC	0.30	SS	-	v	VS22
	Secondary techniques in pharmacy	VOC	0.34	CS	-/v	v	VS23
Refineries	Emission reduction storage and loading volatile products	VOC	0.7	SS	v	v	VS24
	Geodetic roofs and emission reduction storage low-volatile products	VOC	0.7	SS	-	-	VS25
	Covering and post-treatment oil/water separator	VOC	0.7	SS	-	-	VS26
Chemical refineries	LDAR	VOC	1.1 2.6	SS	v	v	VS27
Paint, ink and glue	Secondary techniques in paint and ink production	VOC	1.3	SS	-/v	v	VS28
	BAT package of measures in vehicle refinishing	VOC	0.13	OC	v	v	VS29
	Reduction of solvent emissions through abatement in textile coating	VOC	0.4	SS	-	v	VS30
Printing sector	Secondary techniques in solvent-based printing	VOC	1.3	OC	-/v	v	VS31

	Reducing emission limit values flexography, rotogravure and publication rotogravure in accordance with BREF	VOC	?		-	ν	VS32
	Reduction solvent use in sheet offset printing	VOC	0.1	SS	-	ν	VS33
Petrol stations	Stage II vapour recovery	VOC	0.5	OC	ν	ν	VS34
Car assembly	Water-based coatings	VOC	1.6	OC	ν	ν	VS35
	High-solids paints	VOC	0.3 – 0.8	OC	ν	ν	VS36
Dry cleaning	Package of BAT measures	VOC	0.15	OC	ν	ν	VS37
Non ferrous	Reduction of roller emissions	VOC	0.3	SS	-	ν	VS38
Mineral products **Wood preservation** **Tank cleaning**	BAT measures in various sectors	VOC		SS	-/ν	-/ν	VS39
Storage depots	Reduction storage and loading emissions	VOC	0.3	CS	-/ν	ν	VS40
Sectors using solvents	Solvents Directive	VOC	10	OC	ν	ν	VS41
Decorative paints **Vehicle refinishing**	Product Directive	VOC	3	OC	ν	ν	FS5

[1] OC: own calculations
CS: calculations by the sector
SS: sectorial study

3.3.1.4 NH_3

Table 10: Measures to reduce NH_3 emissions of stationary sources in Flanders

Sector	Measure	Pollutant	Reduction (ktonnes)	Source[1]	With measures	With additional measures	Info sheet
Agriculture and livestock breeding	Livestock reduction	NH_3	8.3	OC	ν	ν	VS51
	Low-emission use of manure	NH_3	5.1	OC	ν	ν	VS52
	Feed-related measures	NH_3	2.9	OC	ν	ν	VS53
	Low-emission stables	NH_3	0.7	OC	ν	ν	VS54
	Manure processing	NH_3	1.8	OC	ν	ν	VS55

[1] OC: own calculations
CS: calculations by the sector
SS: sectorial study

3.3.2 Introduction

3.3.2.1 Cost-effective measures

The intersectorial evaluation revealed that in order to obtain the NEC ceilings, all measures with a marginal cost up to 6.6 €/kg should be taken for NO_x , up to 3.1 €/kg for VOC and up to 2.5 €/kg for SO_2. However, in the remainder of the progress report a maximum marginal cost of 5 €/kg is used for NO_x and VOC as a criterion for cost effectiveness. The reason is that this criterion was also used in the 2003 NEC reduction programme. It is derived from an inventory of the cost effectiveness of specific measures already (partly) implemented in the Netherlands and have been published by the Netherlands Ministry of Housing, Spatial Planning and the Environment as an indicative reference value. The reference value for SO_2 is 2.5 €/kg, i.e. the same value as that which emerged from the intersectorial evaluation. In the round of consultations with the sectors for which no measures had yet been taken upon completion of the intersectorial study, the measures with a marginal cost between 5 and 6.6 €/kg for NO_x were also taken into account.

In the discussion of the sectors in Chapters 3.3.4 and 3.3.5, it will be indicated in each case whether the cost-effective measures are attainable in practice and the timeframe will be indicated in which the measures will be implemented. However, the measures described in this programme should not be regarded as a limitative list. If it appears in practice that there are other cost-effective measures that may be taken in addition to those already identified, they will also be implemented as much as possible.

3.3.2.2 Limitations

On the basis of the specialised literature, surveys and visits to companies, an assessment is made in the sectorial studies of possible additional reduction measures, their reduction potential and their costs. On the basis of the sectorial studies, sectors or companies have been consultated. It has become apparent in the course of these consultations that a part of the measures described in the sectorial studies and deemed to be attainable and cost effective are not necessarily obvious in practice. According to the companies or sectors concerned, the cost price of the measure has in some cases been underestimated (e.g. because no account was taken of additional costs such as the need to replace waste pipelines or discharge or because the costs are much higher for smaller companies because of the difference in scale). In other cases, the measures are said to be technically impossible because of the specific characteristics of the company, which could not be taken into account in the sectorial studies (e.g. flue gas composition).

In other cases, it has appeared that companies have in the meantime already realised higher reductions than the evaluation made in the sectorial study, or new information has led to a lower evaluation of the emissions.

Even though the sectorial studies and the intersectorial evaluation provide a good indication of the reduction potential in each of these sectors, the above considerations mean that one cannot and should not adhere in absolute terms to the apportionment of emission ceilings as proposed in the intersectorial evaluation. The maximum marginal costs calculated in the intersectorial have therefore not been used as absolute limit values but as guide values.

3.3.2.3 Socio-economic assumptions

For sectors for which sectorial studies are available, the forecasts drawn up in those studies have been taken as a basis and where appropriate updated on the basis of information that has become available since the completion of the sectorial study. The forecasts from those studies have been calculated on the basis of the following:

- the expected increase or decrease of production within that sector. This was determined on the basis of growth figures of the past (on the basis of a survey within the sector or data from the international literature), knowledge of planned expansions and discussions with the sector;
- an annual improvement of energy efficiency (1.5%);
- knowledge of the emission reduction measures already planned in the companies concerned;
- in a number of sectorial studies where combustion emissions had an important share and for which the data were not available in sufficient detail, various scenarios have been worked out based on combustion prices (in particular the difference between the price of heavy combustion oil and gas). For the purpose of the emission forecast, this is significant only for part II of the sectorial study of the chemical sector. In this programme, calculations relate to the highest forecasts (calculated if the price of gas exceeds that of heavy combustion oil). Where the price of heavy combustion oil and that of natural gas is the same, the forecasts are 0.05 ktonnes lower for NO_x and 0.6 ktonnes lower for SO_2.

The cost curves in the sectorial studies were worked out for an interest rate of 5% and also of 10%.

Individual calculations have been carried out for sectors for which no sectorial study was available. Such calculations have been based on the energy scenario compiled for reporting under Decision 280/2004/EC of the European Parliament and the Council. In this energy scenario, account has been taken of the results of the sectorial studies with regard to the expected development of production in that sector. At the time when this energy scenario was drawn up, the sectorial studies had therefore all been completed.

For the socio-economic assumptions underlying the emission forecasts from this programme, we therefore refer to the report transmitted in accordance with Decision 280/2004/EC of the European Parliament and the Council. The socio-economic assumptions from this report have been taken over in Annex 4 (these assumptions have been taken over only in respect of the stationary sources; those concerning non-stationary sources are discussed in Chapter 3.1).

3.3.2.4 Additional measures – type of instrument used

In the course of this programme, for the different sectors possible additional instruments are discussed. Often it is stated that these measures will be implemented through the sectoral conditions in Vlarem or the individual environmental permit. In the past, it became clear that these are the most obvious instruments. This however does not mean that the possibility to use other instruments has been excluded. If for example from the consultation of the target group it seems that this target group has a strong preference for a covenant and if this covenant has an added value with regard to legislation, creates juristical clarity and remains workable, than this will of course be considered.

3.3.3 Horizontal measures

For each pollutant, the measures taken to reduce the relevant pollutant's emissions are discussed in the following chapters. However, a number of measures apply to several or all pollutants and they are therefore already discussed here.

3.3.3.1 Implementation of the IPPC Directive

IPPC stands for "Integrated Pollution Prevention and Control". This directive (96/61/EC) also lays down the application of the Best Available Techniques (BAT) for a whole range of installations which are an important source of pollution (into the air, water, the soil or waste). This is obligatory from 1999 for new installations still to be licensed and from 30 October 2007 for existing installations.

In order to be able to evaluate the extent to which the BATs are already being applied, the European IPPC bureau has drawn up Best Reference documents (BREFs) in which the techniques that are regarded as BATs and what the related emission levels are, are studied per sector.

This Directive can be implemented both via a sectorial approach (through adaptation of the Vlarem conditions) and through an individual approach (through companies' environmental permits). For instance, in adapting the conditions for combustion plants, stationary engines and turbines, account has been taken of the BAT study on these installations, ensuring the application of BATs for these plants. The extent to which the legislation in force requires the application of BATs is also examined for other sectors. In addition to this, or if sectorial evaluation is not possible (e.g. because of the sector's diversity), to the extent to which individual companies have already implemented the BATs is also examined.

The investigation of companies also includes, within the NEC framework, whether there is a cost-effective reduction potential. This includes examining whether the cost-effective measures from the relevant study or studies are practicable. If it turns out that neither legislation nor the individual environmental permit enforce the application of BATs or of cost-effective measures, it is proposed that the licensing authority should include such measures as special conditions in the environmental permit.

It is clear, therefore, that the measures that can be taken vary from one company to another. This means that the impact of the IPPC directive on emissions is difficult to quantify. Where specific, quantifiable information is available for sectors or companies, this will of course be taken into account.

See also information sheet VS61.

3.3.3.2 Follow-up Environmental Impact Assessments (EIAs)

When Environmental Impact Assessments are carried out, often in the framework of a new environmental permit or an adaptation of an existing one, care is always taken to ensure that possible additional reduction measures are objectively evaluated in the assessment report. In this connection, attention is given to the possible implementation, the obtainable reduction potential and the associated cost price. If the EIA identifies measures which the licensing authority believes are attainable and lead to a relevant reduction, these measures are imposed in the environmental permit. See also information sheet VS62.

3.3.3.3 Measures in connection with climate policy

Under the Flemish and federal climate policy, a number of measures have already been taken to reduce energy consumption. These measures of course also have an important on (mainly) SO_2 and NO_x emissions. These measures include the following:

- energy performance legislation;
- public service obligations for network managers;
- tax reduction for energy-saving investment;
- stricter legislation on maintenance and inspection of combustion installations.

For more information on these measures, see the Flemish Climate Plan and the progress report pertaining thereto (which can be consulted on http://www.mina.be/klimaatconferentie.html). These measures have been taken into account in the energy scenario that was used to calculate the emissions. See also information sheet VS63.

3.3.3.4 Raising awareness

Apart from taking specific, strict measures (through the Flemish regulation for environmental permits, Vlarem, or through individual environmental permits), raising awareness is also an important way to

encourage emission reductions. Initiatives to raise awareness are addressed to companies and their employees as well as to individual persons.

In relation to companies, there are various approaches. There is, of course, the process of studies described above (Chapter 2.3.1 *et seq.*) and the discussions on possible follow-up measures. Also, the public authorities take part in seminars and symposia where the policy and its objectives are explained.

In respect of private individuals, various campaigns have already been conducted. These include the ROB campaign in which people are given advice on how to drive in an energy-saving and eco-friendly way and what they should bear in mind when buying a new car. There is a special website for this campaign: www.ikbenrob.be. For more information, see Chapter 3.1.3.3.2.

In the brochure 'Adem Diep In' (Take a deep breath), 184 tips are given to suggest what people could do to restrict their impact on the environment in all aspects of daily life, from mobility, via the purchase of domestic appliances, to gardening. This brochure can be downloaded from: http://lucht.milieuinfo.be/extern.cgi?documenten=39.

See also information sheet VS64.

3.3.4 SO_2 and NO_x

3.3.4.1 Demarcation of the sectors

The following sectors are distinguished in this programme:

- electricity production
- chemical industry
- iron and steel industry
- non-ferrous industry
- oil refineries
- ceramics sector
- other industrial emissions
- non-industrial sectors

While this division largely corresponds to that used in the NFR codes, a number of remarks are in order.

The electricity sector comprises all installations operated by one of the electricity producers. The environment policy agreement concluded with this sector (see chapter 3.3.4.3) also includes the emissions of the electricity part of combined heat and power units operated by an electricity producer together with another company. This electricity part is determined in accordance with a fixed formula. In the forecasts for 2010, these emissions from the electricity part of combined heat and power installations have therefore been shifted from the sector where the unit is installed to the electricity sector.

The chapter on the ceramics sector only concerns this sector's SO_2 emissions. In Flanders, the ceramics sector is a major source of SO_2 emissions. The high SO_2 emissions are largely due to the high sulphur content in the raw materials used (and therefore not to the sulphur in the combustibles used). The NO_x emissions of the ceramics sector are taken into account in chapter 3.3.4.9.

In chapter 3.3.4.9 the industrial sectors are discussed that have not been discussed in any of the previous chapters. This also includes emissions from intensive livestock breeding and greenhouse horticulture. The emissions from other agricultural sectors are mainly due to the use of off-road vehicles which are taken into account in the emission reduction programme from non-stationary sources.

3.3.4.2 Stricter conditions for combustion plants

This measure has an impact on the emissions of most of the sectors discussed below. The emission reductions are taken into account in Table 38 and Table 39 for the relevant sector.

On 23 April 2004, the Flemish government approved stricter emission limit values for combustion installations (from 300 kW thermal capacity) and internal combustion engines (including turbines). One of the objectives of these stricter provisions was to implement Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants (LCP Directive). However, in order to meet the emission ceilings from the NEC Directive, it was necessary to introduce stricter standards also for installations not covered by Directive 2001/80/EC. The adaptation was based on the Flemish BAT study for combustion plants and stationary engines. The determination of SO_2 standards was based on the stricter criteria of the European product standards for the sulphur content in liquid fuel: from 1 January 2003 the maximum sulphur content of heavy fuel oil was reduced from 3% to 1%. The maximum sulphur content in gas oil will be reduced from 1 January 2008 from 0.2% to 0.1%. Moreover, account was also taken of commitment of the federal government to lower the sulphur content in heavy fuel oil from a maximum of 1% to a maximum of 0.6%. Since the share of gas oil in plants with a capacity over 300 kW is very limited, no account was taken in the Vlarem adjustment of the federal commitment to reduce the sulphur content of gas oil to 0.05% and therefore to go further than the 0.1% applicable in Europe from 1 January 2008.

This measure reduces NO_x emissions in 2010 by about 1.8 ktonnes and SO_2 emissions by about 4.6 ktonnes (compared with the situation in 2010 if the measure were not taken). This reduction is made mainly in the chemical sector and in "other industrial sectors". The emissions in iron and steel production are mainly process-linked emissions. In the case of electricity producers and refineries, the emission limit values are combined with another approach (see the relevant chapters). The measure is outlined in information sheet VS1.

Introducing a product standard for 0.6% sulphur (S) in heavy fuel oil has proved very difficult because of the rules of the internal market in Europe. This commitment has been translated into the new Vlarem conditions for combustion plants and the concomitant reductions are therefore currently enforced by this method. Despite insisting with the federal government, it has become clear that the heavy fuel oil with 0.6% sulphur will not placed on the market. This means that these installations must implement secondary measures in order to meet the standards, which is certainly not feasible for all these installations. For that reason, it is being considered to adjust the Vlarem conditions that will enter into force in 2008. In this programme, the conservative assumption has been used that the emission reductions to be realised by shifting from heavy fuel oil with 1% S to heavy fuel oil with 0.6% S will not be realised unless this is required by the European LCP Directive (2001/80/EG) or if it is feasible according to the Flemish BAT study on combustion plants. The emission reduction due to the adaptation of the Vlarem conditions is as a consequence of this limited to ca. 0.2 ktonne SO_2. Also in the tertiary sector ca. 0,4 ktonne of SO_2 reduction will not be realised. This means that in total an SO_2 reduction of 4.8 ktonnes will not be realised.

A general reduction of sulphur content in fuel oil from 0.1% to 0.05% has also proved to be unattainable because it is too costly and because fuel oil with 0.05% is not an existing commercial product. In Flanders this measure would lead to an SO_2 emission reduction of about 3.2 ktonnes, mainly in the residential and tertiary sectors. Instead, a fuel oil containing 0.005% sulphur ("fuel oil extra") has been introduced. The planned emission reduction could still be obtained by granting tax concessions for this fuel. However, this "fuel oil extra" is still more expensive than ordinary fuel oil. The original plan was to gradually reduce the excise on this "fuel oil extra" in four stages so that its price in 2007 would be the same as ordinary fuel oil; however, the reduction was not applied either in 2005 or (provisionally) in 2006. Consequently, the share of this "fuel oil extra" in 2004 was only about 5%. The fact is, however, that its share should be 53% in order to attain the same reduction as in the case of an overall reduction of 0.1% to 0.05%. There has been repeatedly insisted with the federal government on the further execution of this measure. Since, according to information provided by the federal government, no further steps are planned in this and since the at this moment very limited

share of gasoil extra , the emission reductions due to this measure (3.2 ktonnes SO_2) have not been taken into account in this programme.

3.3.4.3 Electricity production

Substantial emission reductions have already been attained in this sector: between 1996 and 2004, NO_x emissions dropped by 40% and SO_2 emissions by 50%.

Following the expiry of the national agreement with this sector, a new environment policy agreement was concluded between the Flemish government and the sector (information sheet VS2). This new agreement runs from 2005 to 2009, with the possibility of extension to 2014. Under the agreement, the sector gives a commitment to reduce its emissions as follows:

Table 11: Emission ceilings from the environment policy agreement with the electricity sector

	Reference 1990	**From 2005**	**From 2008**	**From 2009**	**From 2010**	**From 2013**
NO_x (ktonnes)	47	25	14	14	12.5 with target value 11	11
SO_2 (ktonnes)	72	25	7.5	7.5	6	4.3

In exchange, the Flemish government imposes limit values for installations in this sector that are less strict than if no environment policy agreement were concluded. Moreover, during the period of validity of the agreement, the Flemish government will not tighten the sectorial conditions any further unless this is imposed at international level.

The environment policy agreement covers all existing installations (i.e. those in existence when the agreement was concluded) that are operated by or in collaboration with an electricity producer. In the case of combined heat and power units for internal use, only the electricity part is taken into account in accordance with a formula laid down in the agreement. The figures for 2010 from Table 38 and Table 39 therefore comprise more installations than the emission data up to 2004.

It is difficult to oblige new market entrants to join the environment policy agreement. Accordingly, the scope of application of the environment policy agreement is confined to existing plants and emissions from new plants are regulated through Vlarem conditions. In order to ensure that the ceiling for the electricity sector is not exceeded, it has been agreed that, when new plants are taken into service, the annual loads of the existing plants are reduced by emissions of the new installations. When new plants are taken into service, account will be taken, in determining emission limit values for the environment permit, of the available scope environmental impact, with the application of the Best Available Techniques applied as a minimum condition.

Under the terms of the environment policy agreement, the sector should each year draw up a plan indicating how the sector will meet the targets. The plan is based on a number of assumptions relating to the expected demand for electricity, imports and production in Flanders for the period 2005-2013. While in the plan submitted at the beginning of 2006, the NO_x emissions for 2010 are estimated somewhat lower than what had been agreed (12.2 ktonnes instead of 12.5 ktonnes), the calculations in Table 38 and Table 39 are based on the targets of the environment policy agreement because of the many uncertainties.

A possible additional measure for this sector is that the NO_x target value from the environment policy agreement (11 ktonnes) is agreed as binding when the agreement is extended (information sheet VS3).

Further reductions are possible through a costlier measure, namely installing selective catalytic reduction (SCR) on new and possibly also on existing steam and gas turbines. According to the sectorial study, the cost price is much higher for existing steam and gas turbines (27 €/kg NO_x) than

for new ones (15 €/kg NO_x). For all new and existing steam and gas turbines, this leads to a reduction potential value of about 3 ktonnes NO_x. This measure has not yet been discussed with the sector and there are therefore no data on its economic feasibility.

Comparison with the 2003 reduction programme

In the 2003 reduction programme, the environment policy agreement described above was mentioned for this sector; the agreement has been concluded in the meantime. The emission forecasts for this sector therefore remain unchanged.

3.3.4.4 Chemical industry

The chemical sector is very diverse and is divided into basic chemical, fine chemical and para chemical industry, which are further subdivided into a number of subsectors.

After the sectorial study for organic and anorganic industry (chemical industry part I) in 2003, the sectorial studies for organic and anorganic fine chemical industry (part II) and para chemical industry (part III) were also completed in 2004. In the last two subsectors, SO_2 and NO_x emissions mainly originate from combustion processes.

While SO_2 emissions were about halved between 1996 and 2004, NO_x emissions during this period showed a less marked drop. The recent reduction of SO_2 emissions is due among other things to the installation of an ammonia scrubber on a sulphuric acid plant and a new catalyst on another one. One of the measures taken to reduce NO_x emissions was to install an SCR on one process plant (see information sheet VS5 for more details).

SO_2 and NO_x emissions in the chemical sector are to an important extent due to a combustion plant for the generation of heat and/or electricity and are therefore not directly linked with the processes (apart from the energy demand resulting from these processes). However, a number of processes do entail significant process emissions, the most important ones being the production of sulphuric acid and nitric acid (SO_2 and NO_x respectively).

As a major part of the central emissions are combustion emissions, the stricter conditions imposed on e.g. combustion plants and stationary engines as described in chapter 3.3.4.2 will also have a favourable effect on emissions in this sector.

In the sectorial studies, the emissions in 2010 are estimated at 11.8 ktonnes NO_x and 6.0 ktonnes SO_2. In these figures, account has been taken of an estimated development in the demand for various chemical products, an annual energy efficiency improvement (1.5%) and the emission reduction measures already planned or carried out since 2000. However, no account has yet been taken of the stricter conditions imposed on combustion plants and stationary engines (information sheet VS1). The reduction resulting from these stricter criteria is taken into account in Table 38 and Table 39 (2010 with measures).

The sectorial studies also highlight a number of possible additional cost-effective measures. One of these will certainly be taken before 2010 and is therefore taken into account in the 'with measures' scenario; a wet gas scrubber on a process installation (reduction potential of about 0.3 ktonnes SO_2 - see information sheet VS6). The other measures have an additional reduction potential of about 0.8 ktonnes NO_x and 0.5 ktonnes SO_2. For SO_2 this concerns two sulphuric acid plants, an SCR on a process installation and flue gas recirculation on one combustion plant (see information sheet VS7 for more details). The possible measures on the sulphuric acid plants will be checked against the BREF for anorganic chemical industry. As this will not be completed before the end of 2006, it will be very difficult to attain these reductions by 2010. If necessary, the permits of the companies concerned and the relevant Vlarem conditions will be adapted in order to comply with the BAT-related conditions not later than 2010 (taking account of the necessary transitional periods). For NO_x the measures are either very costly or have not yet proven to be achievable in the specific working conditions of the companies concerned. This additional reduction potential is therefore taken into account in the "with

additional measures" scenario. The discussions with the companies concerned on these measures and reductions are in progress.

Through the additional use of SCR on process emissions and combustion emissions in the basic chemical industry, an additional reduction of about 2.5 ktonnes NO_x can be achieved. These measures were not selected because of their high cost price (13 – 28 €/kg NO_x).

Comparison with 2003 reduction programme

When the 2003 reduction programme was drawn up, part II and III of the sectorial study were not yet available. They have been completed in the meantime and it is now possible to improve the emission forecasts. Moreover, the calculation of the impact of the Vlarem amendment for combustion plants has been adjusted (taking account of data from RAINS and other information). The result is a higher estimate of the emissions in the "with measures" scenario. Additional measures are needed to attain the emissions of the 2003 NEC programme (4.9 ktonnes SO_2 and 10.3 ktonnes NO_x).

3.3.4.5 Iron and steel industry

The iron and steel industry includes iron and steel producers and processors. Processors are rolling mills, wire mills, steel tube plants, etc. Most emissions originate from iron and steel producers, of which Flanders has two: one is an integrated steel company which produces flat steel products based on iron ore and coal. The other one manufactures spools and plates of hot and cold stainless steel in an electric steel plant.

More than 94% of NO_x emissions and more than 98% of SO_2 emissions originate from the iron and steel producers.

SO_2 and NO_x emissions of iron and steel processors are mainly combustion emissions, for which new conditions were incorporated in Vlarem in 2004 (see 3.3.4.2, information sheet VS1). Because of this NO_x emissions will be mildly reduced (by less than 0.1 ktonnes), as a result of which emissions in 2010 will be about 0.3 ktonnes NO_x and 0.1 ktonnes SO_2. Additional conditions can be laid down in the framework of the IPPC review.

Despite increased iron and steel production in Flanders, emissions in this sector show a clearly downward trend. This is the consequence of various measures already taken, the most important one being the taking into service of a desulphurisation installation for coke oven gases (in 1997). This has led to a reduction not only of SO_2 but also of NO_x emissions because the desulphurisation also brings about a drop in NH_3 and HCN concentrations in the coking gases, which produce NO_x on combustion.

Taking account only of current policy, the emission forecasts for iron and steel producers amount to 7.4 ktonnes SO_2 and 7.2 ktonnes NO_x. These forecasts are lower than those in the sectoral study because in the last few years a number of energy saving measures have been implemented and low NO_x burners have been installed.

Discussions have started with the main iron and steel producers (accounting for more than 90% of emissions in the sector) to examine what measures can be taken, under the IPPC review and under the NEC Directive. In connection with these discussions, a number of possible reduction measures (those described in the sectorial study and also other measures) were studied in detail by the company concerned. This has led to specific action (information sheet VS8):

- the installation of an SCR on one of the hot rolling mills has in the meantime been included in the investment plan for 2008, which means that the installation can be operational in 2009. This measure would reduce NO_x by about 0.25 tonnes.
- a crushing installation for anthracite has been set up. Replacing coke slack by anthracite as a fuel in the sinter plant affects its SO_2 and NO_x emissions. The impact depends greatly on the type of anthracite used. One type could reduce SO_2 by 1.2 ktonnes and NO_x by 0.6 ktonnes. The success of the measure also depends on the availability of the specific type of anthracite on the market.

Both measures have been included in the "with measures" scenario.

In addition, a number of potential measures has been identified with which, however, no (successful) experience has yet been gained anywhere in the world, making their technical and economic feasibility uncertain (information sheet VS9). One measure would be to fit a regenerative active carbon installation (RAC) on the sinter plants (practical experience exists but the data concerning NO_x reduction vary widely) and an SCR on the coking plant. An RAC installation would be cost efficient on one sinter plant for the removal of SO_2; in the NO_x cost curve this technique has not been selected. Despite the fact that there is already some experience in practice, the removal efficiency for NO_x is very uncertain. In any case, the marginal reduction cost for the removal of NO_x is very high. Another option is to apply a reduction measure to an electricity plant which is being built on the site of a steel producer. The feasibility and its connection with the environment policy agreement of the electricity sector require further study. These measures have been included "with additional measures" scenario.

Other measures that have been discussed with the sector but whose possible reductions have not been taken into account in any of the scenarios because their technical and economic feasibility still raise major question marks are the following:

- installing an SCR on the sinter plants (the presence of SO_2 in the flue gases quickly leads to blockage of the catalyst and, moreover, the flue gases first have to be heated up);
- bicar injection in the sinter plants (which would make it impossible to recycle the electrofilter dust, generating an additional waste stream);
- flue gas circulation in the sinter plants (pilot tests have shown that this has a negative impact on the productivity of the plants, on sinter quality and on electricity consumption).

The use of these techniques as well could (theoretically) reduce emissions down to 2 ktonnes NO_x and 1.2 ktonnes SO_2.

Comparison with the 2003 reduction programme

When the 2003 reduction programme was being drawn up, the sectorial study for the iron and steel producers had been completed but the discussions with the sector had not yet started. For this reason, the indicative sectorial ceiling resulting from the very first consultations with the various sectors was taken as a basic (see 2.3.1). The lower limit for the range indicated in the 2003 reduction programme is constituted by the emissions that would be generated if all measures from the sectorial study with a marginal cost of not more than 2.5 €/kg for SO_2 and 5 €/kg for NO_x were taken. As noted above, this meets with considerable objections for economic reasons and also because of major technical uncertainties. The present estimates take account of the feasibility and the reduction potential of a number of specific measures and are higher than 2003 estimates.

3.3.4.6 Non ferrous sector

This sector comprises the primary and secondary production of non-ferrous metals, including the production of precious metals and iron alloys. It includes metal rolling and drawing if these activities link up with metal extraction and purification.

In Flanders this sector covers 13 companies, with a total of 16 branches. They are mostly medium-sized to large undertakings (50-200 employees) but they also include a couple of small and a couple very large undertakings.

Notwithstanding an increase in the production of non-ferrous metal, SO_2 emission dropped and NO_x emission remained more or less constant.

While NO_x emission in this sector is rather limited (and due to combustion processes), there are significant process-related SO_2 emissions. Taking account of measures already taken and planned (information sheet VS10), the emissions in 2010 are estimated at 2.6 tonnes SO_2 and 1.3 ktonnes NO_x. Measures that have been taken into account include lime injection before the fabric filter on a blast furnace, a ZnO scrubber on a contact unit and a scrubber on the waste gases of a calcinating furnace.

Strengthening the conditions for combustion plants will only have very limited effect in this sector (a couple of tonnes NO_x) (information sheet VS1).

The sectorial study shows that there is still an important SO_2 reduction potential in this sector. As part of the IPPC study of the relevant companies (information sheet VS11), possibilities of imposing these reductions and appropriate timing for this purpose are under examination. This measure concerns installing a scrubber on two sulphuric acid plants and injecting bicarbonate on a process installation. If necessary, the individual permit conditions or Vlarem conditions for the sector can be adapted. The reduction potential of these additional measures is about 1.4 ktonnes SO_2. These additional reductions are taken into account in the "with additional measures" scenario. Part of these measures will certainly still be taken. This may not be possible by 2010 but will be implemented as soon as possible after that date.

Comparison with the 2003 reduction programme

In 2003 the NO_x emission data from the sectorial study were taken as a basis, which, however, proved to be an underestimate of the actual situation. The figures were accurate for SO_2 at the time but in the meantime a number of measures have been taken and taken into account in this programme, as a result of which the SO_2 estimate is lower than that in 2003.

3.3.4.7 Oil refineries

Currently there are four refineries in Flanders, all situated in the port of Antwerp.

The SO_2 and NO_x emissions of the refineries are regulated on the basis of bubble emission limit values. These limit values apply to the refinery in its entirety. Additionally, there are also limit values for particular installations separately (e.g. combustion plants).

A stricter bubble emission limit value for SO_2 came into force in 1998 (2,000 mg/Nm^3), which led to an increase in the use of gaseous fuels and fuel oil with a lower sulphur content and greater decrease in SO_2 emissions. The NO_x emission limit value was also strenghtened in 1998 (up to 450 mg/Nm^3), but this did not have a major effect on total emissions.

On the basis of the sectorial study for this sector, the sector deemed emission ceilings of 10 ktonnes for SO_2 and 6.5 ktonnes for NO_x attainable. These ceilings would be used to determine new bubble emission limit values which were included in Vlarem in 2004 (information sheet VS12). The stricter criteria are phased in two stages: see Table 12.

Table 12: Bubble emission limit values for the refineries

(in mg/Nm^3)	**SO_2**	**NO_x**
Up to 31 Dec 2004	1.000	350
From 1 Jan 2005	800	300
From 1 Jan 2010	350	200

In determining these emission limit values, using the data of the sector as a basis, it was assumed, among other things, that the flue gas volume would stabilise, which was a defensible option at the time. However, recent forecasts by the sector have shown that the flue gas volume at sectorial level will have increased by 2010. In combination with the bubble emission limit values agreed, this could at the most lead to an emission of 16 ktonnes SO_2 and 8.1 ktonnes NO_X, which would be tantamount to significantly exceeding the targets for the refinery sector which were deemed attainable and were agreed at the time. The expected emissions amount to 13.4 ktonnes SO_2 and 6.2 ktonnes NO_x. All these figures include 0.7 ktonnes NO_x of the electricity part of the combined heat and power plants (which in Table 38 are taken into account for electricity producers).

This increase in flue gas volume is to a large extent attributable to the increase in flue gas volume from combined heat and power plants which, in particular for SO_2, has a strongly diluting effect. As emissions from electricity production by combined heat and power plants are already taken into account in the environment policy agreement with the electricity sector and taking account of the increase of these flue gases, the administration proposed in March 2006 that electricity generation by combined heat and power plants and the associated flue gas volume should be outside the bubble. In other words, for combined heat and power plants account is taken only of the flue gas volume for steam production in determining the bubble concentration. As a result, the total flue gas volume to be taken into account reverts approximately to the volume in the year 2000, which means that the planned sectorial emission ceilings would be attained.

The total emissions (i.e. including the electricity part of the combined heat and power plants) would then amount to 10.5 ktonnes SO_2 and 6.0 ktonnes NO_x. This also includes 0.7 ktonnes NO_x of the electricity part of combined heat and power units (which is taken into account under electricity producers in Table 18). This adaptation of the bubble concept is described in information sheet VS13.

According to the sectorial study, further reduction is possible by using an SCR (in combination with a dust filter) on cracking furnaces. This has a reduction potential of about 1 ktonne NO_x at a marginal cost of 9 €/kg NO_x.

Comparison with the 2003 reduction programme

In 2003, on the basis of information from the sector, it was wrongly assumed that there would be stabilisation of flue gas volume. As in practice it has in fact increased, extra measure VS13 is necessary to attain the planned target.

3.3.4.8 Ceramics sector

The clay-processing industry comprises all establishments for the manufacture of ceramic products through heating of clays or loams. In 2000 this sector comprised 62 kilns and by 2005, seven of these had been closed down.

Already in 2003 the sectorial SO_2 standards for the clay-processing industry were tightened (Flemish government Decree of 21 March 2003, published in the Belgian Official Journal of 1 August 2003). (information sheet VS14);

- A first stage in which the standard, depending on the sulphur content of the clay, varies between 500 and 2000 mg/Nm³, which entered into force on 1 January 2004,
- A second stage in which a uniform standard of 500 mg/Nm³ will be imposed, with effect from 1 January 2010.

In recent years, flue gas cleaning techniques have been put into service on various kilns in order to attain the Vlarem standards.

In the second stage, with the imposition of a standard limit value, a semi-wet or wet flue gas cleaning technique has to be implemented on all kilns using clay with a sulphur content exceeding 0.5%. Kilns using clay with a sulphur content of less than 0.5% must implement a dry cleaning technique or implement a cascade counterflow cleaning technique.

When the above emission limit values were approved in principle on 11 October 2002, the Flemish council of ministers instructed the competent minister to have a new BAT study conducted by 2007. In April 2006, the part of the study concerning SO_2 and HF emission problems was completed. It shows that (semi) wet scrubbing cannot be regarded as BAT. The 500 mg SO_2/Nm^3 limit value for installations using clays with a high sulphur content (>0.75% S) requires an excessive effort from these companies. For installations using clays with a sulphur content between 0.5% and 0.75%, the feasibility of the 500 mg SO_2/Nm^3 emission limit value depends on the availability and possibility of extracting low-sulphur clays or calcium-rich loams which can be used as an additional substance in order to reduce SO_2 emissions.

In the BAT study, it is proposed that the SO_2 emission limit values for this sector should be adjusted. The proposal depends on the availability of loams. If this BAT-related proposal is taken over as such in the legislation, the emissions will be reduced to 5.8 (if sufficient loams are available) or 8.3 (in other cases) ktonnes SO_2. This means that neither the earlier target reduction (up to about 4.7 ktonnes SO_2), nor the indicative sectorial ceiling (5.46 ktonnes SO_2) will be attained. The BAT study also extrapolates a number of scenarios with these and other limit values in the event that one or several (large) plants would actually install a (semi) wet flue gas scrubber. This makes the sectorial ceiling attainable and economically affordable for this sector. The sector seems to be prepared to equip these installations with a (semi) wet scrubber if the sectorial conditions are relaxed. Exactly what action will be taken is therefore not yet certain. In this programme, it is assumed that the indicative sectorial ceiling (5.46 ktonnes SO_2) will be attained. The way in which this will be done is still a subject of discussion with the sector.

Comparison with the 2003 reduction programme

In 2003 it was assumed that all installations would meet the 500 mg/Nm^3 standard and calculations were based on a flue gas volume that was the average between that of 2000 and that of 1995 (which was notably higher than that of 2000). In the meantime, it has turned out that since 2000 the flue gas volume has changed little and updating of the BAT study may lead to adaptation of the standard. Consequently, estimates are now based on the indicative sectorial ceiling which was set following the European negotiations of the NEC Directive (see 2.3.1) which is slightly higher than the estimate from 2003.

3.3.4.9 Other industrial emissions

The main other sectors with a share in emissions are greenhouse horticulture, the food industry, the paper industry, waste processing, the glass industry and the textile industry. Most of the emissions in these sectors are combustion emissions. These are dealt with by the Vlarem amendment for combustion plants (information sheet VS1). Two sectors also have process-linked emissions: waste incineration and glass production. The emissions for these sectors, together with the 2010 estimates are shown in Table 13.

Table 13: SO_2 and NO_x process emissions of the "other industrial sectors"

	2000		2010	
	SO_2 (ktonne)	NO_x (ktonne)	SO_2 (ktonne)	NO_x (ktonne)
Waste incineration	0.2	2	0.2	1.4
Glass production	0.8	1.6	0.8	0.9

The drop in NO_x emissions from waste incineration is the result of stricter sectorial conditions for waste incineration (section 5.2 of Vlarem II) which the Flemish government approved at the end of 2004 (information sheet VS15). The drop in emissions of the glass producers is the result of the closure of a number of installations.

An evaluation of various companies in the glass sector has revealed that they all already apply BAT. Accordingly, no additional reductions are taken into account for this sector for the "with measures" scenario. In the "with additional measures" scenario, account is taken of the possible emission reduction that can be brought about by installing an SCR on one of the plants (about 0.5 tonnes NO_x, information sheet VS16). Its feasibility is as yet uncertain (partly because of the fluctuating flue gas output of the plant).

The BAT study for gashouse horticulture shows that the NO_x emission factors used in complying the emission inventory for this sector are an underestimation of the actual situation. If account is taken of

the new emission factors, the NO_x emission from stationary agricultural sources in 2000 was not 2.2 ktonnes but 2.8 ktonnes. In the BAT study, a number of stricter NO_x standards are proposed for new plants (tightening standards in relation to the new emission limit values that were approved in 2004). Their additional reduction potential is rather limited (< 30 ton NO_x, as this concerns only gas-fired plants still to be licensed) and is taken into account in the "with additional measures" scenario (no separate information sheet because of limited reduction potential; based on information sheet VS1).

Further reduction in greenhouse horticulture would be possible by more advanced switching from heavy fuel oil to natural gas a fuel. In many cases, this is not evident because the necessary natural gas connections are not available.

Comparison with the 2003 reduction programme

The difference between the current figures and the 2003 figures is due to the corrected calculations, adjusted to the RAINS data, and to the fact that account has been taken of the energy scenario reported under the UNFCCC (see 3.3.2.3). In 2003 no account was taken either of the rise in energy consumption by combined heat and power plants. For SO_2, the commitment of the federal government to lower the sulphur content in liquid fuels has no longer been taken into account. Finally, one important new emission source has emerged since 2003 that was not taken into account in the 2003 programme. For this source, it is still being examined whether (additional) measures can be imposed. All this leads to lower estimates of SO_2 emissions in comparison with 2003. For NO_x the current estimates indicated in the NEC programme of 2003.

3.3.4.10 Non-industrial sectors

The non-industrial sectors cover households and the tertiary sector (hospitals, hotels and catering establishments, offices, education and trade).

The above-mentioned change of the conditions for *inter alia* combustion installations concerns all combustion installations with a capacity from 300 kW. The installations used in households and the tertiary sector, however, are mostly less powerful than 300 kW. These sectors have an important share in NO_x and SO_2 emissions. These emissions can be reduced by laying down stricter criteria for equipment placed on the market (it is obvious that imposing emission limit values and carrying out inspections is not feasible because of the large number of installations), which comes under the federal government's competence. At the request of and on the basis of information supplied by the Flemish government, a Royal Decree has been drawn up by the federal government to regulate the NO_x and CO emissions of oil and gas-fired central heating boilers, air heaters and burners with a nominal load equal to or less than 400 kW. This Decree lays down maximum emission levels for domestic heating apparatus. It applies to all installations placed on the market from 2005.

Moreover, a Royal Decree is currently being drafted laying down stricter rules for small combustion installations on solid fuel.

SO_2 emissions from households and the tertiary sector are dealt with by reducing the sulphur content in fuel. From 1 January 2003, the maximum sulphur content in heavy fuel oil was reduced from 3% to 1%. From 1 January 2008, the maximum sulphur content in gas oil will be reduced from 0.2% to 0.1%. Moreover, at the Interministrial Conference on the Environment of 25 August 1999, the federal government gave a commitment to reduce the sulphur content in gas oil to 0.05%. As explained in chapter 3.3.4.2 this commitments will not be executed and no other measures will be taken in order to meet equivalent emission reductions.

A study on energy and greenhouse gas scenarios for the Flemish region (Business as Usual scenario up to 2030 (VITO 2005 – these scenarios were used for reporting in connection with the UNFCCC; see 3.3.2.3) shows that consumption of gas oil and natural gas in 2010 will be higher than the level assumed when the NEC reduction programme was drawn up. As a result, the emission estimates for 2010 are also higher. A comparison between the current estimates and the 2003 estimates is made in Table 12. we notice that if the federal commitments are taken into account, the SO_2 emissions are lower than what was estimated in the programme from 2003. This is due to a reduction in the used of

solid fuels, that was not taken into account in 2003. Since the reductions due to the lowering of the sulphur content are no longer realised, SO_2 projections are higher than those from the 2003 programme.

Table 14: SO_2 and NO_x emissions for the non-industrial sectors: comparison with the 2003 data

	NEC 2003	NEC 2006		
	incl. 0.05% S in gas oil incl. 0.6% S in heavy fuel oil	excl. 0.05% S in gas oil excl. 0.6% S in heavy fuel oil	excl. 0.05% S in gas oil incl. 0.6% S in heavy fuel oil	incl. 0.05% S in gas oil incl. 0.6% S in heavy fuel oil
SO_2 (ktonnes)	4.5	7.7	7.3	4.3
NO_x (ktonnes)	11.3	15.0	15.0	15.0

The Royal Decree laid down the NO_x and CO emission levels for oil- and gas-fired central heating boilers, air heaters and burners with a nominal load equal to or less than 400 kW is under review. The Flemish region has proposed to make the current standards stricter in two stages: first for apparatus placed on the market from 2008 and, second, for apparatus placed on the market from 2010. As this concerns only new apparatus, its effect on emissions in 2010 is limited (about 100 tonnes) but of course it will rise each year.

Comparison with the 2003 reduction programme

The difference between the current figures and those from 2003 is fully attributable to the underlying energy scenario and for SO_2 due to the fact that the foreseen lowering of the sulphur content in liquid fuels is no longer taken into account. While in 2003 the energy scenario was arrived at through our own calculations, based on assumptions concerning the number of dwellings, heat demand per dwelling and output of heating apparatus, the current figures are based on those from BAU study by VITO. This has led to higher forecasts in 2010 than in 2003.

3.3.5 VOC

3.3.5.1 General

In order to ensure that emission forecasts and policy can be compared with the situation in 2003, the same classifications are used below as was included in the 2003 reduction programme. For clarity's sake a description is provided in Annex 4 of the demarcation of the various VOC sectors/activities.

One of the most important measures implemented recently is the introduction of the Solvents Directive (1999/13/EC) in Flanders (information sheet VS41). This directive, which was transposed in Vlarem in 2001, imposes channelled and fugitive emission limit values on about 20 activities. In 2000 the activities concerned accounted for a total emission of about 34 ktonnes, or about 37% of total stationary sources. According to the current forecast, these emissions will in the 'without measures scenario' (which takes account of the impact of the Solvents Directive) drop to 24 ktonnes. The emission reduction of the directive can therefore be roughly estimated at 10 ktonnes.

3.3.5.2 Chemical industry

Chemical industry

In the period from 1990 to 2004, emissions dropped from 31.1 to 13.9 ktonnes. This reduction was brought about by process optimisation, the use of secondary techniques and reduction of storage and loading emissions. If in the period 2000- 2010 the companies had or would take no further additional measures, the emission in 2010 would reach 18.2 ktonnes as a result of strong economic growth.

Planned measures:

In 2007 a leak detection and repair programme (LDAR[24]; information sheet VS27) will be introduced in Vlarem, leading to a drop in emission of about 1.1 ktonnes in 2000-2010. This measure, which reduces leak emissions from process equipment, is the most cost-effective measure in the sectorial study. In the same period, moreover, a number of measures will be implemented which together have a reduction potential of about 2.3 ktonnes (information sheet VS20). Examples:

- Reduction of channelled emissions through afterburning (0.3 ktonnes)
- Reduction of channelled emissions by condensation and membrane technology (0.3 ktonnes)
- Reduction of fugitive emissions by replacing sealings (0.6 ktonnes)
- Process optimisation (0.5 ktonnes)

These are measures which have already been taken by individual companies (2006) or will certainly be taken in the years to come.

As a result of these planned measures, the emissions will total 14.9 ktonnes in 2010.

Additional measures:

Cost-effective measures from the sectorial study with a unit reduction cost of less than 5,000 euro/tonne will be carried out wherever possible. The additional reduction potential of these cost-effective measures is 2.1 ktonnes.

Most of this reduction can be achieved by implementing secondary techniques in plastics processing (information sheet VS21). According to the sectorial study, this could lead to another 1.8 ktonnes VOC reduction. The remaining cost-effective reduction potential (0.3 ktonnes) involves reduction of storage and loading emissions (information sheet VS22).

Analysis has shown that the cost effectiveness of these measures depends on the company concerned, making it necessary to adopt an individual approach (to special conditions in the environmental permit). It is possible that these measures, or part thereof, are attainable only if provision is made for a transitional period, as a result of which the reduction will be achieved only after 2010.

Pharmaceutical industry

Despite the implementation of emission reduction measures, emissions in this sector rose from 0.5 to 0.7 ktonnes in 1990-2004. Currently one particular company in this sector accounts for about 90% VOC emissions. Taking account of the impact of the Solvents Directive, the emissions will according to the sectorial study amount to 0.5 ktonnes by 2010.

At present the company which accounts for 90% of emissions is carrying out a study to gain a better insight of the emissions and investigate what measures could be taken to meet the requirements of the Solvents Directive and of the BREF on organic fine chemicals. In light of the provisional results, it would appear that the emissions currently reported are overestimated and the emissions of this sector can by 2010 be reduced to at the most 0.1 ktonnes (information sheet VS23).

---

[24] Leak Detection and Repair

Planned measures:

On the basis of the completed company study, the attainable measures will be identified in consultation with the company and it will be proposed to the licensing authority to include these measures as special conditions in the provisional environmental permit. In light of provisional results of the study, the company is confident that it will be possible to reduce emissions by about 0.1 ktonnes by 2010, bringing the emissions in this sector down to 0.4 ktonnes (information sheet VS23). The full reduction potential may well not be attainable until after 2010.

Comparison with the 2003 reduction programme

In 2003, only one of the three sectorial studies had been completed. In 2004 the other studies were also completed and it became apparent that the emissions for the chemical industry had been overestimated. For instance, in 2003 the estimate for 2010 in the "reference" and the "planned scenario" were estimated at 27.6 ktonnes and 20.5 ktonnes respectively, which are now corrected to 18.2 and 14.9 ktonnes respectively.

At the time, two measures were planned: LDAR and measures to reduce storage and loading emissions. The LDAR measure will be introduced in Vlarem in 2007.

No measures for reducing storage and loading emissions have yet been implemented. It has become clear from discussions with companies that the technical complexity and diversity of the installations is too great to impose uniform rules on the companies. This means that the only formula is a company-by-company approach. Identifying measures will be proposed to the licensing authority for conclusion in the environmental permit. This approach has already been adopted in the evaluation of EIA reports and the screening of IPPC companies.

On the basis of the sectorial study, a number of new additional measures has been planned in comparison with the 2003 programme, as described in information sheets 20, 21 and 23.

3.3.5.3 Refineries

As a result of process optimisation and the implementation of emission reduction measures in storage and loading activities, the emissions dropped from 15.2 to 9.3 ktonnes in the period from 1990 to 2004. One of the main measures was the introduction of stage I regulation in Vlarem in which emissions from petrol vapour arising in storage and loading are prevented through the use of floating roofs and vapour recovery units.

Measures to be implemented in 2007:

Two measures will be introduced in Vlarem in 2007: a leak detection and repair programme (LDAR – information sheet VS27) and the extension of the stage I rules to other volatile products (crude oil, naphta, reformate, etc.) (information sheet VS24). More than 40% of emissions in 2000 were caused by leaks in process equipment (flanges, valves, pumps, etc.). These emissions can be reduced by 50% (2.6 ktonnes) through LDAR. The extension of the stage I measure will produce a 0.7 ktonnes reduction.

As a result of these planned measures, the emission in 2010 will drop to 5.1 ktonnes. A further relevant reduction in the emissions before 2010 is not realistic (see below).

Comparison with the 2003 reduction programme

All measures indicated as "planned" in the 2003 reduction programme (information sheet 24 and 27), will be imposed on the companies in 2007/2008 through a Vlarem amendment. The forecast for 2010 dropped as a result of the merger of two refineries and the concomitant altered production plans. Currently it amounts 5.1 ktonnes in the "with measures" scenario, compared with 7.1 ktonnes in 2003.

The reduction programme also indicated that the following measures would be investigated:

- Geodetic roofs on tanks with external floating roofs (information sheet VS25)

- Floating roofs for low-volatile products (including kerosene, gas oil, etc.) (information sheet VS25)
- Covering and post-treatment water purification (information sheet VS26)

The feasibility of "covering and post-treatment oil/water separator" is uncertain in particular because of technical problems regarding the safety of such a construction. According to the sector, moreover, the emissions have been overestimated, giving rise to questions regarding the cost-effectiveness of this measure. Nevertheless, as there are instances of such covering abroad, this measure is being investigated further. However, its introduction by 2010 is not realistic.

The other measures proposed (information sheet VS25) are certainly not cost effective in all cases. According to the sectorial study, the unit reduction costs vary between 2,000 to 40,000 euro/tonne and it would be therefore not be appropriate to introduce general Vlarem legislation imposing these measures. If there is still cost effective reduction potential in the individual refineries, special conditions will be incorporated in the individual environmental permits. However, it seems most unlikely that any relevant reductions will still be achieved before 2010 as a result of this.

3.3.5.4 Production and use of paint and other solvent-containing products

3.3.5.4.1 Production of paint, ink and glue

In the period 1990 – 2004, the emissions in this sector only dropped to a limited extent, from 2.5 to 2.3 ktonnes. With the methodology used, the emissions, in particular in recent years, have probably been overestimated as there are insufficient data on measures taken recently. In 2007, this will be clarified through an analysis of the solvents management plans of the companies concerned.

In the sectorial study, the emission forecast for 2010, without additional measures and taking account of the impact of the Solvents Directive, has been estimated at 2.3 ktonnes. The Solvents Directive will not enforce all cost-effective measures for paint, ink and glue production, and it will be possible to achieve an additional reduction of more than 1.0 ktonnes by taking measures (secondary techniques) at a marginal costs of less than 5,000 €/ton (information sheet VS28).

In 2006 the feasibility of additional measures for companies that produce more than 1.0 ktonnes solvents on an annual basis has been examined. These companies account for more than 80% of the use of solvents. This analysis has shown that as a result of the closure of one major plant and the reduction measures already in place (in 2006), the emission in 2010 will amount to about 1.0 ktonnes. The as yet unused cost-effective reduction potential is estimated at 0.1 ktonnes, bringing emissions down to 0.3 ktonnes.

Additional measures:

It is difficult to lower the emission limit values in Vlarem (transposition of the Solvents Directive) because of the specific character of the various companies in this sector. However, discussions with the companies concerned which were started in 2006 will be continued and if it appears that cost-effective measures are feasible, the licensing authority will be asked to include these in the environmental permit.

3.3.5.4.2 Industrial use of paint, ink and glue

In the period 1990-2004, emissions dropped from 20.1 to 10.3 ktonnes, in particular as a result of the application of products with a low solvent content and the use of secondary techniques. As a result, the emission in 2010 will be reduced to 9.3 ktonnes.

However, the impact of the Directive differs considerably from one activity to another. Most companies will have to implement all cost-effective measures to be able to meet the mandatory obligations under the Solvents Directive.

Use of paint, ink and glue: plastics, wood and residual waste (in particular metal)

This subsector is characterised by many, often small, companies which have to make considerable efforts to comply with the obligations of the Solvents Directive. In particular in plastics and metal coating, it will be necessary to apply reduction measures with a relatively high unit reduction cost (> 5,000 € /ton) leading to an emission of 7.4 ktonnes in 2010. In this subsector, no additional general measures are therefore planned.

Should it appear that in individual companies other cost-effective measures could be implemented, it will be proposed to the licensing authority to include these measures as special conditions in the environmental permit. Currently no specific measures have been identified.

Vehicle refinishing companies

In the period 1990 – 2004, the emissions dropped from 1.7 to 1.1 ktonnes through the use of low-solvent products, more economical spray guns and low-emission cleaning systems. These measures have been included in Vlarem (information sheet VS29) and will have to be applied by all bodywork companies from 2005. Moreover, the European Product Directive 2004/42/EC (information sheet FS5) will ensure that from 2007 only low-solvent products may be placed on the market. As a result, emissions will be further reduced to 0.7 ktonnes.

In the RAINS model it is deemed possible that there can be an additional 30% reduction through the further shift to low-solvent products. It is not realistic to expect that this reduction will have been achieved by 2010 as the Product Directive, which was introduced only in 2004, would have to be adapted again at European level for this purpose.

Use of paint, ink and glue: textiles

In the period 1990 – 2004, the emissions dropped from 1.3 ktonnes to 0.8 ktonnes because most companies switched from solvent-based to water-based emulsions.

Only a small number of companies are still working with solvent-based products for specific applications. Most of current emissions (90%) in this subsector are caused by solvent coating, an activity which in Flanders is still being carried on by four companies. This activity also falls within the scope of the Solvents Directive but in this case, too, it is clear from the results that the Solvents Directive does not enforce all cost-effective measures.

According to the sectorial study, every company can introduce two cost-effective measures: solvent recovery and incineration. While solvent recovery has been installed in all companies, “only” two of the four companies has installed incineration equipment. Taking into account the impact of the Solvents Directive, the emission of this sector will be about 1.0 ktonnes in 2010.

If the other two companies would also install secondary measures (information sheet VS30), a 0.4 ktonnes reduction would be achieved, bringing the emission down to 0.6 ktonnes.

Measures contemplated:

In the course of 2007, the above-mentioned measure will therefore be further evaluated and, if technically feasible and cost effective, be imposed by a Vlarem or the individual environmental permit.

3.3.5.4.3 Domestic and professional use of paint

In the period 1990-2004, VOCs rose from 4.7 to 4.8 ktonnes. This is due to an increase in the use of paint as the average solvent content in this period diminished only to a limited extent.

European Directive 2004/42/EC was introduced in 2004. This Product Directive was transposed into Belgian legislation in 2005 (Royal Decree 7 Oct 2005) and includes a table with maximum solvent content for a number of decorative paints. (information sheet FS5). From 2010 only paint products that meet these requirements may be placed on the market. The average solvent content of all decorative paints will as a result diminish by 40% in the period 2000-2010.

Taking account of this reduction and a stagnation in sales, it is estimated that by 2010 there will be a 2 ktonnes reduction, bringing emissions in 2010 down to 2.9 ktonnes.

In the RAINS model, a further reduction in solvent content is deemed possible which may further reduce emissions down to 2.3 ktonnes. However, it will not be possible to realise this reduction by 2010 as the Product Directive has only recently been introduced and new European decision making is no longer realistic in that timeframe.

3.3.5.4.4 Domestic and professional use of other products

The emissions for the use of solvent-containing products other than paint are at present estimated with the same emission factor for each year, namely 1.8 kg/inhabitant. The rise of these emissions from 10.1 to 10.6 ktonnes in the period 1990 - 2004 is therefore completely due to the rise in the number of inhabitants. Following this trend, the emission will amount to 10.8 ktonnes in 2010.

So far, no measures have been taken for these "other products". During the negotiations on the Paints Directive (2004/42/EC), Belgium and a number of other member states advocated the drawing up of product rules also for "other products". By 2008 the European Commission will examine whether there is sufficient scope and potential to reduce the VOC content of products that fall outside the scope of the current Product Directive.

In 2005 the federal government also started negotiations with the industry concerned in order to reach agreement on Belgian product standards. These discussions proved difficult because the industry takes the view that such a set of rules ought to be drawn up at European level. Taking account of the limited progress made and the transitional periods that will have to be provided for in establishing such product rules, the chance is quite small that a European and/or Belgian set of product standards will be introduced before 2010.

According to the RAINS model, an emission of 1.5 kg/inhabitant should be possible in the future. With a reduction potential of 1.5 ktonnes this measure would bring emissions to 9.3 ktonnes.

3.3.5.4.5 Comparison with the 2003 reduction programme

All three measures planned in 2003 (BAT for bodywork companies, product rules for decorative and bodywork paints) were implemented.

On the basis of the sectorial study, an addition cost-effective reduction potential has also been worked out (information sheets VS28 and VS30) whose feasibility is currently being examined.

The forecast in the "with measures" scenario (23.8 ktonnes) corresponds with the forecast in 2003 when it was estimated in the "planned" scenario that there would be emissions amounting to 20.3 to 25.4 ktonnes.

3.3.5.5 Printing

In the period 1990-2004, there was a sharp drop in VOC emissions, from 11.3 to 7.0 ktonnes. This is mainly the result of the introduction of low-solvent products and secondary techniques. If no additional measures are taken, emissions in 2010 will diminish further down to 5.1 ktonnes as a result of the impact of the Solvents Directive.

According to the most recent figures, the emissions could through cost-effective measures be reduced at least to 3.7 ktonnes. Over 80% of this reduction potential can be achieved in a number of large IPPC companies engaged in particular in rotogravure, laminating and varnishing activities. While the unit reduction cost is low, the total investment cost for such companies may be very high and is an important factor in the short term within a highly competitive market.

A BREF study on surface treatment using solvents is currently in progress in which *inter alia* the best available techniques for printing firms will be determined. It is noted in the draft BREF that the emission limit values for the Solvents Directive for rotogravure and flexography can be substantially lowered in particular situations. This is in line with the results of the sectorial study.

In 2007 the following measures will be taken:

- adaptation of current environmental permits of printing firms which use more than 150 tonnes of solvent annually (in particular flexography and rotogravure): the cost-effective reduction potential in these companies is at least 1.3 ktonnes. The reduction measures for these companies will be phased in progressively: most of the reduction by 2010 and full implementation not later than 2015 (information sheet VS31). Consultation with a number of companies has shown that a 0.9 ktonnes reduction by 2010 is certainly attainable.
- adaptation of emission limit values for flexography and rotogravure, publication rotogravure in Vlarem after completion of the BREF study (additional reduction not yet known) (information sheet VS32).
- introduction of "good housekeeping" in sheets offset companies via Vlarem or by raising awareness, which may, at a rough estimate, reduce emissions by 0.1 ktonnes (information sheet VS33).

Comparison with the 2003 reduction programme

On the basis of the sectorial study, it was estimated in 2003 that the emissions would drop to 5.3 ktonnes by 2010 as a result of the impact of the Solvents Directive. Cost-effective measures could reduce emissions to 4.4 ktonnes.

Discussions with the sector has shown that after completion of the study a number of companies made substantial changes to their future plans for the implementation of reduction measures. Moreover, publication rotogravure is no longer practised in Flanders. The forecasts for 2010 should be adjusted accordingly; with cost-effective measures, the emissions may be reduced to 3.7 ktonnes.

It has also become clear that as a result of major differences between individual companies general legislation in Vlarem would not achieve the full reduction potential. The introduction of the planned measures (lowering emission limit values in publication rotogravure and "major" rotogravure companies *and* good housekeeping in sheets offset companies) in legislation has not yet been translated into practice. With regard to the main reduction potential, it is now clear that this can be achieved through an adaptation of the licensing conditions. This has been planned for the short term.

3.3.5.6 Service stations

In the period 1990-2004 the emissions dropped by more than 75%, from 7 to 1.7 ktonne, as a result of the diminishing sale of petrol, a reduction in the volatility of petrol (resulting from Directive 98/70/EC) and the introduction of vapour recovery systems.

As a result of stage I and stage II (information sheet VS34) provisions which have been introduced in Vlarem, service stations will no later than 2008 have to be fitted with the necessary equipment to recover petrol vapours that arise when service stations are supplied with petrol and when drivers fill their tanks.

Data obtained in a survey show that in 2002 as many as 75% of service stations already had stage I equipment and 15% stage II equipment in place. By 2010 all service stations will have to have stage I and stage II equipment. Taking account of the forecast 30% reduction in the sale of petrol in the period 2004-2010, the emissions for 2010 are estimated at 0.8 ktonnes.

In contrast with stage I vapour recovery, the stage II provisions were introduced into Vlarem not on the basis of a European Directive but on the basis of the results of the Flemish BAT study concerning service stations. Without the stage II measures, the emissions would amount to 1.2 ktonnes in 2010.

Comparison with the 2003 reduction programme

All measures had already been taken in 2003.

3.3.5.7 Metal degreasing

The introduction of the Solvents Directive in Flanders has been the most important measure taken in recent years. Another European Directive designated the degreasing agent trichloroethylene as carcinogenic, as a result of which its use will diminish drastically.

As a result of the above-mentioned measures, the emissions will by 2010 have been reduced to 0.6 ktonnes. In order to be able to meet the limit values laid down in the Solvents Directive, companies will according to the sectorial study have to take measures with an average unit reduction cost of 8,000 euro/tonne. A further reduction of current emission limit values would oblige many companies to take non-cost-effective measures, and for this reason further reduction is not realistic. Accordingly, there are no plans for additional measures.

Comparison with the 2003 reduction programme

No measures were planned in 2003 either.

3.3.5.8 Car assembly

Following the introduction of incineration, low-solvent products and a more efficient use of solvents, the emissions of the three car manufacturers in Flanders dropped from 9 to 3.5 ktonnes in the period 1990-2004.

Performance with regard to VOC emission reduction in the individual companies can be clearly evaluated in this sector as emissions are expressed in grams VOC per m^2 painted surface. According to the Solvents Directive, only 60 g/m^2 may still be emitted from 2007. It appears from the sectorial study that there are major differences between the individual companies: the highest value in 2000 was only 85 g/m^2 and the lowest 33 g/m^2 There will still be differences between the companies in the future because of a clear difference in the extent of switching to low-solvent products.

Taking account of the 60 g/m^2 limit value from the Solvents Directive, there will be an emission of about 5.2 ktonnes in 2010.

By 2010 two of the three companies will have switched to water-based basecoat and primer (information sheet VS35). One company has decided not to switch to water-based paints but prefers a combination of process optimisation and the use of high-solids paints (information sheet VS36) as a result of which the emission in 2010 will certainly diminish to 50 g/m^2 and possibly to 35 g g/m^3. Taking account of these planned measures, the emission for 2010 is estimated at a maximum of 3.3 ktonnes.

Planned measure:

The company that opts for high-solids paints will have to provide detailed data to show which reductions can be achieved before 2010 and in the longer term. On the basis of this study, it may be proposed to the licensing authority to include a lower emission limit value (35-50 g/m^2) in the environmental permit.

Contemplated measure in the longer term:

If the third company were also to switch to water-based products, the emission would diminish further to 2.6 ktonnes. However, this measure would not be imposed before 2010 as it is not cost-effective in the short term. In the longer term, the measure could be cost effective if it can be combined with replacement investment (new spray lines).

Comparison with the 2003 reduction programme

When the 2003 reduction programme was drawn up, the results of the sectorial study were not yet known and no measures had as yet been planned. As the future plans of the companies concerned have been greatly altered in recent years, the forecast for 2010 deviates considerably from that of the 2003 reduction programme. In 2003, the emission was forecast as 4.4 ktonnes whereas now it is 3.5 ktonnes.

3.3.5.9 Dry cleaning

Technical improvements to dry cleaning machines has meant that less solvents are being used to clean the same quantity of textile. As a result, the emission in the period 1990-2004 dropped from 1.8 to 0.5 ktonnes.

On the basis of the Flemish BAT study of the dry cleaning sector, a number of new provisions were included in Vlarem in 2004 (information sheet VS37), as a result of which only machines with the lowest emissions (machines with deep cooling *and* active carbon) may be used from 2010. These Vlarem provisions are more drastic than the European Solvents Directive which only requires deep cooling.

In 2004, 53% of dry cleaning machines had already been fitted with deep cooling and active carbon filters; this should be 100% from 2010. As a result of the new Vlarem provisions, the emissions will diminish to about 30 tonnes by 2010. Without the mandatory use of active carbon filters, the emissions would be about 190 tonnes in 2010.

Comparison with the 2003 reduction programme

The planned measure (BAT requirements in Vlarem) has been carried out.

3.3.5.10 Combustion

The emission caused by combustion of fuel is estimated by multiplying energy consumption with emission factors. A study was completed in 2005 in which an evaluation was made of the emission factors used up to that time, a new set of emission factors was proposed (see also Chapter 4.2.2).

The emissions for 2000 as determined in the study are shown in the following table.

Table 15: VOC combustion emissions in 2000

Sector	Emission (ktonnes VOC)
Electricity production	0.3
Households	3.3
Heating of buildings	0.4
Industry	1.1
TOTAL	**5.0**

VOC emissions were caused by the incomplete combustion of fuels. In fuel combustion, SO_2, NO_x, CO and CO_2 caused the main environmental problems. The policy aims at an increasingly higher level of efficiency of combustion installations which should automatically lead to reduced VOC emissions. This is a gradual process and because of this no major reductions can be expected by 2010.

Households account for 50% of combustion emissions, of which 2 ktonnes is caused by wood burning.

In the RAINS model, no measures concerning wood burning are provided for with regard to VOC. Wood burning in heaters and stoves causes very high VOC emissions, mainly through discontinuous

feeding (adding logs). Lower emissions can be attained in central heating installations where the wood supply is continuous. In Flanders, wood is almost exclusively used for supplementary heating and for atmosphere. Accordingly, switching from heaters and open fireplaces to continuous feeding is not realistic.

There are therefore no plans for specific measures to reduce VOC.

Comparison with the 2003 reduction programme

As planned in the reduction programme, a study has been compiled in which a new methodology has been worked out to estimate VOC emission in combustion processes (see also Chapter 4.2.2).

3.3.5.11 Other sectors

Ferrous and non-ferrous sector

In the period 1990-2004, VOC emission fluctuated around 0.7 ktonnes. Up to the present, the share of the ferrous metal sector was rather limited (68 tonnes in 2004). Recently one company started using anthracite as a replacement of cokes dust in its sinter plants in order to reduce SO_2 and NO_x emissions. This however lead to an additional reported VOC emission of 1,1 ktonne in 2005, leading to a total reported emission of 1.8 ktonne in 2005.

Most of the VOC emissions reported arise in the non-ferrous sector (0.7 ktonnes) during the rolling of blocks into plates. The roller oils used in this connection cause fugitive VOC emissions. In one company, these fugitive emissions are channelled and treated with secondary measures. According to the sectorial study, this measure, with 90% efficiency, can also be used cost-effectively in other companies (information sheet VS38). The resulting reduction (0.3 ktonnes) could bring down the emission to 1.5 ktonnes by 2010.

Discussions with the sector have shown that the emission estimate and feasibility of the measure from the sectorial study are uncertain. The emissions are probably greatly overestimated and there may be no cost-effective reduction potential.

Currently the emissions are estimated on the basis of production figures in combination with an emission factor. As this estimate is not reliable, estimates are being worked out at company level with the individual companies. As this exercise has not yet been completed, the results of the sectorial study are being used provisionally.

Should it appear that cost-effective measures could be possible, it will be proposed to the licensing authority to include this measure in the environmental permit.

Mineral non-metal products

In the period 1990-2004, the emissions dropped from 1.6 to 0.8 ktonnes. Various types of companies are active in the sector. Emissions are caused mainly by glass and concrete production. The main glass manufacturer reduced VOC emissions (which arise in the coating of mirrors) already before 2000 by using an incinerator, as a result of which there is no further reduction potential for the glass manufacturers. Companies manufacturing concrete products use agents containing solvents to release the products from the mould. Solvent-free or low-solvent agents are increasingly used in this subsector. The sectorial study expects that this changeover will continue optimally, leading to a 0.3 ktonnes reduction in emissions. The trend towards the use of eco-friendly low-solvent stripping agents will be closely monitored. There are plans for introducing a package of BAT measures in Vlarem (information sheet VS39).

Wood preservation

In the period 1990-2004, emissions diminished from 0.4 to 0.2 ktonnes through switching to low-solvent products. Creosoting and the application of solvent-based products fall within the scope of the Solvents Directive. The only company in Flanders that still creosotes wood uses thermal oxidation. The solvent-based products are gradually being replaced by water-based products.

There has been a drop in the use of solvents over the years. It is uncertain whether this downward trend will continue under the influence of the Solvents Directive in the years to come or whether the emissions will stabilise. Consequently, the emission forecast for 2010 is fixed at the same level as that for 2004 (0.2 ktonnes).

On the basis of the results of a Flemish BAT study, a package of measures will be included in Vlarem (information sheet VS39).

Extraction vegetable oil

In the period 1990-2004, emissions dropped from 1.6 to 0.5 ktonnes. This reduction was achieved through process optimisation which ensures that used solvents are more easily recovered. All companies already comply with the emission limit values of the Solvents Directive and all measures from the sectorial study are being implemented. In the next few years, coleseed will be used for oil extraction, in addition to soy, for biofuel production. More solvents are released in the extraction of coleseed, as a result of which emissions by 2010 will rise to 1.1 ktonnes, notwithstanding the application of all possible measures.

Ceramics sector

The over 50% drop in emissions is the result of the review of the sectorial VOC emission limit values. Since 1 January 2003, stricter Vlarem II standards apply for new installations (licensed before 1 January 2003) and since 1 January 2004 for existing installations (information sheet VS14). The emission forecast for 2010 is 0.4 ktonnes. There are no plans for additional measures.

Tank cleaning

In the period 1990-2004, emissions rose by 20% because the number of tanks cleaned in Flanders has been on the increase. Tank cleaning falls outside the scope of the Solvents Directive. The Flemish BAT study shows that implementation of emission reduction measures (e.g. draining and disposing of residual loads, cold (pre) rinsing of tanks and installing closed discharge circuits) will enable an emission reduction of about 60 tonnes (information sheet VS39). These measures are rather limited in terms of investment costs. Without additional measures, the emissions will amount to 0.2 ktonnes in 2010. There are plans for introducing a package of BAT measures in Vlarem.

Waste treatment

Landfills account for about 90% of emissions from waste treatment. In the period 1990-2004, these emissions dropped from 2 ktonnes to 0.9 ktonnes. This reduction has resulted from the phasing out of the number of landfills and a ban on the dumping of organic material (Directive 99/31/EC). This downward trend will continue in the next few years. Emission from waste treatment is estimated to be about 0.4 ktonnes by 2010.

Food, beverages and tobacco

The emissions are estimated by multiplying the quantity of bread, pastry, etc. production by emission factors from the specialised literature. The increase in production in the period 1990-2004 thus explains the increase in VOC emissions from 1.2 to 1.7 ktonnes.

On the basis of production forecasts, it is estimated that by 2010 emission will amount to 1.8 ktonnes. The sectorial study shows that measures can only be taken in industrial bakeries. However, the unit reduction cost is very high (18,000 €/ton) and this is why no such measure is planned. The measure would lead to a 0.4 ktonne reduction.

Storage depots of liquid organic products

In the period 1990-2004, emissions dropped from 2 to 0.6 ktonnes. A significant reduction was achieved through measures for the reduction of petrol storage and transfer (Stage I of the Directive).

Consultations with the sector were started in 2005 to discuss the feasibility of additional measures as on the basis of the sectorial study it could be estimated that there was still a 1.2 ktonne reduction potential in the sector.

On the basis of the sectorial study, a package of cost-effective measures was drawn up (information sheet VS40) as a result of which emissions would be reduced down to 0.4 ktonnes. In order to evaluate the feasibility and effectiveness of these measures, the companies in the sector calculated their emissions and reduction potential according to uniform methods (Literature US-EPA/API). However, the recalculated emissions were much lower than previously estimated and this explains why in 2004 the emissions dropped from 1.4 to 0.6 ktonnes.

Without additional measures, the emissions in 2010 will amount to 0.6 ktonnes. Through the package of measures proposed, the emissions could be further reduced to about 0.3 ktonnes. However, the sector argues that the package of measures cannot be implemented in all companies on technical and economic grounds and that a maximum of 0.1 ktonnes can be achieved by 2010, bringing emissions down to 0.5 ktonnes.

Here, too, the main complication is the great diversity of the companies in the sector. Some are specialised in petroleum products while other companies focus on chemicals, as a result of which the cost effectiveness of identical measures differs from one company to another.

Planned measures:

Work will continue on general Vlarem legislation which will impose the minimum requirements for the sector (0.1 ktonnes). If this does not make full use of the cost effective reduction potential, measures will also be imposed through conditions in the environmental permits of the companies concerned.

Gas distribution

In the period 1996-2004, emissions dropped from 2.6 to 2.3 ktonnes. The emissions are determined by multiplying the mileage of the natural gas grid by emission factors which depend on the type of pipelines (e.g. metal or plastic).

The reduction in emissions is therefore due to the replacement of old pipelines by new, more leak-proof ones. In the next few years, a maximum number of pipelines will continue to be replaced but the natural gas grid will also be further expanded. Taking account of these developments, the emission for 2010 is estimated at 2.2 ktonnes.

Comparison with the 2003 reduction programme

Two measures were planned in 2003: introduction of a package of BAT measures in Vlarem for wood preservation, asphalt and concrete mixing *and* reduction of emissions of storage and loading companies.

Both measures continue to be planned for the period 2006-2010.

3.3.6 NH_3

3.3.6.1 Introduction

In the period 1990-2005 NH_3 emissions dropped from 98 ktonnes to 47,5 ktonnes.

The farming sector accounts for the bulk of NH_3 emissions in Flanders. Hence the focus is primarily on this sector in the description of reduction measures. NH_3 is formed when manure comes into contact with air. Consequently, NH_3 emissions occur during the entire series of links in the farm production chain: housing, storage, use of manure and during grazing. Measures for reducing NH_3 emissions are therefore primarily focused on:

1. reducing the manure-air contact time and contact surface (for example, low emission housing, low emission application)
2. reducing the N produced in manure (cutting back on livestock, feed-related measures)

The NH_3 reduction programme applies to five key targets: reduction of livestock, low emission application, low emission housing, feed-related measures and manure processing so as to attain the NEC emission ceiling. Using 2001 as the reference year, the NEC reduction programme, which the Flemish Government approved in 2003, forecasts the potential NH_3 reduction potential that could be achieved with the various measures.

3.3.6.2 Historical NH_3 emission and the NH_3 emission model

The forecasts from the NEC programme 2003 have been calculated with the NH_3 emission model from 2001.

In 2004 a recalculation of the NH_3 emission inventory has been done taking into account a.o. the lower content of nutrients of livestock feed. This results from 1996 on in changed N-excretion figures for pigs and poultry that have been taken into account and thus a reduced nitrogen excretion in manure with reference to previous years.

In 2005 once more an adaptation of the NH_3 emission model has been done. In the study "Coupling and Analysis of NH_3 field emission measurements in Flanders and the Netherlands" by ILVO (Unit Technology & Food – Agrotechnics) and WUR (Plant Research International) the results of a large number of tests measuring the NH_3 emission for different manure application techniques are being processed statistically in order to calculate an average ammonia emission for different application techniques.

In the past for broadcast spreading an emission percentage of 50% of the applied ammonium nitrogen (TAN) from animal manure has been used for the calculation of the NH_3 emissions. Based on the aforementioned study this seems to be an underestimation leading to a recalculation of the emission factor to be used: 72% of TAN in stead of 50%. This has a significant impact on mainly the historical emissions. These are higher than in previous reports, mainly for the year 1990 and for the period 1991-1999 since then there were hardly any obligations concerning low emission application of manure.

Also the emission percentages for low emission application techniques have to be adjusted based on the results of the study. It seems that NH_3 reduction (in %) when using low emission application techniques is higher than previously assumed. But due to the fact that the emission in the reference situation (broadcast spreading) is higher, the absolute emission (as a % of TAN) for the low emission application techniques is higher than previously assumed. This leads to an increase of the emission due to the application of manure from 2000 on with regard to the values calculated previously.

These changes of the NH_3 emission model make it difficult to compare the in 2003 expected emission reductions with those already realised in 2005. Because of this, in the next part for every key target the reduction that has been realised in 2005 with respect to 2000 has been calculated. This gives us information on the efficiency of the measures that have been proposed earlier and shows us what still has to be realised.

3.3.6.3 Livestock reduction

Against the background of the manure policy, the Flemish Government agreed on a measure to reduce the number of animals (pigs, cattle and poultry) on the basis of a purchase scheme. The Abandonment Decree created a general scheme to provide the opportunity to cease animal husbandry activities completely and permanently and to do so on a voluntary basis. A reduction in livestock also means less production of manure and nutrients. This results in lower emissions in all the emission stages so it is a particularly efficient measure. A budget of 100 million euro was earmarked for this measure for the 2001-2003 period. The measure was extended for all sectors in 2004. The reduction in NH_3 emissions via the purchase scheme for pigs was put at 0.8 ktonnes in 2002 compared with 2001. For 2003 the assumption was that mainly poultry and beef farmers would sign up for the purchase scheme and the NH_3 reduction was estimated at 0.9 ktonnes NH_3.

Within the context of this target it was also accepted that the autonomous reduction in cattle stock already recorded over a few years would continue for some time. At the same time, a further reduction in NH_3 emissions equal to 1.1 ktonnes NH3 by 2010 compared to 2001 is anticipated.

For 2002 the decline in the number of pigs due to the purchase scheme turned out to be a little lower than expected. On the other hand, for 2003, contrary to expectations, quite a significant number of pigs was purchased, leading to a larger decline in NH_3 emission than assumed. The extension of the purchase scheme in 2004 only led to a limited number of applications. The effect of the purchase scheme was shown clearly in the period 2000-2004.

Besides the purchase arrangement, an autonomous decline of the number of animals can be seen in the period 2000-2005 for all kinds of animals. The decline of the number of cattle was larger than estimated leading to a larger emission reduction. The reduction in NH_3 emissions, to be attributed exclusively to the decline of the number of animals, is 6.8 ktonnes for the period 2000-2005.

If the trend of the declining number of animals that we see in the period 2000-2005 is extrapolated to 2010, then this translates for 2010 to a percentual decrease (with regard to the number of animals in 2005) of 13% for the number of cattle, 12% for the number of pigs and 18% for the number of poultry.

The decreasing number of animals is partly due to autonomous evolutions (spontaneous run-down, decrease of production due to economical factors, environmental costs and the policy with regard to manure) and partly to once-only effects (f.e. purchase scheme). For cattle the share of the purchase scheme in the declining trend is rather limited (little more than 30%). When this effect is filtered out, for 2010 a further autonomous decline of the number of cattle with 8.5% with regard to 2005 can be expected. For pigs, the share of the purchase scheme in the declining trend is larger (about 50%). When this effect is filtered out, for 2010 a further autonomous decline of the number of cattle with 6% with regard to 2005 can be expected. For cattle the share of the purchase scheme in the declining trend is rather limited (about 20%). On the other hand, the decline of the number of animals in this sector has been largely influenced by the bird flu (mainly in 2003). When both effects are filtered out of the trend, this results in an expected autonomous decline for 2010 (with regard to 2005) of about 8% for poultry.

This autonomous decline in production from animals would result in a significant decrease of the NH_3 emission in 2010. On the other hand, the new proposition for the Manure Decree (see 3.3.6.9) foresees for individual firms the possibility of an extension if 125% of the production of manure linked to the extension is being processed. This can influence the number of animals, weakening the expected autonomous decline somewhat.

This measure is described in information sheet VS51. The estimated emission reduction in 2010 amounts to 8.3 ktonnes.

3.3.6.4 Low emission use

The compulsory low emission use of manure in the wake of MAP[25] 2 bis has already had a tremendous impact on the reduction of NH_3 emissions: almost 60% of the emission reduction achieved during the 2000-2003 period (with regard to 1999) was attributable to low emission use of animal manure since 2000. Back in May 2003 an even more stringent low emission use requirement was included in the manure Decree. This placed a ban on irrigation and spreading during wet weather, so that within two hours (previously four) of broadcast spreading the manure has to be incorporated. The NEC programme for 2003 put the contribution of this stricter regulatory system to emission reduction at 3.9 ktonnes NH_3. The emission figures for 2005 revealed that over 75% (6 ktonnes NH_3) of the 7.9 ktonnes NH_3 reduction from 2003 is attributed to the tighter rules for low emission use. The rest of the reduction in relation to 2003 is ascribed to a further cut in the cattle and pig population and to a very limited degree to the erection of low emission housing.

[25] MAP: Manure Action Plan

This measure is described in information sheet VS52. The estimated emission reduction in 2010 amounts to 5.1 ktonnes.

3.3.6.5 Feed-related measures

When the nitrogen level in the animal feed is tailored more effectively to the requirements during the growing process, nitrogen excretion in the manure is lower. The most efficient way of achieving this aim is to reduce the raw protein content in the feed ration. The use of multiphase feed or multiphase feeding, in combination or not with a closer alignment between the fodder and the amino acid requirements of the animals, may significantly reduce nitrogen excretion from pigs and poultry.

The forecasts anticipated a 10% reduction in N excretion from pigs and poultry. The related NH_3 emission reduction was put at 1.1 ktonnes. As in the case of a cut in the livestock population, a reduction in N excretion affects all the emission stages and the achievement of other targets under the manure policy. The NH_3 emission inventory was recalculated in 2004 including the current excretion figures for pigs and poultry (see also chapter 4.2).

The use of current excretion figures, taking account of items such as better feed efficiency primarily for pigs and poultry, leads to a significant cut in the level of NH_3 emissions in Flanders. As a result, emissions are 1.7 to 2.8 ktonnes lower than previously calculated (Table 16).

Table 16: Comparison between the emission calculations using the old and new actual excretion figures (ktonnes NH_3)

	'Old' figures for stockbreeding	*'New ' figures*	*Difference*
2000	57,9	56,2	1,7
2001	55,7	53,4	2,3
2002	54,3	51,7	2,5
2003	51,9	49,4	2,4
2004	44,7	42,5	2,2
	44,3	41,5	2,8

More efficient feeding and the use of feed with a low protein content are permanently stimulated by the government a.o. by closing a low protein covenant with feed producers. This will make sure that also in the future the lower N-excretion by animals is continued.

This measure is described in information sheet VS53. The estimated emission reduction in 2010 amounts to 2.9 ktonnes.

3.3.6.6 Low emission housing

Achievement

As a result of the amendment to the Vlarem II environment legislation in 2003, all new pig and poultry housing units have to have low NH_3 emissions. A significant level of investment aid may be provided towards this end. When the NEC programme for 2003 was formulated, it was estimated that about 15% of the pig population and 25% of all poultry (not including chickens kept for meat production) should be accommodated in low emission buildings by 2010. The related emission reduction was estimated at 1.5 ktonnes NH_3.

In order to be able to make a valid estimation of the measure implementation process, an inventory system was launched so as to monitor the number of animals kept in low emission animal housing units and to be able to assess the measure. First of all, the authorisations were used as a basis for assessing how many animals from the list of low emission animal housing units per system have been authorised since September 2003.

Table 17 and Table 18 show which systems in the list of low emission housing units[26] were authorised between late 2003 and the end of July 2005, while revealing the number of animals authorised for each system. Several housing systems (such as maternity pens and accommodation for barren and in-pig sows) may be used in one housing unit (building).

Table 17: Number of times that a low emission pig housing unit has already been authorised and the number of animals authorised per system

Type of system	*Number of authorisations*	*Number of animals*
Piglet rearing systems		
V 1.2	***23***	***25024***
V 1.3	***1***	***800***
V 1.5	***98***	***69097***
V 1.6	***21***	***10257***
V 4.4	***1***	***560***
S 1	***1***	***800***
S 2	***4***	***4645***
	149	***111183***
Maternity pens		
V 2.1	***2***	***160***
V 2.2	***95***	***6788***
V 2.5	***2***	***38***
V 2.6	***12***	***1018***
	111	***8004***
Barren and in-pig sow systems		
V 3.1	***65***	***4868***
V 3.2	***4***	***186***
V 3.5	***139***	***16588***
V 3.6	***15***	***1474***
V 3.7	***6***	***717***
	229	***23833***
Meat-type pigs		
V 4.4	***1***	***485***
V 4.6	***25***	***13010***
V 4.7	***238***	***117625***
	264	***131120***
Growth systems (excl. piglets)		
S 1	***18***	***14086***
S 2	***44***	***33644***
	62	***47730***
Total	***814***	***321870***

[26] *The list of low emission housing units can be consulted on www.vlm.be.*

Table 18: Number of times that a low emission poultry housing unit has already been authorised and the number of animals authorised per system

System	*Number of authorisations*	*Number of animals*
breeding hens laying hens		
P 1.4	***1***	***10000***
P 2.1	***1***	***31432***
	2	***41432***
Laying hens		
P 3.4	***1***	***38880***
P 3.5	***1***	***80280***
P 4.2	***6***	***155335***
P 4.3	***5***	***121767***
	13	***396262***
Broiler parent animals		
P 5.4	***4***	***46097***
Growth systems		
S 1	***1***	***7885***
Total	***20***	***491676***

This inventarisation based on authorisations shows that at the end of 2005 almost 322,000 pigs (of which 111,183 piglets) and almost 492,000 pieces of poultry have been authorised in low emission stables. In pigs farming 16.5% of the animals is authorised in low emission housing systems kept in stables with secondary techniques (S1: biological scrubbing systems, S2: acid scrubbing systems). In almost three quarters of the cases, an acid scrubber was chosen.

The number of pigs and poultry authorised in low emission housing systems is at this moment still rather low. Of course, a housing system can be built only after the authorisation has been granted. This means that using the number of authorisations to get an estimate of the number of animals kept in low emission housing systems is somehow ahead of reality. As most of the low emission housing units where the animals are (due to be) kept were still under construction, the related emission reduction (roughly 0.2 ktonnes NH_3) is not yet factored into the emission calculation for 2004. In 2005 the emission reduction realised by low emission housing systems is taken into account for the first time. In Flanders, they entrain an emission reduction of 0.3 ktonnes NH_3.

Information

As low emission housing units are still a comparatively new development for Flemish stockbreeders, it is important for them to be able to count on suitable guidance and information. Under this heading, the Ministry of the Flemish Community, the Administration for the Management and Quality of Agricultural Production (ABKL) and the Information Department in cooperation with Agriconstruct organised a study day on the theme of “Ammonia emissions from piggeries”. The Flemish Land Agency (VLM) has also made a contribution to the various study days. The study day in question was held at five different sites in Flanders from October 2004 to May 2005. During these sessions, the stakeholders (pig breeders, advice agencies, administrations, colleges, …) were told about VLIF support, the legal dimensions and the structural aspects of low emission housing.

A successful environmental policy depends on all the stakeholders involved, which are in this case first and foremost the stockbreeders, being well informed about the policy's rationale and purpose. Thus a situation where stockbreeders merely ‘put up with' the policy is avoided. Instead the stockbreeders themselves should act as the driving force for achieving the environmental targets and help to discover more effective solutions. The comparatively high number of applications for changes to systems in the list of low emission housing units in any event points in this direction.

If the trend in low emission housing reported for the 2003-2005 period continues, combined with the effect of the new proposition for a manure decree (see 3.3.6.9), about 11% of pigs, 10% of laying hens

and 2% of grandparent stock for chickens kept for meat production will be housed in low emission accommodation by 2010. These assumptions are included in the forecasts for 2010.

This measure is described in information sheet VS54. The emission reduction in 2010 is put at 0.7 ktonnes NH_3.

3.3.6.7 Manure processing

Manure that is no longer applied to the land does not create any emissions over there anymore. In order to be able to factor manure processing in as a net reduction measure, it is obviously vital that the processing activities themselves should not produce any excessive additional emissions. When the NEC programme for 2003 was prepared, manure processing was the necessary crowning achievement for creating an emission ceiling. The premise was a NH_3 emission reduction of 2.5 ktonnes in 2010 (assuming that 70% of the manure would be processed in large-scale installations and 30% in smaller ones). The problem with this measure is that manure processing primarily for pig manure seems to take a slow start.

The amount of manure now being processed contributed roughly 0.4 ktonnes to the NH_3 emission reduction in 2004 simply because this manure is no longer included in the land-use emissions category. However, the NH_3 emissions caused by the processing of manure itself are not yet taken into account. The calculation for NH_3 emissions from stockbreeding assumed manure processing does not involve any ammonia losses. The assessment of the actual contribution of manure processing to the emission reduction is somewhat distorted at the moment. The emission reduction that is actually achieved will in fact be lower: manure processing makes a contribution to NH_3 reduction only when NH_3 losses from processing a specific quantity of manure are lower than the losses from spreading the manure on the land.

The main reason for not (yet) including NH_3 losses that occur during manure processing is the fairly limited knowledge available about the actual emissions involved in the various manure processing systems. As ammonia (and nitrous oxide) measurements are not classified as Vlarem regulated emissions, experience in measuring is somewhat limited hitherto, even in the case of accredited laboratories, so questions may be raised about the reliability and comparability of measurements carried out in the past.

In order to tackle this shortcoming, a study was conducted aiming to create a procedure for measuring NH_3 and nitrous oxide losses from manure processing installations. Using this measuring procedure to determine emissions from manure processing installations will mean a significant improvement in the reliability and comparability of the emission measurements obtained. This measuring procedure is also an extremely valuable tool for the nutrient balance that has to be established for every manure processing installation.

The new manure decree (see 3.3.6.9) will lead to an increase of the amount of processed manure due to several measures included in this decree (the whole of Flanders designed as vulnerable, self regulating manure disposal, expansion only possible with processing of manure). This contributes to the reduction of NH_3 emissions. At this moment, a 5% NH_3 loss is assumed for the different manure processing techniques.

This measure is described in information sheet VS55. The emission reduction in 2010 is put at 1.8 ktonnes NH_3.

3.3.6.8 The current policy's impact on year 2005 NH_3 emissions

An estimation of how the year 2005 policy measures affect NH_3 reduction first of all involved calculating the so-called ‘without measures emissions’, or emissions computed in the light of the livestock population in 2000 where:

- the 'old excretion coefficients' are used, that is, feed efficiency is not included;
- nutrients from manure not used on the land thanks to processing were not deducted;
- solely a limited level of low emission use (see the use requirement applied since 2000) is taken into account;
- the number of animals kept in low emission housing systems is not taken into account.

In this case stockbreeding emissions are reported to be 57,9 ktonnes NH_3 in 2004 (**Figure 1**). The decrease in the number of animals that has been realised in the period 2000-2005 leads to an emission reduction of 6,8 ktonnes NH_3. Including actual excretion figures and therefore better feed efficiency produces an emission reduction of 2.8 ktonnes NH_3. The inclusion of emissions avoided via manure processing produces a further reduction of 0.5 ktonnes NH_3. the share of pigs and poultry kept in low emission housing systems contributes 0.3 ktonnes NH_3 to the reduction. Factoring in the impact of the stricter low emission use requirements applied since 2003 (-6.0 ktonnes NH_3) results in a final NH_3 emission from stockbreeding of 41.5 ktonnes in 2005.

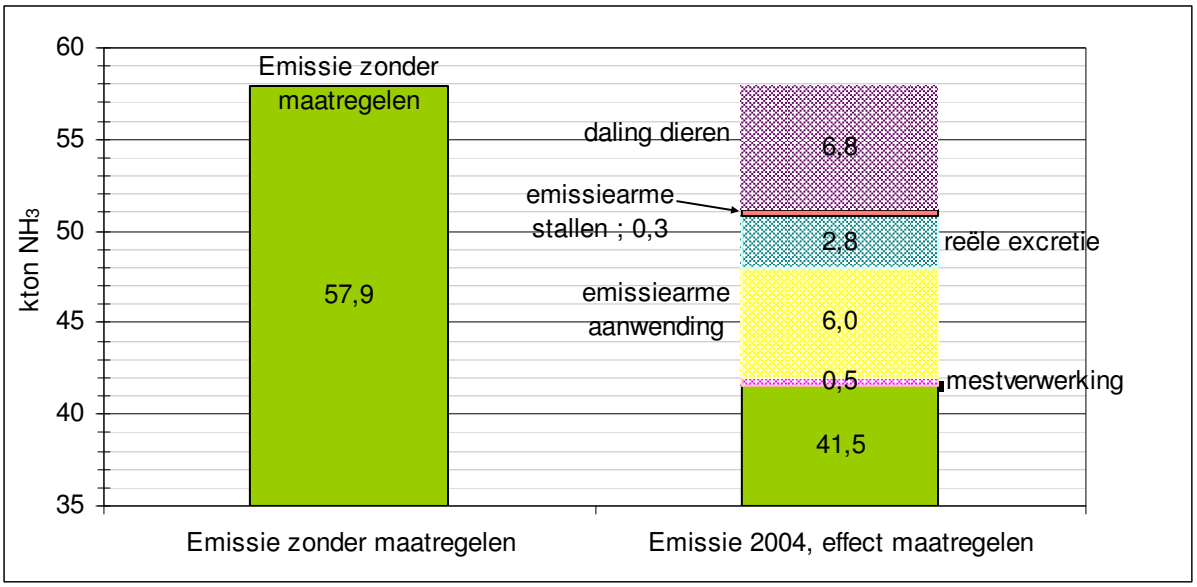


Figure 1: Impact of measures on stockbreeding ammonia emissions in 2004

3.3.6.9 Effect of the new manure decree on the NH_3 emissions

A new manure decree has been elaborated. This manure policy will contribute to a further reduction of NH_3 emissions from stock breeding.

From January 1st 2007 on, Flanders will, according to the European nitrate directive, completely be mapped as a vulnerable area. This means that the use of animal manure has to be limited to 170 kg N/ha. Even taking into account a possible derogation (possibility to, if allowed by the European Commission, apply more than 170 kg N/ha from animal manure), the self regulating manure disposal will lead to a limitation of the disposal of animal manure to the soil. Emissions during application, even if this is done with low emissions, are considerable. It is estimated that disposal to the soil will be limited to 108 million kg N. Limiting the amount of manure that goes to the soil has a positive effect on the emissions of NH_3. Limiting the possibility of disposal of animal manure to the soil means that either less manure will be produced or that more manure will be processed.

The new manure decree also incorporates a number of concrete measures that certainly will continue the decrease of the number of animals and the production of animal manure that have been noticed the last few years. The most important measure is most certainly the introduction of nutrient emission rights (NER) as a replacement of the nutrient content that was introduced in 2002. These NER

represents the maximal number of animals that a stockbreeder can keep. The NER are tradable. When the NER are traded, the government diminishes its value by 25%. NERs can also be devaluated due to conversions within the company or when during a longer period an insufficient disposal of manure is proven.

On the other hand, the new decree foresees the opportunity for individual companies to expand, guaranteeing the dynamics and competitiveness of the Flemish agricultural sector. Expansion however is only possible under strict conditions: 125% of the manure that is produced due to the expansion has to be processed.

This possibility for expansion for individual companies will not lead to an increase of the number of animals on a Flemish level because the number of companies that will be prepared to use this opportunity will probably be very limited. Thus a scenario has been calculated in which the expected autonomous decrease of the number of pigs (6%) and of the number of poultry (8%), based on the evolution of the number of animals in the period 2000-2005, is compensated by an expansion of individual companies that want to grow and are willing to process their manure. In these projections the number of pigs and poultry is kept the same as in 2005. For cattle, the expected autonomous decline (-8.5% with respect to 2005) is maintained.

An increase of the number of animals on a company level often means that additional animals have to be kept in newly to be built, and thus low emission, stables. This leads to a decrease of the emissions on a stable level with respect to 2005 due to the larger share of low emission stables. Moreover, expansion is only possible when 125% of the additional manure is being processed. In other words: a part of the manure which at this moment still goes to the soil will be processed. This lower pressure on the soil is not only positive because it lowers the risk on nitrate leaching, but it also leads to lower emissions in the application phase compared to 2005.

The effect of the new proposal for a manure decree on the different NH_3 reduction measures has been taken into account in the projections for 2010.

3.3.6.10 Other NH_3 emissions

Stockbreeding may be to blame for the bulk of NH_3 emissions in Flanders, but the other sources should not be overlooked. Apart from the road traffic issue considered in chapter 3.1, the use of fertiliser leads to NH_3 emissions to which industry, too, is contributing.

Just as ammonium N content in animal manure leads to NH_3 emissions when used for fields and grassland, so the deployment of N fertiliser results in NH_3 evaporation. A key difference with NH_3 emissions from animal manure is that fertiliser pellets (unless this applies to liquid fertiliser) first have to be dissolved before NH_3 emissions can appear. In the event of there being insufficient moisture to dissolve the pellet the fertiliser may remain for a longer time on the land in an undissolved state without any NH_3 emissions emerging. The same emission coefficient is applied for all fertilisers when calculating NH_3 emissions resulting from the use of N fertilisers but there is a breakdown according to the type of soil. In the case of polder lands characterised by a basic pH, facilitated by NH_3 emissions, an emission coefficient of 11.6% is used. In the case of acid to neutral loamy and sandy soils, where the risk of NH_3 evaporation is lower, a lower emission coefficient of 1.7% is used. The level of fertiliser used and the resulting NH_3 started to decline in the 1990s. It is reasonable to expect that fertiliser use emissions will continue to fall.

Non-land-and non-garden-related NH_3 emissions equalled 2.7 ktonnes in 2004, 1.0 ktonnes of which involving emissions reported by companies in their annual reports. Half of this is accounted for by one producer of nitric acid, and the other half by a series of businesses operating in various sectors. They are each responsible for only a tiny proportion of these emissions. A slight reduction in the level of these emissions (up to about 0.9 ktonnes NH_3) is expected by 2010 as a result of various measures, such as the replacement of a nitric acid installation, so that the entire reduction potential will be exploited in the case of the largest industrial source. No additional measures are identified for the other sources.

The remaining 1.7 ktonnes originate from septic tanks and are calculated on the basis of the number of homes and inhabitants not connected to a sewage system and on the basis of a fixed emission factor. These emissions have been steadily declining since 1990 as a result of more homes being connected to the public sewage system and the decline is expected to continue in the future. As no quantitative information is available about this, the figure for 2004 is also used for the calculation.

Thanks to the aforementioned measures, the NEC ceiling for stationary sources in Flanders (45 ktonnes NH_3) appears to be feasible.

3.3.7 Developing economic instruments

Up until now, emissions have chiefly been regulated in the light of a system of standards where maximum emission concentrations are established via title II of the Vlarem or via the individual environmental authorisations. However, as there are often major differences between installations in one sector, this approach does not invariably allow feasible emission reductions to be imposed. There is no incentive to reduce the emissions any further than what is legally required.

This can be addressed as a result of incorporating economic instruments into the policy. This includes a whole variety of instruments, each one with its own qualities and advantages and disadvantages, such as a basic emission levy with the revenue being recycled (with recycling on the basis of various criteria) or negotiable emission rights, with, in turn, various opportunities for allocating the emission rights. These instruments allow a more cost-efficient reduction policy to be conducted so the required emission reductions are (ideally) achieved at the lowest possible cost.

AMINAL (the Environment, Nature, Land and Water Management Administration) announced in 2003 the launch of a study called “Deployability of economic instruments for the emission reduction policy in Flanders”. The first part of this study provides an overview and description of the various economic instruments (including a number of instruments already being applied abroad), while their applicability in Flanders is assessed in the light of the pollutants NOx and SO_2. This review is based on technical factors such as the number of sources, differentiation, reduction opportunities, socio-economic factors, cost (comprising system costs and the costs for the various sectors and businesses) and, lastly, on the complementary relationship between the policy instruments available. Attention is also paid to the market monopoly enjoyed by some sectors and how this affects the deployability of certain economic instruments. This section was presented during a symposium held in the Flemish Parliament on 12 March 2004. Speaking on behalf of industry, the Flemish Economic Union (VEV) expressed its concern about the potential anti-competitive impact of applying economic instruments in Flanders and not other countries. The VEV is calling for an approach based on the application of best available techniques (BAT), even though this would offer no guarantees about achieving an absolute target, such as the NEC emission ceilings. On the other hand, environmentalists and trade unions are in favour of economic instruments.

The second part of the survey features a step-by-step procedure for implementing certain of these instruments (trading system, basic emission levy, emission levy with support for the reduction measures). A review is also made of the scope for applying economic instruments for reducing emissions of volatile organic compounds (VOC). The complete study may be consulted at the following address www.vlaanderen.be/lucht (click on verzuring - studies).

This study was used as a basis for drawing up a discussion paper to be considered by a working group whose members represent all the relevant administrations (OVAM – Flemish Community Waste Company-, Environment, Nature and Energy Department, VMM – Flemish Environment Company). On the economic instrument development front, the working group grants priority to NO_x, in view of the big question marks hanging over the feasibility of attaining the emission ceiling with the current package of measures.

Based on the results of the study project and the findings of the working group, the Flemish Government has decided to introduce by 2008 or 2009 a temporary regulation NO_x levy for stationary

sources with maximal recycling of revenues to costefficient reduction projects for stationary sources unless in the consultation of the target groups a consensus is reached on alternative additional instruments and/or measures with the same reduction potential. These alternative instruments can either be another economic instrument or the imposing of the often company specific measures that are discussed in chapter 3.3.4. If no consensus is reached in the consultation, a NO_x emission levy will be introduced.

3.4 Stationary sources: Wallonia

3.4.1 Acceptations socio-économiques

Des projections d'émissions ont été établies pour les différents secteurs de l'étude. Celles-ci ont été élaborées sur base de:

- les taux de croissance attendus de la production et acceptés par le secteur; ceux-ci ont été établis sur base des chiffres de croissance historique et des discussions avec le secteur;
- une amélioration annuelle de l'efficience énergétique, notamment dans le cas où le secteur a conclu un accord de branche;
- la connaissance de mesures de réduction des émissions qui ont déjà été planifiées par les entreprises concernées.

Table 19: politique intégrée dans le scénario BAU 2010

Sector	Mesures pris en compte
Production d'électricité	- Directive LCP (Large Combustion Plans)
Industrie	- Accords de Branche - Emission Trading
secteur résidentiel	- Proposition de directive européenne sur l'efficience énergétique des bâtiments
secteur tertiaire	
Agriculture	- Pas de mesure supplémentaire par rapport à celles dont on a tenu compte pour établir le scénario de référence (qui prend en compte l'impact de la PAC Politique Agricole Commune)
Transport	
Production d'énergie	- Directive NEC - Politique wallonne en matière de certificats verts - Directive échange de quotas d'émissions

3.4.2 Description des mesures: SO_2 et NO_x

Le paragraphe introductif donne une vision générale des émissions par secteur ainsi que des mesures qui ont déjà été prises en vue de réduire et de celles qui peuvent encore être prises. Une estimation des émissions sectorielles à l'horizon 2010 a été réalisée; en voici les distinctions:

- BAU 2010 avec mesures envisagées : des mesures qu'on a déjà prises ou qu'on prendra certainement
- BAU 2010 avec mesures additionelles : mesures qui sont encore fort incertaines

En résumé et plus concrètement dans l'industrie:

1er cliquet: mise en application de la directive IPPC telle que négociée actuellement;

2nd cliquet: pistes envisagées pour aller plus loin (on en dégagera un potentiel additionnel).

Il est à présent clair et évident que la Région wallonne ne pourra atteindre le plafond NEC pour les NO_x avec les mesures envisagées seules mais qu'elle devra puiser dans le paquet des mesures additionnelles. En ce qui concerne les émissions de SO_2 par contre, les mesures envisagées nous permettront d'atteindre le plafond NEC; nous avons toutefois identifié un paquet de mesures additionnelles pour pallier tout imprévu.

3.4.2.1 Délimitation des secteurs

La délimitation des secteurs est orientée autant que possible vers la subdivision qui est aussi utilisée dans l'inventaire d'émission wallon et connexe. Nous avons également tenu compte de l'importance des émissions des polluants NEC ainsi que de l'importance du potentiel de réduction des secteurs.

3.4.2.2 Mesures horizontales

Dans les chapitres suivants, les mesures qui ont été prises ou qui doivent être prises vont être débattues par secteur. Un certain nombre de mesures ne relève toutefois pas des secteurs mais ont un impact sur ceux-ci et seront en conséquence déjà intégrées. Les réductions d'émissions prises en compte dans les différents secteurs sont les suivantes:

3.4.2.2.1 Renforcement des conditions des installations de combustion

Renforcement des normes d'émissions pour les installations de combustion…

3.4.2.2.2 Mise en application de la directive IPPC

L'acronyme IPPC désigne "Integrated Pollution Prevention and Control". Cette directive (96/61/EG) concerne les meilleures technologies disponibles (Best Available Technologies BAT) qui sont prescrites dans les documents de référence (BREF) des différentes catégories d'installations… L'obligation d'intégration de la dir IPPC dans les permis court depuis 1990 pour les nouvelles installations. A noter que le 30/10/2007 est la date limite de mise en conformité en ce qui concerne les installations existantes.

Nous avons tenu compte des meilleures technologies disponibles en fonction des conditions locales et parfois mêmes individuelles propres aux installations.

3.4.2.3 Production d'électricité

Dans ce secteur, une importante réduction des émissions de SO_2 et NO_x a déjà été réalisée entre autres grâce à un accord de branche avec le secteur. Pour le reste, les techniques qui devront être mises en œuvre pour respecter les normes des nouveaux permis génèrent également de fortes diminutions d'émissions.

Et pour ce qui concerne la production d'électricité, on s'est permis de s'écarter du cadre du rapportage national parce que le VITO n'avait pas intégré la production à partir de biomasse aux Awirs, semblait avoir oublié la production d 'électricité chez Burgo et avait introduit des perspectives très ambitieuses de pénétration de la cogénération (sur la base des objectifs du PMDE de 2003, et non sur base des potentialités observées récemment). On s'est donc plutôt basé sur un plan de développement de centrales électriques issu des informations qui nous avaient été transmises par Electrabel et SPE lors des rencontres bilatérales d'août et septembre 2005 en y ajoutant un projet à Carsid pour exploiter des gaz sidérurgiques.

On a également pris une hypothèse de croissance de la cogénération assez minimale, au vu du décollage très lent actuellement. En fait, nous avons repris l'hypothèse basse des scénarios développés pour la CWAPE quand elle a examiné les perspectives de quotas de certificats verts à imposer après 2007.

En outre, la mise en application de la dir LCP a déjà été intégrée dans le scenario BAU.

3.4.2.4 Industrie du fer et de l'acier

SIDERURGIE

Cokeries

SO_2:

Le total des gaz produits dans les cokeries comprend la combustion de gaz de cokerie dans les fours à coke (+/- 40 % du gaz produit) et les gaz brûlés à l'extérieur des fours à coke (60 % du total des gaz produits). Ces 40 % ne seront pas désulfurés. Par contre, les 60 % restants (brûlés en dehors des fours à coke) seront désulfurés avec un taux de désulfuration de 90 %.

La désulfuration de ceux-ci représente un potentiel de réduction d'environ 3,5 kt.

NO_x: pas de mesures d'abattement prévues a priori.

Agglomérations

Ougrée devrait fermer à l'horizon 2009.

Choix des combustibles pour leur teneur basse en S et N.

Parmi les mesures additionnelles, figure une mesure inspirée de résultats d'études du CRM, sorte d'application de la R&D: adjonction à la charge de matières à effet catalytique potentiel sur la formation des NO_x (réduction de 15 à 20 % des émissions de NO_x suite à une addition de 10 % de goethite dans le mélange cru).

Hauts fourneaux

HF6 Arcelor fermé en 2005. HFB Arcelor devrait fermer en 2009.

Pas de moyens d'action particulier sur SO_2, NO_x.

Aciéries à l'oxygène

Arcelor Chertal devrait fermer en 2009.

Fours de réchauffage

Arcelor Chertal: fermeture 2009.

Mesure additionnelle mais date de mise en application inconnue: chez Arcelor CARLAM: permis IPPC délivré. Dérogation pour les anciens brûleurs en matière de NO_x jusqu'à leur remplacement par des brûleurs "low-NO_x". A ce moment, on pourra tabler sur une réduction de l'ordre de 30-40 % par rapport aux émissions actuelles. Cette mesure n'a pas été chiffrée vu l'incertitude qui pèse sur sa date de réalisation.

3.4.2.5 Non ferreux

Les améliorations qui seront obtenues au travers de l'application de la dir IPPC ne sont pas chiffrables à ce stade.

3.4.2.6 Secteur de la céramique

CHAUX

SO_2

Info technique

Le potentiel de réduction pris en considération résulte notamment:

- de mesures primaires: en jouant sur les combustibles;
- de la mise en œuvre de techniques d'abattements "sèches" connues (appliquées et/ou applicables)

La réduction par sélection des combustibles à faible teneur en S est envisageable sur les fours rotatifs. Un rendement attendu de 80 % a été pris en considération sur certaines installations. Le potentiel de réduction assimilé à cette technique est de l'ordre de 1,8 kt pour le secteur chaufournier (voir fiche WS 01).

Il s'agit d'une mesure envisagée qui a déjà fait l'objet d'une discussion avec le secteur.

NO_x

Pas de possibilité de dégager une latitude supplémentaire pour réduire davantage les émissions de NO_x dans les fours MAERZ où il n'y a déjà pas de surcuit.

Sur certaines installations, une SCR est envisageable techniquement. Un rendement d'abattement de 90 % est pris en considération.

Niveau décisionnel: cette mesure est loin d'être acceptée par le secteur. C'est donc une mesure strictement additionnelle et l'estimation du potentiel escompté est de 1,15 kt. Cette technologie n'est donc pas encore adoptée au travers des permis.

Rendement de la mesure. Un rendement théorique de 90 % est quant à lui pris en considération; ce qui représente un potentiel d'abattement de l'ordre de 1,15 kt.

CIMENT

SO_2

Info technique

Les différentes techniques qui ont été envisagées sont le scrubber voie humide ou l'injection d'adsorbant dans les fumées (rendement de 20 % pris en considération).

NO_x

Des études sont en cours dans le secteur pour tester l'applicabilité de la technonolgie SNCR sur les installations cimentières wallonnes. Cette messure (SNCR) est donc une mesure envisagée.

Le potentiel associé dépasserait les 4 kt.

La SCR, dont le rendement attendu est de 90 % est parfois envisageable sur ces installations mais parfois uniquement si une dénitrification préalable avec une SNCR est attendue (rendement de 30 à 40 %).

Un dispositif de réduction des NO_x par combustion étagée avec une étape en conditions réductrices "Minox" a été envisagé sur certaines installations. Cette technique est intégré dans le scenario BAU et représente un abattement de 15 % des émissions de NO_x.

VERRE

SO_2

Abattement parfois envisageable par injection d'un réactif (carbonate de sodium). Ces installations assurent un taux de désulfuration de l'ordre de 25 %.

NO_x

La dénitrification est parfois envisageable sur certaines installations grâce à une SCR mais le rendement attendu n'avoisinne cette fois pas les 75 % en raison du fait que cette technique doit souvent être bypassée pour éviter l'empoisonnement du catalyseur. Du fait du by-pass de certaines installations de SCR (ce by-pass n'aura pas lieu sur l'ensemble des lignes équipées), le rendement global de deNOx descend à 35%); ce qui donne un potentiel d'abattement de l'ordre de 1,2 kt.

D'autres mesures ont été annoncées par une des deux grosses firmes du secteur pour un potentiel de réduction équivalent à 0,9 kt.

3.4.2.7 Autres mesures additionnelles

3.4.2.7.1 Brûleurs low NO_x en industrie

Un certain nombre d'installations sont déjà équipées de brûleurs Low NO_x qui deviennent le standard des producteurs de brûleurs. Mais on connaît mal et la performance de ces équipements et leur pénétration actuelle; on considère donc qu'une mesure pourrait constituer en la généralisation des brûleurs Low NO_x en 2010, mais en lui associant une performance de 15% de réduction et non 30%, tenant compte par là d'une certaine pénétration déjà effectuée.

La mesure est appliquée aux émissions industrielles hors grands équipements (sidérurgie, ciment, verre, chaux).

3.4.2.8 Secteurs non-industriels

POTENTIELS D'ABATTEMENT DANS LE DOMESTIQUE (RESIDENTIEL, TERTIAIRE ET AGRICULTURE)

En ce qui concerne les émissions de SO_2

1. Réduction de la teneur en soufre du fuel lourd de 1% à 0,6%.

Description de la mesure: limiter la teneur en S du fuel lourd à 0,6 %.

Nature de mesure: mesure additionnelle.

Mesure prise en compte dans le BAU car l'entité fédérale s'est engagée sur ce point; toutefois, cette mesure relève encore des mesures additionnelles puisqu'elles doivent faire l'objet d'une volonté de l'entité fédérale pour être mise en application.

Consommation de fuel lourd en 2010 : 13 207 TJ

Facteur d'émission fuel lourd à 1% S : 0,495 t SO_2/TJ

Facteur d'émissions si teneur est de 0,6% : 0,297 t/TJ

Réduction d'émission : 2 615 t SO_2

2. Réduction de la teneur en soufre du gasoil de chauffage de 0,1% à 0,05%.

Description de la mesure: limiter la teneur en soufre (S) du gasoil de chauffage.

Actuellement, le gasoil de chauffage contient 0,2 % de S (gasoil de chauffage que tout le monde consomme en ce moment). Pour 2010, on doit atteindre 0,1 % de S. Il s'agit d'une mesure envisagée qui est déjà prise en compte.

Il existe effectivement un gasoil à 0,05 % de S mais il est optionnel (il nous reste donc à investiguer pour envisager un stimulant pour faire passer le prix du gasoil à 0,05 % au prix du gasoil à 0,1 % pour une utilisation dans les chaudières à haut rendement telles que les chaudières à condensation qui ne sont actuellement pas développées pour le gaz et pour lesquelles cette mesure constituerait un outil de promotion intéressant). Cette mesure est une mesure additionnelle dont le potentiel est non négligeable mais il ne sera pas évident de recevoir l'aide du fédéral sur ce point.

En ce qui concerne les émissions de NO_x

1. Brûleurs "low-NO_x"

Cette mesure serait typiquement obtenue par une norme d'émission imposée aux nouvelles chaudières (la compétence "norme de produit" est fédérale). L'efficience de brûleurs "low-NO_x" est en moyenne de 30 %. Leur pénétration ne peut s'envisager que progressivement, lors du renouvellement des chaudières. Considérant une durée de vie de l'ordre de 20 ans pour une chaudière, d'ici 2010, on n'obtiendrait une pénétration que de 25 % dès lors, le rendement d'abattement devient: 30 % * 25 % = 7,5 %.

2. Normes d'émissions de NO_x des chaudières de chauffage central < 400 kW.

Il existe une norme fédérale sur les émissions de chaudières, d'application depuis le 1 janvier 2005. Cette norme est déjà prise en considération dans le calcul des émissions des secteurs résidentiel et tertiaire, considérant une pénétration progressive des nouvelles chaudières sur base d'une durée de vie de chaudière de 20 ans.

Facteurs d'émission par application de l'AR 8.01.2004, chaudières < 400 kW

Normes d'émission NOx		mg/kWh	g/GJ	t/TJ
Gaz naturel, brûleur atmosphérique		150	41,667	0,042
Gaz naturel brûleurs à air pulsé		120	33,333	0,033
Gasoil < 70 kW		120	33,333	0,033
Gasoil de 70 à 400 kW		185	51,389	0,051

Cet arrêté est moins strict que les valeurs limites qui avaient été envisagées en 2001 (70 mg/kWh pour le gaz et 120 pour le gasoil). Outre qu'il convient de vérifier que la technologie des brûleurs peut atteindre de tels niveaux, il est peu probable que cette norme plus stricte, si elle est décidée, soit d'application avant le 1-1 2008 au plus tôt. Elle ne concernerait donc que 15% du parc de chaudières à la fin de 2010. Dans ces conditions, le parc serait équipé à la fin de 2010 de 70% de brûleurs normaux, 15% de brûleurs respectant l'arrêté royal et 15% respectant la nouvelle norme.

Réductions d'émissions :

112 t NO_x dans le secteur résidentiel et 127 t dans le secteur tertiaire

3.4.2.9 Unités de cogénération

On a également pris une hypothèse de croissance de la cogénération assez minimale, au vu du décollage très lent actuellement. En fait, nous avons repris l'hypothèse basse des scénarios développés pour la CWAPE quand elle a examiné les perspectives de quotas de certificats verts à imposer après 2007.

Table 20: Emissions de SO_2 en région wallonne

Env. : mesure envisagée
Add. : mesure additionnelle

Secteur	SO2 2004 (t)	SO2 2010 BAU (t)	Pot réd mes env (t)	Pot réd mes add (t)	SO2 2010 mes env (t)	SO2 2010 mes env+add (t)	Mesures Codification Fiches WS
INDUSTRIE et production d'énergie	**30.258**	**29.951**	**7.390**	**4.429**	**22.561**	**18.131**	**WS 01 - 05 + WS 09**
Chaux	**3.135**	**3.168**	**1.845**	**0**	**1.323**	**1.323**	**WS 01**
Ciment	**4.783**	**5.630**	**1.122**	**1.814**	**4.508**	**2.694**	**WS 02, WS 03**
Verre	**5.262**	**4.642**	**856**	**0**	**3.786**	**3.786**	**WS 04**
Sidérurgie et cokeries	**11.067**	**9.396**	**3.506**	**0**	**5.890**	**5.890**	**WS 05**
Briques et tuiles	**806**	**190**	**0**	**0**	**190**	**190**	
Chimie procédés	**433**	**402**	***60***	**0**	**342**	**342**	
Combustion en industrie	**4.772**	**6.523**	**0**	**2.615**	**6.523**	**3.908**	**WS 09**
PRODUCTION D'ELECTRICITE	**5.662**	**2.460**	**0**	**0**	**2.460**	**2.460**	**WS 06, WS 07**
RESIDENTIEL	**7.320**	**3.594**	**0**	**1.509**	**3.594**	**2.085**	**WS 08**
TERTIAIRE	**1.283**	**607**	**0**	**255**	**607**	**352**	**WS 08**
AGRICULTURE	**42**	**6**	**0**	**3**	**6**	**3**	**WS 08**
DECHETS	**1.354**	**1.326**	**0**	**0**	**1.326**	**1.326**	
TOTAL TOUS SECTEURS Hors Transports	**45.919**	**37.944**	**7.390**	**6.196**	**30.554**	**24.357**	

Plafond NEC 29.000

Table 21: Emissions de NO_x en région wallonne

Env. : mesure envisagée Add. : mesure additionnelle Secteur	NOx 2004 (t)	NOx 2010 BAU (t)	Pot réd mes env (t)	Pot réd mes add (t)	NOx 2010 mes env (t)	NOx 2010 mes env+add (t)	Mesures Codification Fiches WS
INDUSTRIE et production d'énergie	**50.714**	**46.085**	**6.331**	**8.886**	**39.754**	**30.867**	**WS 10-13**
Chaux	**6.415**	**3.348**	**0**	**1147,5**	**3.348**	**2.201**	**WS 12**
Ciment	**14.132**	**14.478**	**4.181**	**4.724**	**10.298**	**5.573**	**WS 11,12,13**
Verre	**6.644**	**4.945**	**2.151**	**0**	**2.794**	**2.794**	**WS 12**
Sidérurgie et cokeries	**15.259**	**7.176**	**0**	**594**	**7.176**	**6.582**	
Briques et tuiles	**443**	**604**	**0**	**0**	**604**	**604**	
Chimie procédés	**947**	**1.636**	**0**	**0**	**1.636**	**1.636**	
Combustion en industrie	**6.874**	**13.898**	**0**	**2.421**	**13.898**	**11.477**	**WS 10**
PRODUCTION D'ELECTRICITE	**7.161**	**5.934**	**0**	**0**	**5.934**	**5.934**	
RESIDENTIEL	**5.698**	**4.850**	**0**	**100**	**4.850**	**4.750**	**WS 14**
TERTIAIRE	**1.357**	**1.444**	**0**	**117**	**1.444**	**1.327**	**WS 14**
AGRICULTURE	**22**	**9**	**0**	**0**	**9**	**9**	
DECHETS	**1.343**	**1.750**	**0**	**0**	**1.750**	**1.750**	
TOTAL TOUS SECTEURS Hors Transports	**66.295**	**60.072**	**6.331**		**53.741**	**44.637**	
Plafond NEC				46.000			

3.4.3 Description des mesures: COV

En matière d'émissions de COV, les incertitudes liées tant aux émissions qu'aux potentiels de réduction sont plus importantes que pour les émissions de SO_2 et NO_x couvertes précédemment par le présent document.

Dans ce domaine, un grand nombre de décisions réglementaires ont été établies au niveau européen et/ou en droit wallon : directive solvant, directive teneur en solvant des peintures, arrêtés station-service et stockage des carburants… Elles vont provoquer des réductions d'émissions substantielles dans un grand nombre de secteurs d'activité. Il pourrait demeurer un potentiel dans des secteurs non encore réglementés (puisque les autres secteurs auront proportionnellement diminué leurs émissions) et donc les émissions liées notamment à la fabrication de la bière, du pain... mais les émissions de ces sous-secteurs figurent parmi les plus mal connues et les possibilités techniques et économiques de réduction d'émissions ont jusqu'à présent été peu examinées.

Remarque: les informations sur lesquelles reposent souvent les évaluations des niveaux d'émission (consommations de peintures, de solvants…) sont souvent connues au niveau national et leur répartition entre les 3 régions du pays nécessite l'usage de clés de répartition qui introduisent ici aussi une certaine incertitude.

Nous allons présenter les données COV dans le cadre de trois scénarios :

1. un scénario 2010 no Control, dans lequel les émissions évoluent sous l'effet des activités qui les occasionnent mais sans modifier les performances environnementales des équipements et des produits entre les années 2000 et 2010 ;
2. un scénario 2010 "with measures" (dit CLE : current legislation) qui considère les réductions d'émissions dues à l'entrée en vigueur d'ici 2010 de toutes les décisions et réglementations prises ;
3. un scenario 2010 "with additional measures"

3.4.3.1 Application de la directive solvants

Toutes les mesures concernant l'application de la directive solvants consistent en des mesures de bonne gestion, le recours à des produits de substitution lorsque c'est possible ou des produits contenant moins de solvants organiques et, dans certains cas, le recours à des techniques d'absorption sur charbon actif ou d'incinération des effluents (dans l'industrie pharmaceutique ou les grandes imprimeries par exemple). Ces mesures sont considérées d'application dans les établissements de grande et moyenne taille, pas dans les petites installations puisque la directive s'applique à partir d'un seuil de consommation de solvants.

3.4.3.2 Assemblage des automobiles et carrosserie

Mesures du scénario CLE

L'assemblage automobile n'est pas présent en Région wallonne.

Dans le secteur des carrosseries, la directive solvant imposait des plafonds d'émission aux installations dont la consommation annuelle de solvants dépassait un seuil.

Le secteur a suggéré de lever ces contraintes et de les remplacer par une normalisation européenne des teneurs en solvants des produits utilisés. Cette approche permettait de limiter les investissements en techniques de capture et de destruction des COV et assurait une égale répartition des émissions sur tous les acteurs et plus seulement sur les grandes et moyennes installations. C'est l'objet de la directive 2004/42/CE qui réglemente la teneur en solvants des peintures décoratives et de celles utilisées en carrosserie.

C'est donc l'entrée en vigueur de ces normes qui est prise en compte par ces mesures (avec les normes dont l'application est prévue pour 2010).

3.4.3.3 Dégraissage métallique

Ici, dans le cadre du scénario CLE, ce sont des mesures de réduction mises en œuvre pour pouvoir satisfaire les exigences de la directive solvants qui sont considérées (dans les établissements de moyenne et grande taille). Les réductions envisagées sont estimées sur base de mesures primaires (bonne gestion des solvants, usage de substituts lorsque cela est possible, bains de solvants équipés de couvertures flottantes, voire de réfrigération/condensation au bord supérieur des réservoirs. Aucune mesure de capture et abattement des effluents n'est considérée.

Un potentiel de réduction additionnel, peu important, demeure dans les petites installations non concernées par la directive solvants parce que leurs débits sont trop faibles, il est considéré dans le scénario avec mesures additionnelles.

3.4.3.4 Nettoyage à sec

La directive solvants impose des normes d'émission qui imposent en pratique la disparition progressive des machines de nettoyage à sec sans récupération des solvants. Le marché s'est dès lors adapté et ne fournit plus que des machines performantes avec recyclage de ces solvants. Vu que la durée de vie d'une machine est de l'ordre de 10 ans, on estime que tout le parc sera renouvelé en 2010.

3.4.3.5 Dépôts d'essence et stations-service

Mesures du scénario CLE

Dépôts et transport d'essence : les émissions sont réduites par application de la directive 94/63/CE imposant des mesures d'étanchéité et de récupération des vapeurs d'essence lors des opérations de remplissage des cuves fixes ou mobiles (stage 1A).

Dans les stations à essence, la même directive ci-avant réglemente déjà les émissions en provenance des stockages d'essence ainsi que durant le remplissage des cuves (stage 1B). La transposition de cette directive en droit wallon a en fait été plus loin et a imposé une récupération des vapeurs d'essence au remplissage des réservoirs de voiture à partir de 2010 (mesure dite « Stage 2 »). Elle est donc prise en considération dans le cadre du scénario CLE.

3.4.3.6 Utilisation domestique et professionnelle de produits contenant des solvants

Les émissions reprises sous cette rubrique proviennent de l'usage d'un très grand nombre de produits : cosmétiques, produits d'entretien, de bureau, colles, insecticides, produits pour voitures (lave-glace notamment)… Ce poste d'émission est important et très mal connu. Nous utilisons une estimation établie sur base de données hollandaises (dans le cadre du programme KWS 2000) et canadiennes, à défaut de disposer d'informations plus spécifiques à la Région wallonne.

On estime qu'un potentiel de réduction existe, qui pourrait être mobilisé soit par une réglementation (comme cela est appliqué de manière très concertée entre tous les acteurs en Californie) ou par des campagnes d'information ou de sensibilisation de la population. Ce potentiel est estimé à 10% des émissions et est pris en considération dans le cadre du scénario avec mesures additionnelles.

3.4.3.7 Chimie

Les émissions du secteur sont essentiellement des émissions fugitives en provenance d'installations de la chimie organique de base, dues à des défauts d'étanchéité ou au vieillissement de certains équipements (vannes, joints, …).

Des normes d'émission peuvent être considérées dans le cadre de l'application de la directive IPPC et des BREF de Séville (Best Available Technologies) à travers la délivrance de permis d'environnement. Le respect de ces normes nécessite la mise sur pied de programmes d'inspection réguliers et le remplacement préventif d'équipements vieillissant.

Ces aspects étant toujours en phase d'examen actuellement, ils ne sont considérés que dans le cadre du scénario avec mesures additionnelles.

3.4.3.8 Industrie pharmaceutique

Si les entreprises de ce secteur peuvent identifier de manière assez précise les quantités de solvants organiques qu'elles mettent en œuvre et leurs émissions atmosphériques, leurs émissions varient très fortement d'une année à l'autre en fonction des préparations qu'elles fabriquent.

Dans ce secteur, le respect des normes d'émission imposées par la directive solvants requiert des techniques d'abattement sur les effluents. C'est ce qui est considéré dans le scénario CLE.

3.4.3.9 Production et utilisation de peinture, d'encre et de colle

Mesures du scénario CLE

Peintures en bâtiment: la directive 2004/42/CE normalise la teneur en solvants des peintures décoratives. C'est donc la mise en œuvre de ces normes (étape 2, d'application en 2010) qui est prise en compte dans le scénario CLE. Pour ce faire, on se base sur des statistiques du CEPE pour la Belgique sur la répartition des consommations de peintures par catégorie et teneur en solvant[27] et sur une estimation moyenne de la densité des produits consommés en plus grande quantité.

Pour les usages de colle, peu d'information existe sur le niveau d'émissions et cette incertitude ne nous permet pas d'envisager des mesures de réduction.

3.4.3.10 Secteur graphique

Dans le secteur graphique, dans le cadre du scénario CLE, on prend en considération des mesures d'abattement (adsorption et recyclage, incinération,…) sur les grandes installations effectuant de la rotogravure, flexographie ou tout procédé utilisant des encres à forte teneur en solvants, soumis aux normes d'émissions de la directive solvants. Un léger potentiel supplémentaire serait dégagé par la mise en œuvre de plans de gestion des solvants de nettoyage chez les petits imprimeurs effectuant le plus souvent de l'offset à froid. Il est pris en compte dans le scénario avec mesures additionnelles.

3.4.3.11 Décision du programme de réduction: COV

Le tableau transmis classe les émissions selon la nomenclature SNAP. Il faut donc faire attention que certaines activités apparaissent deux fois. C'est le cas des activités présentant des émissions à la combustion (SNAP 01 ou 03) et des émissions procédés (SNAP 04). Un exemple c'est la cokerie qui a des émissions en 01 (combustion) et en 04 : émissions fugitives aux portes.

Le tableau présente:

- les émissions 2004, telles qu'elles figurent dans l'inventaire de la DGRNE ;

[27] Publiées par EGTEI

- les émissions 2010 dans un scénario sans contrôle (en gros : les activités de 2010 multipliées par les facteurs d'émission de 2000) ;
- les émissions 2010 dans un scénario CLE (avec mesures envisagées et en fait découlant de réglementations déjà prises ou de directives qui doivent entrer en vigueur avant 2010 ;
- les émissions 2010 dans un scénario avec mesures additionnelles. Les mesures considérées ici en sont pas exhaustives et ne semblent pas devoir l'être dans la mesure où le plafond NEC pour source fixe ne semble guère poser de problème.

Table 22: Emissions de COV (en tonnes)

SNAP		Scénario sans contrôle	Mesures envisagées	Scénario CLE	Mesures additionnelles	Scénario additionnel
01	Transformation de l'énergie	1.379,9		1.379,9		1.379,9
01 01	Production centralisée d'électricité	423,7		423,7		423,7
01 04 06	Cokeries	956,1		956,1		956,1
02	Chauffage bâtiments	3.753,3		3.753,3		3.753,3
02 01 03	Combustion secteur tertiaire	411,2		411,2		411,2
02 02 02	Combustion secteur résidentiel	3.341,7		3.341,7		3.341,7
02 03 00	Combustion dans l'agriculture	0,38		0,4		0,4
03	Chaudières industrielles	1.932,0		1.932,0		1.932,0
03 01	Combustion industrielle y compris autoproduction d'électricité	1.208,8		1.208,8		1.208,8
03 02 03	Cowpers de haut fourneau	3,0		3,0		3,0
03 03 01	Agglomérations	281,2		281,2		281,2
03 03 02	Sidérurgie laminoirs et froid	31,6		31,6		31,6
03 03 03	Autre sidérurgie et fonderies	15,4		15,4		15,4
03 03 04 à 10	Non ferreux	2,0		2,0		2,0
03 03 11	Ciment	173,4		173,4		173,4
03 03 12	Chaux	106,1		106,1		106,1
03 03 13	Asphalte concrete plants	49,7		49,7		49,7
03 03 14	Verre plat	39,3		39,3		39,3
03 03 15	Verre creux	4,7		4,7		4,7
03 03 16	Autres verres	5,4		5,4		5,4
03 03 18 à 20	Autres minéraux non métalliques	11,4		11,4		11,4
04	Procédés industriels	5.194,6		5.194,6		3.695,9
04 02 01	Cokeries, émissions fugitives	792,0		792,0		792,0
04 02 03	Coulée haut fourneau	76,0		76,0		76,0
04 02 06	Aciéries O2	22,4		22,4		22,4
04 02 07	Aciéries électriques	3,2		3,2		3,2
04 02 08	Laminoirs	107,4		107,4		107,4
04 02 10	Autres	4,2		4,2		4,2
04 03 09	Autres					
04 04 03	Ammoniac					
04 04 16	Autre					
04 05 05	MVC	85,5		85,5		85,5
04 05 06&07	PET	920,0		920,0	Inspections trimestrielles	368,0
04 05 08	PVC	35,9		35,9		35,9
04 05 09	PP	1.090,6		1.090,6	Inspections trimestrielles	436,2

04 05 11	PS	487,2		487,2	Inspections trimestrielles	194,9
04 05 19	Anhydride phtalique	0,0		0,0		0,0
04 05 27	Autres	32,4		32,4		32,4
04 06 01	Panneaux agglomérés en bois	32,2		32,2		32,2
04 06 02	Pâte à papier proc Kraft	391,1		391,1		391,1
04 06 05	Pain	738,4		738,4		738,4
04 06 07	Bière	150,5		150,5		150,5
04 06 11	Asphaltage des routes	225,8		225,8		225,8
05	Stockage et distribution combustibles	3.236,1		1.263,7		1.263,7
05 05 02	Dépôts et transport	614,8	Stage 1	217,4		217,4
05 05 03	Stations service	1.699,1	Stages 1 & 2	124,1		124,1
05 06 00	Réseau GN	922,2		922,2		922,2
06	Usages de solvants	21.341,6		15.491,7		14.738,0
06 01 02	Carrosserie	1.468,8	Directive peintures	562,8		562,8
06 01 03	Peinture bâtiments	3.273,6	Directive peintures	2.084,7		2.084,7
06 01 05	Coil coating	68,0		68,0		68,0
06 01 07	Peinture bois	98,7	Directive solvants	67,1		67,1
06 01 08	Coating of metallic products	870,2	Directive solvants	677,7		677,7
06 01 08	Tanning and leather coating	190,4		190,4		190,4
06 01 08	Heavy duty coatings	420,0		420,0		420,0
06 01 09	Marquage routier	373,0		373,0		373,0
06 02 01	Dégraissage industriel	1.343,9	Directive solvants	471,6	Good houskeeping dans PMI	429,3
06 02 02	Net à sec	389,4	Directive solvants	216,2		216,2
06 03 01	Transformation de polyester	533,6		533,6		533,6
06 03 02	PVC souple	125,0		125,0		125,0
06 03 03	Mousses de PUR	102,2		102,2		102,2
06 03 04	Mousse PS	414,0		414,0		414,0
06 03 06	Pharmacie	1.596,3	Directive solvants	485,3		485,3
06 03 07	Production de peinture	119,5		119,5		119,5
06 03 08	Production d'encre	54,0		54,0		54,0
06 03 09	Production de colles et adhésifs	201,4		201,4		201,4
06 04 03	Printing industry	1.365,0	Directive solvants	832,1	SMP en PMI	819,1
06 04 05	Uses of glues and adhesives	1.130,3	Directive solvants	351,7		351,7
06 04 06	Préservation du bois	220,5	Nouvelle formulation	157,5		157,5
06 04 08	Usages domestiques de solvants	6.983,9		6.983,9	Promotion produits substitution	6.285,5
09	Déchets	108,8		108,8		108,8
09 00 00	Incinération de déchets	108,8		108,8		108,8
	Total sources fixes hors nature	36.946,3		29.124,0		26.871,6

3.4.3.12 Conclusions

Le plafond NEC ne sera atteint en Région wallonne pour les COV qu'à la condition d'aller puiser dans les mesures additionnelles.

3.4.4 Descriptions des mesures: NH_3

Confert premier programme de réduction NEC à l'horizon 2010 dont le Gouvernement wallon a pris acte. Aucun changement n'a été opéré ni constaté et l'évolution favorable due à la réforme de la politique agricole commune (PAC) suffit à atteindre et respecter le plafond NEC pour ce polluant.

Explications

Les émissions de NH_3 n'ont pas fait l'objet d'une attention particulière. Elles sont dominées par les émissions en provenance de l'agriculture. Les autres contributions sont très modérées, même si celles en provenance des transports pourraient connaître une forte croissance. Il s'agit en fait d'un effet secondaire des pots catalytiques à trois voies qui se généralisent dans le parc automobile. Il faut toutefois souligner que ce phénomène est encore mal connu et que ces émissions sont déterminées avec une très grande marge d'incertitude.

Le tableau ci-dessous présente une première approche de l'évolution des émissions de NH_3 en Région wallonne d'ici 2010. Il est essentiellement basé sur les perspectives établies par le SITEREM. Il montre que le niveau d'émissions qui devrait être atteint en Région wallonne se situerait en-dessous de celui imposé par la directive NEC.

Nous n'avons uniquement établi des projections d'émissions à l'horizon 2010 dans le cadre d'un scenario "Business as Usual".

Il n'y aurait donc pas lieu d'envisager un programme de réduction supplémentaire de ces émissions, mais d'être attentif à ce que les mesures éventuellement prises en agriculture pour réduire les émissions de N_2O n'aient pas un impact défavorable sur celles de NH_3. C'est la raison pour laquelle des scenarii "With measures" and "With Additionnal Measures" ne sont pas pertinents et ne sont donc pas repris dans le présent document.

Table 23: Emissions de NH_3 (exprimées en tonnes)

Secteur	Inventaires d'émissions 2000 (t)	Inventaires d'émissions 2004 (t)	Projections 2010 BAU (t)
INDUSTRIE	**983**	**849**	**960**
Chaux	**13**	**14**	**14**
Ciment	**262**	**246**	**246**
Sidérurgie et cokeries	**238**	**217**	**217**
Papier, pâte et impression	**10**	**3**	**3**
Chimie	**303**	**181**	**292**
Combustion en industrie	**5**	**5**	**5**
Alimentation (nourriture et boissons)	**16**	**8**	**8**
Autres industries manufacturières	**136**	**175**	**175**
PRODUCTION D'ELECTRICITE	**30**	**33**	**33**
RESIDENTIEL	**56**	**58**	**58**
TERTIAIRE	**8**	**8**	**8**
AGRICULTURE & ELEVAGE	**25.363**	**24.454**	**24.247**
DECHETS	**450**	**293**	**428**
TOTAL TOUS SECTEURS Hors Transports	**26.890**	**25.694**	**25.734**
Plafond NEC			**28.700**

3.5 Stationary sources: Brussels

3.5.1 Introduction

The region's economic fabric is characterized by a heavily dominant services sector, a very small industrial sector, small companies and a wide range of activities.

The bulk of emissions from the Region is generated by energy consumption in the services and residential sectors, which explains why a large number of measures seek to reduce consumption in these areas. The impact of these prescriptions is not included in the table below because they concern all pollutants and are not targeted on NO_x, SO_x or VOC. Their impact is therefore already included in the no-control scenario.

3.5.2 Description of NO_x and SO_x measures

Table 24: Measures for reducing SO_2 and NO_x emissions from stationary sources in Brussels

Sector	Measures	Pollutant	Reduction (kilotonne) *	With measures	With additional measures	Fiche number
Industry	Transposition of the IPPC Directive	SO_x NO_x	NE	ν		
	Transversal measures: Emission Trading System, premiums, eco-label	SO_x NO_x	NE	ν		
	Change in sulphur content of light fuel oil	SO_x	0.015/ 0.008	ν	ν	FS3
Electricity generation	Introduction of a selective catalytic reduction for waste incineration	NO_x	0.846	ν		BS1
Residential	Measures to reduce energy consumption in the Air-Climate Plan	SO_x NO_x	NE	ν	ν	BS1

	Royal Decree for regulation of CO and NO_x emission levels for small installations on liquid and gaseous fuel	NO_x	0.152 / 0.07	ν	ν	FS1/FS2
	Change in sulphur content of light fuel oil	SO_x	0.443/ 0221	ν	ν	FS3
Services	Measures to reduce energy consumption in the Air-Climate Plan	SO_x NO_x	NE	ν	ν	BS1
	Royal Decree for regulation of CO and NO_x emission levels for small installations on liquid and gaseous fuel	NO_x	0.056/ 0.045	ν	ν	FS1/FS2
	Change in sulphur content of light fuel oil	SO_x	0.251/0.125	ν	ν	FS3
Multi-sectoral	Catalysis of CHP gases	NO_x	0.041		ν	

*: reduction with measures / reduction with additional measures

3.5.2.1 Industry

The few significant industries (9) are monitored in the context of the IPPC Directive[28]. There are no large combustion plants in the Brussels Capital Region (BCR).

Given its low presence, the industrial sector has not been given its own measures, except for the purpose of reducing consumption. The BCR has transposed the European Union Directives and complies with Belgian legislation.

3.5.2.1.1 Horizontal measures

* Emissions Trading System

Directive 2003/87/EC was transposed into Brussels law via the decree of 3 June 2004, which sets out a greenhouse gas emission allowance trading system. It will soon be repealed and replaced by a new ordinance setting up a greenhouse gas emissions allowance trading system in the context of the Kyoto Protocol's flexibility mechanisms, which will include the changes introduced by Directive 2004/101/EC. The draft ordinance has been reviewed by the advices Councils and should be approved in 3rd reading by the Brussels government.

In accordance with new guidelines issued by the European Commission[29] concerning small combustion facilities, the 2nd Brussels' allocation[30] plan for the 2008 to 2012 period covers six installations: 3 in the energy sector, 2 industrial and 1 service installations.

* Premiums

The BCR has set up a system of premiums designed to provide financial support to actions aimed at improving the energy performance of buildings in the services and industrial sectors.[31]

In this way, alternative and innovative designs for new buildings, in addition to good energy management in existing buildings are given support: compatibility, reviews, analysis of electricity consumption, feasibility studies for particular investment projects as well as certain types of investment such as CHP... This latter is eligible for green certificates.

It should be noted that cogeneration has a harmful, short-term impact on emissions in the BCR and has sharply increased NO_x emissions in the Region, which imports most of its electricity.

* Greater awareness of environmental management in companies: the eco-label.

In 2000, the BCR's environment administration, IBGE, created a programme for official certification of Brussels companies that have introduced an environmental management system. By 2006, 80 companies had obtained the "Label for Ecodynamic Organisation". This label acknowledges a company's improved environmental performance. The actions taken, in particular in energy matters, as well as in mobility, waste management, greater awareness of employees, customers and suppliers, will help to reduce the impact of companies on the environment.

---

[28] IPPC Directive 1996/61/CE relating to integrated pollution prevention and control

[29] COM(2005) 703 final, "Further guidance on the allocation plans for the 2008 to 2012 trading period of the EU Emission Trading Scheme".

[30] The 2nd Brussels allocation plan is available on IBGE Website: http://www.ibgebim.be/francais/contenu/index.asp

[31] http://www.ibgebim.be/francais/pdf/Entreprise/Energie/7_primes2006_terindus_fr060512.pdf

The impact of the preceding three measures has not been quantified in terms of reducing NO_x and SO_x because these measures are directly incorporated into the energy scenario and are not a typical NO_x or SO_x measure.

* For the record: the federal measures

In 2004 a Royal Decree was published regulating the CO and NO_x emissions from oil and gasfired central heating boilers, air heaters and burners with a nominal power up to 400 kW. The maximal emission levels mentioned in this R.D. apply to installations sold after 1/1/2005. Emission levels are dependent on the fuel, the type of installation and its power

Changes in the sulphur content of light fuel oil, from 0.2 to 0.1%.

3.5.2.1.2 Electricity producers

The BCR has only small electricity producers and one waste incinerator with energy recovery.

The latter complies with Directive 2000/76/EC on the incineration of waste, which was transposed into regional law by the decree of 21 November 2002 that imposes a concentration standard of 50 mg SO_2/Nm^3 in emissions and 200 mg NO_x/Nm^3 in flue gas .

These standards are adhered to, thanks to the installation of a flue gas cleaning device in 1999 and a selective catalytic reduction system for reducing NO_x (prescription no. 49 of the Air-Climate Plan). The introduction of this system enabled the BCR to go even further than the Directive and to keep flue gas emissions to 70 mg NO_x/Nm^3.

3.5.2.2 The residential sector

*The Air-Climate Plan contains the following prescriptions (nos. 23 to 32) in order to reduce energy consumption in the residential sector:

- Better knowledge of the energy situation of housing.
- Conduct public information campaigns, set up an information and awareness centre for consumers. By way of example, the following has been achieved since 2002:
  - Design assistance and information at no cost, as well as assistance in decision-making in energy savings, via facilitators for professionals and the ABEA[32] for individuals.
  - Information on potential energy savings by means of changes in behaviour and thanks to profitable investment, for example, the “Energy Challenge” action.
  - The training of energy specialists in the field of energy efficiency; information and support missions for the development of cogeneration and renewable energy (information, advice, critical review of projects, seminars and calls for projects).
- Boost the aid offered to households:

  financial incentives for investing in energy performance including Energy and renovation premiums, which were expanded and whose consistency has been strengthened. The amounts earmarked for financing the 2006 energy premiums have been increased threefold since 2004.
- Make energy bills easier to read and more informative

[32] http://www.abea.be/

- Implement and enforce thermal regulations: the transposition of the EPB Directive (2002/91/EC) is now underway. It will cover all new and renovated buildings and is based on four important pillars:
  - The creation of a method for calculating the energy performance of a building;
  - The establishment of minimum requirements that must be met by all new buildings and existing buildings having undergone major renovation;
  - Make the certification of energy performance of buildings compulsory when buildings are sold or rented and for new buildings,
  - Set up a regular inspection system for boilers and airconditionner in buildings, as well as an evaluation of the entire heating system if it contains boilers that are 15 years old or more.

The impact of the preceding prescriptions has not been quantified in terms of reducing NO_x and SO_x because these measures are directly incorporated into the energy scenario and are not a typical NO_x or SO_x measures.

* For the record: the federal measures

- In 2004 a Royal Decree was published regulating the CO and NO_x emissions from oil and gasfired central heating boilers, air heaters and burners with a nominal power up to 400 kW. The maximal emission levels mentioned in this R.D. apply to installations sold after 1/1/2005. Emission levels are dependent on the fuel, the type of installation and its power
- Changes in the sulphur content of light fuel oil

3.5.2.3 The services sector

*The Air-Climate Plan contains the following prescriptions (nos. 33 to 43) to reduce energy consumption in the services sector:

- Better knowledge of the energy situation of buildings
- Develop and enforce energy regulations, the periodical energy certification: the transposition of the EPB Directive (2002/91/EC) is now underway. It will concern all new and renovated buildings (see residential sector).
- Meet with the concerned professional sectors to discuss “energy efficiency in office buildings”;
- A “Technological information centre” for professionals, featuring free design assistance and information services, as well as assistance in decision-making for energy savings; for professionals via the facilitators and for individuals via the ABEA;
- Training of energy specialists; information and support missions for the development of cogeneration and renewable energy (information, advice, critical review of projects, seminars and calls for proposals);
- Boost and reorganize the system of company aid (premiums);
- Boost and reorganize public sector aid;
  - The granting of subsidies to municipalities for encouraging investment in the public interest (“work conducted on buildings belonging to municipalities or public social assistance centres and that contribute to the rational use of energy”).
  - The launch of management and investment projects that could set an example, e.g. invitations to propose candidates for a Local Programme for Energy

Actions and Management, known by its French initials, PLAGE, in municipalities;

- Promote high-energy efficiency electrical applications;
- Improve the energy efficiency of government purchasing;
  - Preparation of guides,
  - Inclusion of energy performance criteria at an profitable cost in all public or subsidized investment and in the specifications, at project design, of optimal energy performance criteria.

* Emissions trading system and premiums (see horizontal measures in the industrial sector).

The impact of the aforementioned measures has not been quantified in terms of reducing NO_x and SO_x because they are included directly in the energy scenario and are not a typical NO_x and SO_x measurement.

* For the record: federal measures

- In 2004 a Royal Decree was published regulating the CO and NO_x emissions from oil and gasfired central heating boilers, air heaters and burners with a nominal power up to 400 kW. The maximal emission levels mentioned in this R.D. apply to installations sold after 1/1/2005. Emission levels are dependent on the fuel, the type of installation and its power
- Changes in the sulphur content of light fuel oil

3.5.2.4 Additional technical measures

* Further reduction in the sulphur content of light fuel oil to 0.05%;

* Reinforcement of the royal decree on emission standards for boilers on the market (change in 2008 to a limit of 70 mg NOx/kWh for natural gas and 120 mg NO_x/kWh for diesel oil);

* Technique for reducing cogeneration emissions via the introduction of catalysis .

3.5.3 Description of VOC measures

Table 25: Measures for reducing VOC emissions from stationary sources in Brussels

Sector	Measures	Pollutant	Reduction (kilotonne)	With measures	With additional measures	Fiche number
Industry and crafts	Transposition of Directive 2004/42/EG in car body shops	VOC	0.084	ν		BS1
	Transposition of Directive 1999/13/EG in the dry-cleaning sector		0.034			
	Transposition of Directive 1999/13/EG in the printing sector		0.17			
	Transposition of Directive 1999/13/EG to the application of coatings		NE			
	Transposition of Directive 1999/13/EG to the application of paint on new cars		0.085			
	Transposition of Directive 1999/13/EG to surface treatment		0.042			
Storage and distribution of petrol	Stages I and II	VOC	0,719	ν		BS1
Residential	Awareness	VOC	0.198	ν	ν	BS1
	Transposition of Directive 2004/42/EG	VOC	0.344	ν		

3.5.3.1 Industry and the services sectors

The environment permits limit VOC emissions from large companies, as described in the VOC Directive (1999/13/EC) and/or in the IPPC Directive. Small and medium sized companies are governed by the VOC Directive via its transposition in sectorial decrees issued by the government of the Brussels Capital Region. These decrees concern the sectors of car body shops, dry-cleaning, printing, manufacture of paints and varnishes, the application of coatings, the application of paints to new vehicles and surface treatment. One specific example of the aim of these decrees is the imposition of emissions lower than 60 g NMVOC/m² during the painting of new vehicles (in BCR, industry has limited these emissions to less than 50 g NMVOC/m²) and the closed circuiting of dry cleaning machines. An overview of the transposition of the VOC Directive and its impact is available on the IBGE Website [33]

The Directive 2004/42/EG, transposed at federal level on 7 October 2005, and in the region on 21 November 2006, amended the car body shop decree and now sets maximum levels of organic solvents for all products used in car body work.

For the record, Directive 94/63/EC was transposed with the aim of limiting emissions from the storage of petrol and the distribution of fuels is subject to Stage I B and Stage II[34].

3.5.3.2 Residential and services sectors

Prescription no. 55 of the Air-Climate Plan backs, via information and awareness campaigns, the royal decree of 7 October 2005, on products' solvent content (in the wake of Directive 2004/42/EG).

This measure will be boosted in 2007 by a study of the behaviour of the region's inhabitants in order to better target the awareness campaigns relating to the use of VOC-emitting products.

This same prescription urges administrations to include in their specifications the principle of limited use of products containing solvents in purchases of office supplies and cleaning products and the use of paints and varnishes for interior decoration.

3.5.4 Description of NH_3 measures

Farming is negligible in the Brussels Capital Region. Regional emissions of NH_3 are also (~0.01 Gg). No measures have been taken concerning this pollutant.

[33] http://www.ibgebim.be/francais/pdf/entreprise/mgobeantwoording%20vragenlijst%202.doc

[34] http://www.ibgebim.be/DbDroit/download/19990121_agb_CondExpl_StatServ.pdf

4 Emissions and forecasts (Emissions and projections)

For an overview of the historical emission data since 1990 for Belgium we refer to the yearly emission reporting to the European Commission in the framework of the NEC directive.

4.1 Non-stationary sources

The sectors taken into consideration are consistent with those used to establish emission ceilings as specified in chapter 3.1.2, i.e. road traffic, rail traffic, inland shipping and farm tractors. Account is also taken of the emission factors for road traffic and the off-road sector, which form the basis for the emission ceilings.

4.1.1 Assessment of road traffic emissions

The calculations for road traffic emissions are based on the TEMAT model of the Flemish Technologic Research Institute (VITO). The TEMAT model is a bottom-up model calculating fuelconsumption and emissions in the light of the number of kilometres driven for each type of vehicle. The basic formula for the calculations is as follows:

Emission/year =	number vehicles	x	emission factor	x	activity/vehicle/year
	[number]		[g/km]		[km/(vehicle*year)]

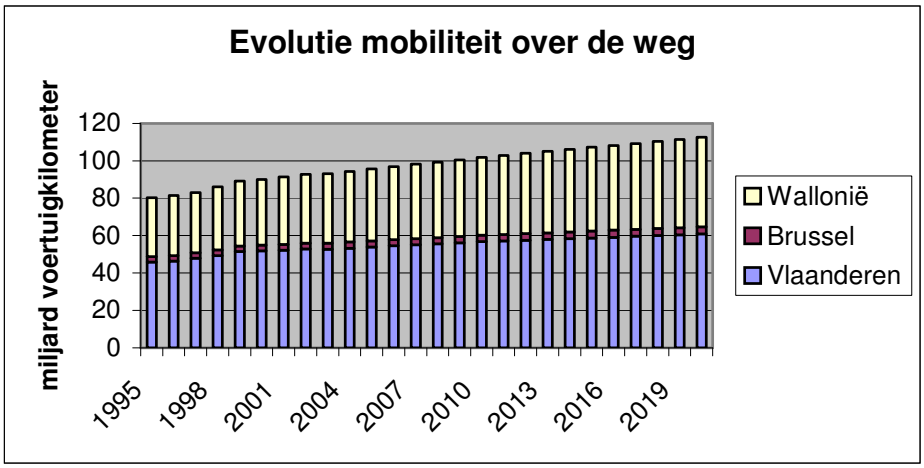
A combination of detailed information about the vehicle fleet, annual number of kilometres, traffic situation and specific fuel consumption and emission factors provides the total energy consumption and emissions. TEMAT singles out five main vehicle categories: passenger cars (including mini buses), light lorries (Light Duty Freight), buses, heavy lorries and motorised two-wheelers.

Mobility trend

The scenario calculations use an extrapolation of the last five years for the forecasts. The available traffic statistics are invariably extrapolated separately to 2020 for motorways (MW), regional roads (RR) and municipal roads (MR) and for each region separately. The extrapolation of the last five years for the three regions separately provides a means of taking account of the regional differences.

The extrapolation of the last five years for Flanders is roughly consistent with the travel demand as an average between the trend and the sustainability mobility scenario, the BAU scenario considered in chapter 3. The figures for Brussels are consistent with the Plan Air based on the IRIS plan. Wallonia does not have any plan featuring figures with which to make a comparison.

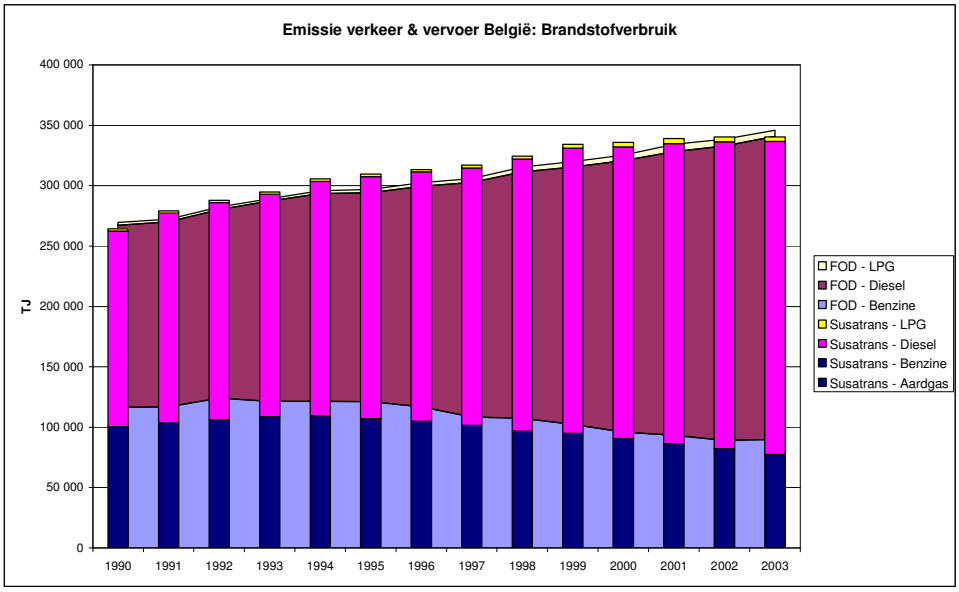
Figure 2: Evolution of road mobility



Comparison with fuel sales

Emissions are calculated in the light of the number of kilometres driven by vehicles to produce a specific level of energy consumption. This consumption has been compared with the quantity of fuel bought as reported by the Federal Government. Figure 3 shows an adequate correspondence.

Figure 3: Fuel consumption for traffic in Belgium



FOD: Federal Public Service: these are the reported sales of fuel to the road transport sector
SUSATRANS: survey conducted by VITO at the request of the Federal Public Service - Science: these figures reflect the TEMAT model forecasts for Belgium

The differences that invariably appear may be attributed to refuelling operations outside the country, petrol used for lawnmowers and army mobile vehicles and others that are not included in the road traffic models.

Technological changes in vehicle fleets

TEMAT covers both historical and future vehicle fleets. A vehicle fleet is replaced on the basis of the historical one, survivorship curves and the annual number of kilometres for each type of vehicle plus

future mobility needs. In addition to the time-honoured technologies, petrol and diesel-fuelled vehicles, the vehicle fleet also covers alternative vehicles.

Subsequent to a validation of the TEMAT model VITO has adjusted the changeover from petrol to diesel, as this was always underestimated in the past. It is now assumed that that 24% of new passenger cars will run on petrol, 75% on diesel and 0.25% on LPG by 2010, while there will be a small number of vehicles powered by gas, electricity and hybrid petrol cars on the market.

Analysis of the emission findings

NO_x emissions

The calculations are made with the emission factors from the RAINS model used to establish the emission ceilings. This results in 65 ktonnes NO_x in 2010, up 7 ktonnes on the forecasts in the reduction programme for 2003.

Table 26: Projections for NO_x for road traffic

2010	**Forecast in reduction programme for 2003**	**Current forecast**
road traffic	58 ktonnes	65 ktonnes

A multiannual review of emissions shows that in spite of increasing mobility, NO_x-emissions discharged by road traffic have decreased as a result of a series of vehicle standards for diesel-fuelled cars and those running on petrol, plus the successive standards issued for lorry and bus engines. The extent to which these vehicle and fuel standards lead to lower emissions in the transport sector depends on the trend in mobility and the composition of vehicle fleets. The reduction programme takes account of the BAU scenario, which stands midway between the trend and the sustainable mobility scenarios. What is more, the changeover from petrol to diesel in recent years has been higher than originally anticipated. The appeal of cheaper diesel and the concern over climate policy are two of the factors contributing to the significant shift to diesel. This development is less favourable for NO_x emissions than the experts estimated in 2003. furthermore, the calculations take into account an amount of 10% Euro 5 vehicles in 2010. however, the introduction date of Euro 5 has been postponed until 2009-2010 for passenger cars and 2011-2012 for light duty vehicles by the European Parliament. This will give a slight overestimation of the emission reduction.

VOC and SO_2

The following table shows the results for road traffic compared with the national emission ceiling for VOC and SO_2.

Table 27: Projections for SO_2 and VOC for road traffic

2010	**VOC**	**SO_2**
road traffic	19.9 ktonnes	0.16 ktonnes

The cut in emissions of VOC over the years is a result of a series of European standards applicable to discharges from petrol-powered vehicles (passenger cars as well as two and three-wheelers) and the increasing number of people changing over to diesel in Belgium. The reduction in SO_2 emissions is ascribed to a series of European standards for the sulphur content in fuel. Starting from 1 January 2005 the permissible sulphur content in petrol and diesel is a maximum of 50 ppm.

4.1.2 Off-road transport

RAINS 1999 forms the basis for calculating emissions from off-road sources. Off-road transport (TRA_OT) was divided into two categories: OT_LD2 (other two-cylinder vehicles) and OT_LB (other

land-based vehicles: rail, inland shipping, farm tractors). Another category was AIR, for aviation where solely the VOC emissions were taken into account.

The table below examines energy consumption as recorded in 1999 and energy consumption as it is currently estimated for 2010 (PJ).

Table 28: Energy consumption in the off road sector (PJ)

RAINS 1999		Current forecasts	
OT_LD2	0.4	Rail traffic	1.84
OT_LB	14.5	Inland shipping	3.66
		Farm machinery	8.15
Total	**14.9**		**13.65**

The emissions are reproduced from RAINS 1999 so as to be able to take account of the applicable emission factors for developing the emission ceilings. The following table provides an overview:

Table 29: Emissions in the off road sector

	NO_x	VOC	SO_2
RAINS 1999	10.94 ktonnes	7.85 ktonnes	0.16 ktonnes

These figures are consistent with the figures in the reduction programme for 2003.

4.1.3 Emission ceilings assessment decision

The following table features the forecasts for the transport sector:

Table 30: Emission projections for non stationary sources

ktonnes	NO_x	VOC	SO_2
Road traffic	65	19.9	0.16
Off-road	10.94	7.85	0.16
TOTAL	**75.94**	**27.75**	**0.32**
Ceiling	68	35.6	2

The emission ceilings for VOC and SO_2 are attained. The ceiling for NO_x is exceeded as a result of the higher emissions for road traffic. The following table shows how Belgium is seeking to close this gap with the measures considered in an earlier chapter.

Table 31: Projections for emission reductions by different sets of measures

ktonnes	**NO_x**	**VOC**	**SO_2**
total emissions	**75.94**	**27.75**	**0.32**
ceiling	**68**	**35.6**	**2**
Measures by the Federal Government	NE		
Measures by the Flemish Community	2.8	NE	NE
Measures by the Walloon Region	2.5	NE	NE
Measures by the Brussels Region	0.2	NE	NE
balance	**+ 2.44**	**-7.78**	**-1.68**

The NO_x ceiling for non-stationary sources has been exceeded even though further measures have been taken on top of the technological measures included for developing the emission ceilings

4.1.4 New conclusions

4.1.4.1 Road traffic

Emission calculations are based on emission factors for each type of vehicle and each type of road. These emission factors seek to address the actual vehicle emissions. NO_x emissions in real traffic conditions were recently reported to have differed significantly from the regulated emissions. In the case of lorries, Euro II lorries apparently discharge even more NO_x than Euro I lorries, while the standard implies a reduction. This is because the standards reflect a specific driving cycle, but a vehicle does not follow this driving cycle in real traffic conditions so will use other areas of the engine pattern, characterised by other emissions. The following section features a review of NO_x emissions. There are no major changes in the emission factors for VOC and SO_2, thus the aforementioned values may continue to be taken into account.

These new conclusions were incorporated into the VITO TEMAT model. The source for the results reported is a study entitled "Sustainability assessment of technologies and modes in the transport sector in Belgium (SUSATRANS)", where TEMAT was used to calculate the emissions for Belgium. The emission factors used differ according to the calendar year, type of fuel, vehicle category, vehicle age, emission standard, type of road, traffic situation and cylinder capacity, size class or tonne class. The TEMAT model was subjected to a root-and-branch analysis in 2004. The emission factors were tailored to the latest international conclusions (ARTEMIS)[35].
In both RAINS and TEMAT the NO_x emission factors were adjusted on the basis of the latest conclusions. In order to build up a picture of the impact of adjusting the emission factors the calculation was made with the old emission factors from RAINS and the new ones from RAINS. Their impact is shown in the table below.

[35] The new emission factors were also used for the Flemish emission inventory. Brussels is still using the older COPERT methodology. Wallonia, too, has been using the old methodology up to now, but is presently busy with a detailed revision. Even if the three regions were to use the new emission factors, differences would continue to be seen between the results from the TEMAT model for Belgium and the total for the regional emission inventories. The emission factors are based on average speed and type of road. Just as the average speed differs in the three regions so will the emission factors differ. In the Belgian TEMAT, the calculation was undertaken with a set of emission factors tailored to the most recent international conclusions.

Table 32: Projections NO_x emissions road traffic with old and new emission factors

2010	**new EF**	**old EF**
road traffic	106 ktonnes	65 ktonnes

The first column features the new calculation VITO applied in the SUSATRANS study, while the second one shows calculations based on the VITO findings from SUSATRANS but with the old emission factors from RAINS. A comparison of these two values shows that the adjustment of emission factors involves a 41 ktonnes difference.

4.1.4.2 Off-road

The off-road sectors figure much more prominently in the calculations IIASA recently applied via RAINS for the new emission ceilings (2015-2020). The following subsectors are included:

- Inland shipping
- Short sea shipping: transport between ports (diesel and heavy fuel oil)
- Fisheries
- Rail traffic (solely diesel-fuelled trains)
- LTO[36] emissions from the aviation industry
- Farm machinery
- Off-road machines in the construction sector and industry
- Other off-road mobile machines (such as lawnmowers)

A major effort was also made in Belgium to gather information about the off-road sector. There was still not enough information available in 1999 for the off-road sector and it has only become available in recent years through additional studies.

4.1.4.2.1 Current off-road methodology

The source for energy consumption by rail traffic (diesel trains) and inland shipping is the VITO SUSATRANS (Sustainability assessment of technologies ands modes in the transport sector in Belgium) study, whose results were also used for road traffic. The emission factors for NO_x-emissions from inland shipping were also derived from the SUSATRANS study. The other emission factors for rail and inland shipping are the RAINS emission factors.

VITO's starting point for **rail traffic** is information from the National Railway Company of Belgium (NMBS) about the vehicle stock, the number of kilometres driven and energy consumption. Under this heading, a distinction is made between passengers and goods transport. The frame of reference is an annual growth in passenger traffic of 1.2 to 1.4%. The level of goods transport was assumed to be constant after 2003. The share diesel trains represent in rail traffic is 3.9% for passenger traffic and 21.9% for goods transport.

Emissions from **inland shipping** are calculated in the light of the number of tonne kilometres and energy consumption and emission factors per tonne carrying kilometre. Historical figures are available from the National Statistics Institute (NIS). An annual rate of growth of 2% is also assumed.

Agricultural emissions from mobile machines in Flanders are determined in the light of emissions from the following subsectors: arable farming, permanent crops, grazing animal keeping and in-field gardening (the intensive cattle breeding, glasshouse horticulture and CHP sectors are taken into account in the chapter on stationary sources, as these emissions are mainly ascribed to the heating of animal housing and greenhouses). 80% of the total farm emissions in Wallonia are attributable to farm machinery. Use is made of the RAINS emission factors and emission factors based on the emission inventory.

[36] LTO: landing and take off

Emissions from the landing and take off of planes (**LTO planes**) are calculated in the emission inventory for the landing and take off cycle (LTO cycle). The types of aircraft are divided into various categories of plane and types of flights, while EMEP/CORINAIR emission factors are taken into account. Forecasts are not available. The findings from RAINS are used in this context.

The energy and emission figures for **short sea shipping** (SSS - with diesel) and **fisheries** are derived from the emission inventory and the energy balance. In the case of the energy forecast for 2010 the level of consumption in 2000 is kept constant for short sea shipping, and the level of consumption in 2002 is kept constant for fisheries. The emissions for 2010 were calculated with the RAINS emission factors.

No heavy fuel oil-based energy and emission figures are available for **short sea shipping** so use is made of the findings from RAINS. Recent information shows that dredging and tug boats are the main users of heavy fuel.

In the case of the energy consumption of **off-road machines in industry and construction,** 65% is accounted for by diesel consumption in industry. This percentage was obtained in the light of a study called "Emissions by off-road mobile machinery in the context of international reporting", conducted by TMLeuven and TNO, and was kept constant for the years ahead. The emissions were calculated with the RAINS emission factor. However, these emissions are not reported.

Energy consumption (historical and forecasts) for **other off-road machines** (lawnmowers, for example) was obtained from the study "Emissions by off-road mobile machinery in the context of international reporting" conducted by TMLeuven and TNO. In this case, an estimate was made of the number of mobile machines and their use. The emission factors used are the RAINS emission factors. The emissions are not reported for the time being.

4.1.4.2.2 New emission findings for the off-road sector

Table 33 shows the level of energy consumption as featured in RAINS 1999 and the level of energy consumption now being estimated for 2010 (PJ).

Table 33: Energy consumption in the off road sector (PJ)

RAINS 1999	**petrol**	**diesel**	**heavy fuel oil**	**New figures**	**petrol**	**diesel**	**heavy fuel oil**
OT_LD2	0.4			Rail traffic		1.836	
OT_LB		14.2	0.3	Inland shipping		3.658	
				Farm machinery		8.149	
				SSS (diesel) and fisheries		2.376	
				Subtotal		**16.019**	
				SSS (heavy fuel oil)			2.64
				Off-road in industry and construction		5.728	
				Other off-road	2.5		
				Subtotal	**2.5**	**5.728**	**2.64**
Total	**0.4**	**14.2**	**0.3**		**2.5**	**21.747**	**2.64**

The above clearly shows that the new conclusions about the various subsectors of the off-road sector result in a significantly higher level of energy consumption. Another consequence of this is a higher level of emissions.

Apart from the more detailed figures that were issued recently, changes have been made to the emission factors for inland shipping and the rail sector. These higher emission factors are a result of VITO's validation of its models. However the VITO emission factors still have to be aligned with those of RAINS. The VMM has launched a study for the purpose of developing new models for the rail and shipping sectors, whose emissions may still undergo a change in the light of these study findings.

The following tables show the emissions in Belgium in the various subsectors (tonnes)

Table 34: Emissions in the off road sector

(in tonnes)	NO_x		VOC		SO_2	
	2000	**2010**	**2000**	**2010**	**2000**	**2010**
Rail traffic	2509	2064	397	324	2003	912
Inland shipping	4143	4831	562	654		
farm machinery	9760	7141	1612	1225		
Off-road machines in construction and industry	7857	3553	1421	697		
LTO aviation	1914	2362	680	816	191	236
SSS (diesel) en fisheries	2697	2852	427	452	212	112
SSS (heavy fuel oil)	3696	3696	79	79	1899	1899
Other off-road 2t	182	168	9100	5336	10	1
Other off-road 4t	409	499	1128	1376		
TOTAL	**33167**	**27166**	**15406**	**10959**	**4315**	**3160**

A percentage of the off-road emissions are not featured as such in the emission inventories. A proportion of these emissions is not included in the industrial sector. One percentage, such as lawnmowers and transport between seaports by ships using heavy fuel oil, is not included in the inventories. This is examined in the following table.

Table 35: Reported and non reported emissions from the off road sector in 2010

(in ktonnes)	NO_x	VOC	SO_2
reported off-road	19.25	3.47	3.16
SSS (heavy fuel oil), off-road construction and industry, other off-road	7.92	7.49	
TOTAL	**27.17**	**10.96**	**3.16**
RAINS 1999	10.94	7.85	0.16

New emission factors are at the root of the higher emissions for rail, inland shipping and farming (reported emissions). The future emission ceilings also feature a number of sectors that are not reported for the time being.

4.1.4.3 Comparison of the new and old transport figures

Table 36 examines the emission ceilings for the transport sector, the assessment in the light of the emission factors and the off-road sector for the development of the ceilings and the emissions in the light of the new emission factors for road traffic and new conclusions about emissions in the off-road sector.

Table 36: Emissions from non stationary sources

	NO_x	VOC	SO_2
NEC ceiling	**68 ktonnes**	**35.6 ktonnes**	**2 ktonnes**
NEC evaluation			
road traffic	65 ktonnes	19.9 ktonnes	0.16 ktonnes
off-road	10.94 ktonnes	7.85 ktonnes	0.16 ktonnes
measures	-5.5 ktonnes	NE	NE
	70.44 ktonnes	**27.75 ktonnes**	**0.32 ktonnes**
New conclusions			
road traffic	106.1 ktonnes	19.9 ktonnes	0.16 ktonnes
off-road	27.17 ktonnes	10.96 ktonnes	3.16 ktonnes [37]
	133.27 ktonnes	**30.86 ktonnes**	**3.32 ktonnes [37]**

4.1.4.4 Trend in emissions from non-stationary sources

The following table examines the trend in NO_x-emissions from road traffic and the off-road sector. The figures were reproduced from the LRTAP reporting system for 2005. This reporting is the total for the three regions separately. Flanders' emission reporting already features the new emission factors for NO_x, while Wallonia and Brussels use the COPERTIII methodology.

Table 37: Evolution of NO_x emissions from non stationary sources

ktonnes	NFR CODE	1990	2000	2004
Civil Aviation	1A3a[38]	1. 07	1. 86	1. 6
Road	1A3b	183. 65	152. 24	133. 53
Railway	1A3c	3. 669	2. 78	2. 19
National navigation	1A3dii	5. 25	5. 44	6. 01
Other mobile sources and machinery	1A3e ii	NE	NE	NE
Household and gardening (mobile)	1A4bii	NE	NE	NE
Agriculture Off-road Vehicles and Other Machinery	1A4cii	9. 49	9. 80	9. 68
National Fishing	1A4ciii	3. 45	2. 68	3. 07
Other, Mobile	1A5b	0. 93	0. 60	0. 6
Total		**207. 51**	**175. 4**	**156. 68**

[37] 1.9 ktonnes is attributable to emissions from short sea ship using heavy fuel oil. Dredging and tug boats are the main consumers of heavy fuel.

[38] 1A3a without 1A3ai(ii)

4.2 Stationary sources: Flanders

The following tables make a review of the historical emissions (1990, 2000 and 2004) and the emission forecasts for each pollutant and sector in the light of both the 'with measures' and the 'with additional measures' scenario. In the context of these scenarios, the measures taken into account are invariably specified (via a reference to the information sheets in Annex 1, see also Table 8, Table 9 and Table 10). When interpreting the information for 1990 we have to bear in mind that back then companies were not required to report their emissions hence the figures for 1990 are merely illustrative.

4.2.1 SO_2 and NO_x

Table 38: overview of NO_x (ktonnes)

	NFR CODE	1990	2000	2004	2010 without measures	2010 with measures		2010 with additional measures	
						Emission forecast	Information sheet number	Emission forecast	Information sheet number
Electricity	1A1	46.8	29.1	22.5	29.0	12.5	VS2	11.0	VS2, VS3, VS4
Refineries	1A1	9.1	7.5	8.0	8.8	5.5	VS12	5.3	VS12, VS13
Ferrous metals	1A1/1A2	5.4	7.3	7.2	7.6	6.7	VS1, VS8	3.8-6.7	VS1, VS8, VS9
Non ferrous metals	1A2/2	1.4	0.9	1.3	1.3	1.3	VS1	1.3	VS1
Chemical industry	1A2/2	11.4	11.7	9.9	13.5	10.6	VS1, VS5, VS6	9.8	VS1, VS5, VS6, VS7
Non industrial sectors	1A4	11.1	13.0	14.2	15.4	15.0	FS1	14.9	FS1, FS2
Other industrial sources	1A2/1A4/2	12.6	13.2	14.6	12.6	11.8	VS1	11.2	VS1, VS15, VS16
Total		**97.8**	**82.6**	**77.7**	**88.1**	**63.4**		**57.3-60.2**	
NEC ceiling					**58.3**				

Table 39: overview for SO_2 (ktonnes)

	NFR CODE	1990	2000	2004	2010 without measures	2010 with measures		2010 with additional measures	
						Emission forecast	Information sheet number	Emission forecast	Information sheet number
Electricity	1A1	72.0	28.2	27.1	34.1	6.0	VS2	6.0	VS2
Refineries	1A1	41.1	26.3	25.3	27.1	13.4	VS12	10.5	VS12, VS13
Ferrous metals	1A1/1A2	15.6	7.2	6.3	7.4	6.2	VS1, VS8	2.5-6.2	VS1, VS8, VS9
Non ferrous metals	1A2/2	14.8	4.1	4.4	4.1	2.6	VS1, VS10	1.2	VS1, VS10, VS11
Chemical industry	1A2/2	27.9	9.2	5.9	8.4	5.4	VS1, VS5, VS6	4.9	VS1, VS5, VS6, VS7
Ceramics	2	1.0	11.0	11.3	11.0	5.5	VS14	5.5	VS14
Non industrial sectors	1A4	16.1	13.4	14.6	7.7	7.7		7.7	
Other industrial sources	1A2/1A4/2	53.8	13.6	12.9	11.4	11.3	VS1	11.3	
Total		**242.2**	**113.1**	**107.7**	**111.1**	**58.0**		**49.5-53.2**	
NEC						**65.8**			

Both the SO_2 and the NO_x emissions fell slightly between 2000 and 2004. A sharp fall is anticipated by 2010 on the basis of the policy already decided upon or planned for both pollutants. The emissions may even be nearly halved in the case of SO_2 emissions. The electricity producers, refineries and the ceramic sector have a large share in this fall.

The forecasts for both SO_2 and NO_x in the period up to 2010 are higher than in the reduction programme from 2003. A major percentage of this is accounted for by the domestic and tertiary sector, for which energy forecasts have become available in the meantime, resulting in higher emissions. For SO_2 the fact of not taking into account the federal commitments on lowering the sulphur content in liquid fuels leads to a strong increase in the projections. For the iron and steel sector, the frame of reference in 2003 was still the indicative ceiling for this sector (established when the Directive was being established) and for the non ferrous industry the emission forecasts for NO_x for 2003 were apparently underestimated. The forecasts for NO_x emissions from refineries have been revised slightly down, while they show an upward trend for SO_2 (if the policy is unchanged).

For further details see the review for the relevant sector.

4.2.2 VOC

Table 40: overview of VOC (ktonnes)

	NFR code	1990	2000	2004	2010 without measures	2010 with measures		2010 with additional measures	
						Emission forecasts	Information sheet number	Emission forecasts	Information sheet number
Chemical engineering	2	31.6	14.6	14.6	18.7	15.3		12.9	
Chemical engineering	2	31.1	14.0	13.9	18.2	14.9	VS20, VS27	12.8	VS20, VS21, VS22, VS27
Pharmacy	3	0.5	0.6	0.7	0.5	0.4	VS23	0.1	VS23
Refining	1B	15.2	12.2	9.3	8.4	5.1	VS24, VS27	5.1	VS24, VS27
Paint, ink and glue	3	37.4	31.4	28.0	25.3	23.8		23.3	
Production	3	2.5	2.3	2.3	2.3	1.0		0.9	VS28
Industrial use	3	20.1	13.4	10.3	9.3	9.1	VS29, FS5	8.7	VS29, VS30, FS5
Domestic and professional use of paint	3	4.7	5.2	4.8	2.9	2.9	FS5	2.9	FS5
Domestic and professional use of other products	3	10.1	10.5	10.6	10.8	10.8	-	10.8	-
Printing	3	11.3	8.0	7.0	5.1	4.2	VS31	3.7	VS31, VS32, VS33
Petrol stations	1B	7.0	2.8	1.7	1.2	0.8	VS34	0.8	VS34
Metal degreasing	3	4.0	1.9	1.0	0.6	0.6	-	0.6	-
Car assembly	3	9.0	5.4	3.5	5.2	3.3	VS35, VS36	2.6	VS35,VS36
Dry cleaning	3	1.8	1.0	0.5	0.2	0.03	VS37	0.03	VS37
Incineration	1A2	5.7	5.0	5.2	5.3	5.3	-	5.3	-
Other sources		13.5	11.4	8.3	9.1	9.0	VS14, VS40	8.3	VS14, VS38, VS39, VS40
Total		**136.5**	**93.7**	**79.1**	**79.1**	**67.4**		**62.6**	
NEC ceiling					**70.9**				

Table 41: Overview of VOC for 'Other sources' (ktonnes)

	NFR code	1990	2000	2004	2010 without measures	2010 with measures	Information sheet number	2010 with additional measures	Information sheet number
Ferro and non ferro	2	0.7	0.7	0.7	1.8	1.8	-	1.4	VS38
Mineral non-metal products	2	1.6	0.7	0.8	0.3	0.3	-	0.3	VS39
Preservation of wood	3	0.4	0.3	0.2	0.2	0.2	-	0.2	VS39
Oil extraction	3	1.6	1.5	0.5	1.1	1.1	-	1.1	-
ceramic industry	1A2	1.3	1.3	0.5	0.4	0.4	VS14	0.4	VS14
Tank cleaning	3	0.2	0.2	0.2	0.2	0.2	-	0.2	VS39
Waste processing	6	2.0	1.4	0.9	0.4	0.4	-	0.4	-
Food, drink, tobacco	2	1.2	1.4	1.7	1.8	1.8	-	1.8	-
Storage depots	1B	2.0	1.4	0.6	0.6	0.5	VS40	0.3	VS40
Gas distribution	1B	2.6	2.5	2.3	2.3	2.2	-	2.2	-
Total		**13.5**	**11.4**	**8.3**	**9.1**	**9.0**		**8.3**	

In contrast to the inventory for SO_2 and NO_x, the current methodology for making an inventory of VOC emissions differs quite significantly from the situation in 2003. The table below shows the emissions for 1990 as estimated in 1999 during the formulation of the NEC Directive, in 2003 during the development of the reduction programme and the most recent estimate.

Table 42: Comparison of VOC for 1990 and 2006 estimated in 1999 – 2003 - 2006 (ktonnes)

	1990 dated 1999	1990 dated 2003	1990 dated 2006	2000 dated 2003	2000 dated 2006
Chemical engineering	39.7	55.5	31.6	27.6	14.6
Refining	19.8	15.2	15.2	13.0	12.2
Paint, ink and glue	38.7	31.5	37.4	30.3	31.4
Printing	7.8	11.3	11.3	8.0	8.0
Petrol stations	7.0	7.0	7.0	4.1	2.8
Metal degreasing	7.8	4.0	4.0	1.9	1.9
Car assembly	7.6	6.8	9.0	5.4	5.4
Dry cleaning	1.4	1.7	1.8	1.0	1.0
Combustion	7.6	14.3	5.7	16.7	5.0
Other sources	7.6	11.7	13.5	12.8	11.4
Total	**145.9**	**159.1**	**136.5**	**120.7**	**93.7**

Major efforts were made during the 2000 – 2003 period to improve the quality of the VOC emission inventory. Towards the end, a study was conducted which involved a brand new methodology offering a much better reflection of the impact of emission reduction measures. This means the estimate for VOC emissions was much higher in 2003 than before that time. This called into question the feasibility of the NEC ceiling in the NEC reduction programme 2003. Subsequent to the implementation of the sectorial study, it was found that the methodology has to be fine-tuned for a number of sectors: Consequently the current emission assessment for 1990 is even lower than estimated in 1999. As a result, the forecasts for 2010 also have to be revised downwards of course and in the light of the current conclusions it may be presumed the NEC programme ceiling will be attained.

As a result of the NEC Directive, it was announced in 1999 that VOC emissions should be reduced by 50%: from 146 to 71 kilotonnes. According to the current forecasts the emissions in the 'with measures scenario' will fall to about 67 kilotonnes, a reduction of about 50%. The target Flanders set itself at the time will therefore will continue to be taken into account.

In the previous table emissions for 2000 as estimated in 2003 are also compared with the recent assessment (2006). The emissions for 2000 are currently 27 kilotonnes lower than estimated three years ago. The key differences are to do with 'chemical engineering' and 'combustion': the emissions for these two sectors for 2000 are put at 25 kilotonnes lower than three years ago.

The next section features a brief account of the changes in the methodology for VOC emissions – inventory taking:

Chemical industry	The sectorial studies had still not been completed in 2003. The study findings showed that the emissions had been overestimated in the past. The emissions were then estimated on the basis of an annual sectorial survey where VOC emissions were reported in terms of total carbon rather than total VOC. The conversion factor used appeared to be too high. The emissions are currently estimated to a great extent on the basis of the individual annual reports. This is not the case for a number of subsectors (such as plastic processing) and the uncertainties continue to be high.
Refining	No changes have been made to the methodology, the emissions are estimated on the basis of individual annual emission reports. The disparities for 2000 were the result of the emission inventory for businesses being fine-tuned.
Paint, ink and glue	It was reported as early as the reduction programme for 2003 that the methodology for assessing emissions in this sector had to be revised. The provisional findings from the sectorial study were then used. The sectorial study has been completed in the meantime and the emission assessment has been slightly adjusted. Nonetheless, the emission assessment for this sector continues to be highly uncertain, as the main tools are emission factors and extrapolations of survey information. It was reported recently that emissions from the manufacture of paint, ink and glue may also be significantly overestimated. The solvent accounting system under the European solvent Directive may result in a more reliable assessment.
Printing	The business solvent accounting system has been applied as early as 2005 to the graphics sector.

Petrol stations	No information was available in 2003 about the implementation of a vapour recovery system for petrol stations (phase I+II) and the impact of the measures already taken was still not taken into account. Survey data recently became available to be taken into account starting from 2004.
Metal degreasing	It is by no means easy to assess the emissions originating with this activity: widely divergent findings are produced depending on the methodology used. On the basis of the sectorial study the emission forecast for 2010 is solely 236 tonnes. In the light of another methodology, now being used in the emission inventory, an emission forecast of about 600 tonnes is estimated. The emissions in the sectorial study are estimated for solely one year (2000) on the basis of a survey conducted among 273 companies. In the emission inventory the emissions are estimated on the basis of the sales figures and emission factors. Both methodologies are subject to a great deal of uncertainty.
Car assembly	No changes have been made to the methodology, the emissions are estimated on the basis of individual annual emission reports.
Dry cleaning	Starting in 2002 the emissions were estimated on the basis of new survey data using new emission factors. This made a major impact on the emissions for 1990 and 2000 and on the forecasts for 2010. In 2003 the emissions for 2010 were still estimated at 0.5 kilotonnes, where this is currently still only 0.03 kilotonnes
Combustion	It was concluded in 2004 that much lower emission factors were used in the RAINS model than what is being used in Flanders. Hence a start was made on a study of the literature so as to provide an overview of all emission factors to be discovered therein. This formed a basis for drawing up a list with new emission factors, to be used from 2006 onwards in emission reporting. The emission factors are almost the same as those in the RAINS model.
Other sources	The key differences are attributable to a revision of the emission factors for gas distribution.

4.2.3 NH_3

Table 43: overview of NH_3 (ktonnes)

	NFR code	1990	2000	2004	2010 without measures	2010 with measures		2010 with additional measures	
						Emission projections	Information sheet number	Emission projections	Information sheet number
Stockbreeding	4	89.2	56.2	41.5	57.9	39.1	VS51-VS55	39.1	VS51-VS55
Fertiliser use	4	3.5	2.9	2.5	2.1	2.1		2.1	
Other	1A2/1A4	5.2	3.2	2.7	2.7	2.6		2.6	
Total		**97.9**	**62.3**	**46.7**	**62.7**	**43.8**		**43.8**	
NEC ceiling						**45.0**			

For the assessment of these emission figures account has to be taken of a number of items, both in a positive and a negative sense:

1. Manure processing is an important measure because it avoids losses when applying manure to the soil. In the emission calculations up to 2005 the possible NH_3 losses that can arise during the different manure processing techniques have not yet been taken into account. In the projections for 2010 a NH_3 loss of 5% when processing manure is taken into account.
2. Low emission use of manure is one of the most efficient measures for reducing NH_3 emissions. The success of this measure has been helped along by this emission stage figuring large in the total emission path (with 'unpurified' emissions) plus the fact that high emissions reductions may be achieved with comparatively simple but particularly efficient techniques. In the meantime, the maximum feasible reduction has almost been achieved in the context of the 'low emission use' target.

4.3 Stationary sources: Wallonia

	NOx					SO2					COVNM					NH3		
	Inventaires d'émissions		Projections d'émissions			Inventaires d'émissions		Projections d'émissions			Inventaires d'émissions		Projections d'émissions			Inventaires d'émissions		Projections
Secteur	2000	2004	2010 BAU	2010 avec mesures envis	2010 avec mesures envis + add	2000	2004	2010 BAU	2010 avec mesures envis	2010 avec mesures envis + add	2000	2004	2010 BAU	2010 avec mesures envis	2010 avec mesures envis + add	2000	2004	2010 BAU
	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)	(t)
Industrie	53.783	50.565	46.085	39.754	30.867	34.522	29.845	29.951	22.561	18.131	10.778	8.726	8.083	8.083	6.584	975	855	960
Prod d'ENERGIE (y compris électricité)	8.870	7.320	5.934	5.934	5.934	6.552	6.070	2.460	2.460	2.460	280	310	424	424	424	30	33	33
Stockage & distribution de combustibles	0	0	0	0	0	0	0	0	0	0	3.404	3.032	3.236	1.264	1.264	0	0	0
Résidentiel	5.312	5.698	4.850	4.850	4.750	7.863	7.320	3.594	3.594	2.085	4.148	3.808	3.342	3.342	3.342	56	58	58
Tertiaire	1.356	1.357	1.444	1.444	1.327	1.260	1.284	607	607	352	193	193	411	411	411	8	8	8
Usage de solvants	0	0	0	0	0	0	0	0	0	0	20.563	17.824	21.342	15.492	14.738	0	0	0
Agriculture & élevage	21	22	9	9	9	39	42	6	6	3	4	4	0	0	0	25.363	24.454	24.247
Déchets	590	1.344	1.750	1.750	1.750	1.086	1.354	1.326	1.326	1.326	39	109	109	109	109	450	293	428
Total tous secteurs (Hors Transports)	69.932	66.306	60.072	53.741	44.637	51.322	45.915	37.944	30.554	24.358	39.409	34.006	36.946	29.124	26.872	26.882	25.700	25.734
Plafond NEC			46.000					29.000					28.000					28.700
Emissions de la nature											35.135	34.024						

4.4 Stationary sources: Brussels

4.4.1 Socio-economic hypotheses

The working hypotheses of projections as established in 2003 for energy consumption are found in the document entitled "Potential for reducing CO_2 emissions in the Brussels Capital Region in 2008-2012"[39] [40] and have been updated in 2006 (see annex D). The main changes to the 2003 projections concern cogeneration, whose development had been underestimated No projection of industrial activity has been conducted in light of its small overall contribution and its disparity.

Turning to inventories, the difficulty of estimating VOC emissions and in particular the emissions of certain small-scale activities should be highlighted. These sectors concern a large number of entities involved in different processes and production.

[39] http://www.ibgebim.be/francais/pdf/Donnees/Climat_EtudePotentielReduction24-12-03.pdf

[40] A large share of emissions is caused by the heating of buildings. Emissions are therefore linked to weather conditions. The climatic hypothesis was 2010 degree-days 15-15.

Table 44: Emissions and projections for NO_x for the Brussels Capital Region

NO_x (ktonne)	NFR CODE	1990	2000	2004	2010 without measures *	2010 with measures		2010 with additional measures	
						Emission estimate	Fiche number	Emission estimate	Fiche number
Electricity; incineration of waste with energy recovery, CHP…	1A1	0.799	1.072	1.091	1.350	0.505	BS1	0.464 **	
Industrial process	1 A 1 c / 1 B 1 b / 2 C	0.438	0.002	0.002	0.002	0.002		0.002	
Industry (energy consumption)	1 A 2 f	0.263	0.229	0.192	0.170	0.170		0.170	
Residential (energy consumption)	1 A 4 b i	1.389	1.548	1.624	1.792	1.640	FS1	1.570	FS2
Services (energy consumption)	1 A 4 a	0.781	0.784	0.815	0.882	0.826	FS1	0.781	FS2
Incineration	6 C	0.004	0.003	0.003	0.025	0.025		0.025	
Others									
Total		**3.674**	**3.639**	**3.726**	**4.221**	**3.168**		**3.012**	

* : including measures of energy consumption reduction

** : CHP, catalysis

Table 45: Emissions and projections for SO_2 for the Brussels Capital Region

SOx (ktonne)	NFR CODE	1990	2000	2004	2010 without measures *	2010 with measures		2010 with additional measures
						Emission estimate	Fiche number	Emission estimate
Electricity: incineration of waste with energy recovery, CHP	1A1	0.291	0.017	0.016	0.020	0.019	BS1	0.018
Industrial process	1 A 1 c / 1 B 1 b / 2 C	0.528	0.010	0.010	0.010	0.010		0.010
Industry (energy consumption)	1 A 2 f	0.084	0.052	0.048	0.030	0.015	FS3/FS4	0.008**
Residential (energy consumption)	1 A 4 b i	1.373	1.133	0.941	1.011	0.569	FS3	0.347**
Services (energy consumption)	1 A 4 a	0.620	0.435	0.397	0.501	0.251	FS3	0.125**
Incineration	6 C	0.001	0.001	0.001				
Others								
Total		**2.896**	**1.647**	**1.413**	**1.573**	**0.863**		**0.508**

- *: including measures of energy consumption reduction
- **: - Further reduction in the sulphur content of light fuel oil to 0.05%

Table 46: Emissions and projections for VOC for the Brussels Capital Region

VOC (ktonne)	NFR CODE	1990	2000	2004	2010 without measures	2010 with measures		2010 with additional measures
						Emission estimate	Fiche number	Emission estimate
Electricity-incineration of waste with energy recovery, CHP	1A1	0,010	0.011	0.012	0.017	0.017		0.017
Industrial process	1 A 1 c / 1 B 1 b	0.888	0.000	0.000	0.000	0.000		0.000
Industry (energy consumption)	1 A 2 f	0.005	0.005	0.004	0.003	0.003		0.003
Residential (energy consumption)	1 A 4 b i	0.339	0.214	0.239	0.159	0.159		0.159
Services (energy consumption)	1 A 4 a	0.059	0.065	0.069	0.036	0.036		0.036
Distribution of oil products	1 B 2 a v	1.256	0.636	0.643	0.765	0.046	BS1	0.046
Natural gas	1 B 2 b	0.473	0.305	0.202	0.141	0.141		0.141
Food and Drink	2D2	0.398	0.134	0.171	0.146	0.146		0.146
Paint application	3A	1.134	1.134	0.813	1.159	0.990	BS1	0.990
Decreasing and dry cleaning	3 B	0.184	0.185	0.148	0.167	0.091	BS1	0.091
Others	3 D	3.249	3.035	3.139	3.810	3.296	BS1	3.098 *
Incineration	6 C	0.000	0.000	0.000	0.000	0.000		0.000
Total		**7.993**	**5.724**	**5.440**	**6.403**	**4.925**		**4.726**

*: reinforcement of awareness campaigns on products' solvent content

4.5 Belgium: total

Summing up the emissions from the previous tables in this chapter leads to the emissions that are given in Table 47. Both SO_2 and NO_x emissions are expected to decrease drastically. Emissions of VOC and NH_3 will also decrease, but to a lesser extent.

A discussion of these emissions as compared to the NEC ceilings is given in chapter 8.

Table 47: Emission data and projections for Belgium

(ktonnes)	**2000**	**2004**	**2010 With measures**	**2010 With additional measures**
SO_2	171.0	157.3	89.7	74.7 – 78.4
NO_x	331.6	304.4	196.2	175.4 – 178.3
VOC	202.0	167.2	127.6	120.5
NH_3	91.1	74.5	70.2	70.2

5 Geographical distribution of the emissions

The following table shows the emissions for 2000 for the various pollutants and the emission forecasts for 2010 for stationary sources in each of the regions and for mobile sources. In view of the limited surface area in Belgium and each of the regions, this provides an adequate picture of changes in the geographical distribution of the emissions.

Table 48: Emissions in Belgium between 2000 and 2010

(emissions in ktonnes)		Non-stationary sources	Stationary sources			Total
			Flanders	Wallonia	Brussels	
SO_2	2000	4.9	113.1	51.3	1.6	171.0
	2010 w.m.	0.3	58.0	30.6	0.9	89.7
	2010 w.a.m.	0.3	49.5-53.2	24.4	0.5	74.7-78.4
NO_x	2000	175.4	82.6	69.9	3.6	331.6
	2010 w.m.	75.9	63.4	53.7	3.2	196.2
	2010 w.a.m.	70.4	57.3-60.2	44.6	3.0	175.4-178.3
VOC	2000	63.2	93.7	39.4	5.7	202.0
	2010 w.m.	27.7	67.4	29.12	4.93	129.2
	2010 w.a.m.	27.7	62.6	26.87	4.73	121.9
NH_3	2000	2.0	62.3	26.9	<0.1	91.1
	2010 w.m.	0.6	43.8	25.7	<0.1	70.2
	2010 w.a.m.	0.6	43.8	25.7	<0.1	70.2

EMEP grid cell reporting for 2000 (revised version of 2006) and forecasts described in this programme formed a basis for checking for any major emission shifts between the various grid cells in Flanders. None were discovered apparently: the grid cells where most of the emissions are located are also set to be the focus of the main emissions in the future. The percentage reductions, too, are similar in the various grid cells.

6 Costs and benefits of the policy and measures

6.1 Costs : Flanders

The intersectorial weighing referred to in chapter 2.3.3 estimates the costs for stationary sources in order to comply with the NEC ceilings for VOC, SO_2 and NO_x.

If solely the costs curves per pollutant are considered, thus discounting the interactions between the various pollutants, the total annual cost for Flanders works out at 111 M€ (44 M€ for SO_2, 48 M€ for NO_x and 19 M€ for VOC). When a joint optimisation is performed across the three pollutants, but discounting correction factors, the total annual cost falls to **92 M€** (50 M€ investment cost and 42 M€ operational cost). Consequently, this is the cost price if the most cost-effective solution is chosen. The sectors that have to bear the highest costs are the electricity industry, oil refineries and the glasshouse horticulture sector. Table 49 features the annual costs for the key sectors when the most cost-effective solution is chosen.

Table 49: Costs for stationary sources in Flanders with a cost-effective distribution of the reduction efforts

Sector	Annual cost (k€)
Electricity production	30,031
Oil refineries	20,961
Iron and steel production	5,975
Chemical engineering	6,486
Glasshouse horticulture	9,013
Other	19,067
Total	**91,533**

When the financial-economic capacity of the sectors are factored in, the costs rise to 94 M€. Allowing for the relative environmental impact produces a total cost for Flanders of 93 M€ and taking account of both parameters together also gives a total cost of 94 M€. The shifts appear in the costs borne by the various sectors but in these cases, the same sectors as before have to bear the highest cost. Factoring in these parameters increases the total costs for industry in Flanders but they continue to be well under the cost calculated if no heed is paid to interactions between the various pollutants (chiefly SO_2 and NO_x).

The study also examines what impact higher versus low NEC ceilings have on the costs. A 5% decrease in the NEC ceilings leads to a 27.5 M€ cost increase or 30%. A 5% increase in the NEC ceilings leads to a 20.1 M€ cost decrease or 22%.

In reality a number of the measures that have to be taken in the case of the most cost-effective solution are not feasible. Thus, the high costs for glasshouse horticulture reflect investments in new natural gas pipes, while this conversion to natural gas is not a straightforward requirement in practice. Measures have also been selected for the iron and steel sector that seem not to be feasible. This means that other, more costly measures have to be taken instead. The real cost of achieving the NEC ceilings for SO_2, NO_x and VOC will therefore be close to 119 M€ (NEC-5%).

No information is available for the policy covering NH_3 emissions from farming and stockbreeding and the policy on non-stationary sources so that an assessment can be made of the cost in the context of this programme. In both cases, the air contamination policy forms part of a broader framework focused on such things as reducing the amount of nitrate leaching into groundwater or manure surpluses or improving traffic management.

6.2 Costs: Wallonia

Techniques d'abattement des SO_2

Les unités de désulphuration humide représentent un investissement de l'ordre de **50 à 80 € par Nm³/h** et des coûts d'exploitation de 0,5 à 1 euro par kg de SO_2 abattu.

D'autres chiffres expriment le coût d'investissement qui serait de l'ordre de **15 €/t de capacité** annuelle et des coûts d'exploitation de **35 €/t clinker produit**.

Dans la pratique de nos installations, des calculs ont démontré que le coût variait entre **200 et 300 € par tonne de SO_2 abattue** dans des secteurs comme le ciment où l'investissement d'une désulfuration humide sur une installation représente au minimum **un investissement de 2 à 3 millions d'euros** et probablement plus.

Techniques d'abattement des NO_x

Les coûts d'investissement d'une technique SNCR appliquée à des fours rotatifs se situent **entre 0,5 et 1,2 millions d'euros**.

Les coûts d'exploitation se situent quant à eux entre **0,1 et 1,7 €/tonne de chaux** pour une capacité de four de 1000 tonnes par jour et des émissions initiales de l'ordre de 1 500 mg de NO_x/Nm³.

6.3 Costs: Brussels

The region has undertaken two cost studies:

- The first, on the "Potential for reducing CO_2 emissions in the Brussels Capital Region in 2008-2012"[41], is devoted to the cost of reducing energy consumption in the residential and services sectors. It has helped to improve the premium system.
- The second, "A technical-economic analysis of technical prescriptions in the Air-Climate Plan of the Brussels Capital Region"[42], is devoted to the emissions saving and the cost of each prescription. This study led to the establishment of priorities, to budgeting and programming of various measures of the Air-Climate Plan.

6.4 Benefits: Belgium

The emission ceilings established at the start of the negotiations undertaken by the European Commission were calculated on the basis of the following objectives for 2010 compared with 1990:

- halving the ecosystem surface area where the critical load for acidification is exceeded;
- a 67% reduction in the ozone excess above the threshold value for the protection of public health (AOT60=0);
- a 33% reduction in the ozone excess above the threshold value for the protection of vegetation (AOT40=3ppm.h);

In the light of the negotiations, most ceilings were raised so they are not sufficient to achieve these objectives.

---

[41] http://www.ibgebim.be/francais/pdf/Donnees/Climat_EtudePotentielReduction24-12-03.pdf

[42] http://www.ibgebim.be/francais/pdf/Donnees/Climat_Couts-Benefices-PAC-intro.pdf

The emission ceilings were developed as a result of modelling with the RAINS model developed by the Austrian research institute IIASA. The RAINS model was used to try to attain the specified objectives in the most cost-effective way for Europe. The effects that appear in Belgium are the outcome not only of emissions in Belgium, but also of those from neighbouring countries and even those from further afield. Similarly, the emissions in Belgium contribute to acidification and ozone formation in other EU Member States.

Any comparison of the costs and benefits of this Directive should therefore be focused not at Belgian but at a European level. Studies carried out for the formulation of this Directive and the Gothenburg Protocol under the LRTAP Convention (where national emission ceilings are also included, which are a bit less stringent than those in the NEC Directive) show that the benefits of this Directive for the European Union outweigh the costs to a significant degree.

Presented by the European Commission in September 2005, the thematic strategy on air pollution was preceded by a detailed costs–benefits analysis, to convert the effects of air pollution (such as years of life lost and diseases) into monetary values (owing to a lack of information this was not undertaken for the effects on ecosystems). This was applied for the year 2020 and the information is also available at Member State level. Apparently this strategy, involving in particular a revision of the NEC Directive, with emission ceilings up 2020 and possibly also for particulate matter, would also offer Belgium benefits far outweighing the costs. Further details are available on the European Commission website: http://ec.europa.eu/environment/air/cafe/general/keydocs.htm

7 Assessing and monitoring the programme

7.1 Federal Government

The follow-up of the implementation of this Plan is checked regularly. Twice a year (six-monthly), each department (FPS/PPS) communicates a roundup of the implementation of the relevant measures within their competence to the Federal Public Service of the Environment.

An intermediary evaluation is carried out and presented to the Council of Ministers on the basis of those reports.

7.2 Flanders

7.2.1 General

This programme offers a description of emission reduction measures that will or may be taken, while formulating emission forecasts reflecting these measures. The forecasts form a basis for deciding whether or not further measures are required. As it is impossible to make a completely accurate forecast of what will happen in the future, a regular assessment has to be made to see if the forecasts formulated are still appropriate, or if the emission trends reflect what was evaluated. This is achieved in various ways:

- The Flemish Environment Agency (VMM) publishes every year its “Lozingen in de Lucht” (“Discharges into the Air”)-report. This examines the emissions from a whole series of pollutants (apart from the NEC pollutants, it covers heavy metals, POPs, greenhouse gas emissions and particulate matter) in the various sectors in Flanders. This covers emissions that companies refer to in their annual emission reports and emissions estimated for companies not required to present an annual emission report and those for other sectors (such as households and transport). Consequently, these publications provide an adequate overview of the trend in emissions, both for Flanders as a whole and for the various sectors.
- In the case of companies that account for a large share of the emissions or companies for which specific measures are planned, the emissions are monitored via the individual annual environmental reports, where the emissions are reported for each source within the company and information is also provided about activities and reduction measures.
- Via consultations that have been and are being held between the administration and industry for the preparation of this reduction programme or as a result of a proposal for new measures.
- A specific system of reporting is provided for a number of policy measures. This is the case, for example, for the environmental policy agreement with the electricity sector. Under this heading, the sector is required to draw up a report every year making a review of the emissions and describing how the requirements in the environmental policy agreement (more specifically the emission ceilings, see chapter 3.3.4.3) will be met.
- Changes in activities and emissions of companies are also monitored via environmental impact reports. These EIRs feature not only descriptions of emissions from new installations or extensions but also a review of the progression of the emissions hitherto. EIRs also examine the implemented and future emission reduction measures.
- As part of the process for implementing the IPPC Directive all the key industrial installations in Flanders are audited for measures due to be taken and to see how far their emission levels are consistent with what is presented in the best BAT reference document (BREF) as a BAT level.
- Solvent Directive – solvent accounting system: starting in 2003 companies covered by the solvent Directive are required to prepare a document every year making an assessment in the light of the Directive's emission limit values. These documents, which may be sought at the request of the

administration, feature information about solvent emissions, plus details about solvent consumption and the reduction measures put in place.

The development and implementation of the measures described in this programme will result in the emission forecasts being adjusted, which, in turn, may lead to another analysis of the need or otherwise for further measures. This is a continuing process. A suitable follow-up will be provided for by the administration being required to report to the Government of Flanders every year about the state of play with the implementation of the programme. This will be achieved together with the system for reporting progress with particulate matter (under the air quality Directives).

7.2.2 Emissions from extensions and new installations

Just about all the relevant sectors will have to make major efforts with a view to achieving the ambitious objectives of this reduction programme. This applies first of all to existing installations, whose emissions have to be curbed. It is equally important to decide which emissions from new installations and extensions of existing ones may be expected, which emissions for these new installations may be allowed and which policy instrument will be deployed to get these emissions under control.

Although existing establishments will be required to make major efforts this need not imply that no additional emissions from new establishments should be allowed. In the case of new installations and extensions of existing installations, careful thought should be given to ensuring that the overall environmental space (in this case for emissions from the relevant pollutants) is not exceeded, while guaranteeing that space is provided for the additional emissions within the Flemish emission ceilings.

The sectorial studies take account of the anticipated economic growth, a rise in production capacities, planned expansion and an increase in energy consumption pursuant to the formulation of the various cost curves and the corresponding scenario's[43]. This anticipated growth for one sector is invariably reproduced in the Business as Usual (BAU) scenario. Meanwhile, these sectorial studies now date back a few years, and the outlook for industry has been adjusted in the meantime. Although it was impossible to produce an analysis that is just as detailed as the sectorial studies, the forecasts have been updated via:

- a survey of the sector or the leading businesses within a sector (refineries, iron and steel production, non ferrous metals, storage and handling, production of ink and paint);
- the required annual reporting pursuant to the environmental policy agreement with the electricity producers;
- recent forecasts for energy consumption (chemical engineering, other industrial sectors and non-industrial sectors);
- including information available in environmental impact reports and environmental permit applications in the forecasts;
- assessing these forecasts in the light of the growth figures companies report under the benchmarking agreement and making adjustments where appropriate.

The level of economic growth has to remain within the limits of these forecasts so as not to jeopardize the chances of achieving these emission ceilings, while new installations also have to observe tough environmental conditions. Should the level of economic growth be higher within these sectors (and thus the additional emissions) the ceiling may be attained solely by applying even more ambitious (and more economically difficult to achieve) measures to the existing installations.

[43] More detailed information about the sectorial studies is available at www.vlaanderen.be/lucht or in the NEC programme for 2003 where the assumptions from the sectorial studies are reproduced

This analysis shows that for sectors that have been subjected to sectorial studies the assessments (for growth) undertaken in the sectorial study are confirmed by the most recent assessments. The future energy consumption was apparently underestimated in 2003 for the residential and tertiary sectors.

In the case of 'other industrial sources' another major source of emissions has emerged. Not all the relevant services were asked their opinions about the subject of licensing. This showed that in spite of the extensive monitoring structure available in the Flemish Region, a case may slip through the net, and so there is room for an improvement in the coordination between the various departments (such as the Environmental Authorisations Department, Air, Nuisance, Risk Management, Environment & Health Department and the Environmental Impact Reporting Department). This will of course be addressed. In the aforementioned case, a check is being made to see if further measures may be taken under this heading.

When information from environmental impact reports and environmental authorisations is used to keep the forecasts up to date, these environmental impact reports and environmental authorisations represent an instrument for keeping the anticipated emissions from extensions and new installations in check (see also information files VS61 and VS62). One of the criteria for deciding if additional reduction measures should or should not be considered in an environmental impact report (and possibly imposed during a subsequent phase) is in fact the NEC Directive. An examination has to be made for each project to see to what extent the additional emissions fall within the limits of the forecasts from the corresponding study or studies. If this is not the case, a check has to be made to see what emission reduction measures are possible and what their reduction potential and costs are. Apart from the NEC there are also other criteria for considering reduction measures. The contribution a project makes to the concentrations of various pollutants in the ambient air, compared with the standards in the framework Directives and the daughter Directives on air quality and the application of the best available techniques, may also be a reason for considering and imposing additional measures.

As explained earlier on, consideration is being given to the use of economic instruments for NO_x. The way in which the issue of potential extensions and new installations is dealt with as a result of this depends on the instrument chosen and the procedures related to the instrument.

One option that has been investigated is to develop an economic instrument for imposing a maximum level of emissions (cap) on the total for installations covered by the instrument. The way in which additional emissions resulting from extensions or new installations are managed depends on the way the emission rights are allocated: if this is achieved on the basis of historical emissions or emission forecasts, new installations or extensions will have to buy emission rights from existing businesses. If the emission rights are provided in the light of a performance standard, there may be a decrease in the number of rights provided for each unit of the standard. A number of rights may also be set aside for new entrants.

The scope would obviously have to be defined so as to cover the leading (industrial) sources of NO_x emissions.

In such an emission trading system, the cap has to be established in the light of the emission ceiling imposed for stationary sources in Flanders and the emission forecasts for sources not covered by the field of application (with due regard to measures that are still possible for these sources). The emissions from these other sources obviously have to be monitored so as prevent them from reaching higher-than-anticipated levels. Should this be the case, additional measures must be taken for these other sources, or the NO_x cap for the major sources will have to be made more restrictive.

The balancing of the effectiveness and efficiency of the different possible economic instruments an emission levy with recycling of revenues (see earlier in this text) has been chosen in case an economic instrument will be introduced. In such a system environmental impact reports and authorisation requests will have to be carefully monitored so as to keep the emission forecasts up to date, while the rate of levy may have to be adjusted so as to encourage more businesses to espouse the emission-

reducing measures (rather than paying a higher levy). When a levy is applied with recycling, the level of recycling may obviously be adjusted.

7.3 Brussels

Every month, the Air-Climate department of IBGE sits around the table with a number of experts in particular fields relating to air pollution such as transport and energy, in order to discuss and monitor the measures of the Air-Climate Plan. Every two years, the department prepares a report on the Plan's state of play. The report is then submitted to the government.

The study, "A technical-economic analysis of the Air-Climate Plan of the Brussels Capital Region" also sets up a system of implementation and performance indicators for each prescription in the Air-Climate Plan.

8 Conclusion

8.1 Non-stationary sources

The following table examines the forecasts for the transport sector. An appropriate assessment is based on the emission factors and demarcation of the off-road sectors used in the development of the emission ceilings.

Table 50: Emission forecasts for non-stationary sources in Belgium

(ktonnes)	**2010 NEC**	**2010 with measures**	**2010 with additional measures**
SO_2	2	0.32	0.32
NO_x	68	75.94	70.44
VOC	35.6	27.75	27.75
NH_3		0.64	0.64

The emission ceilings for VOC and SO_2 are attained. The ceiling for NO_x is breached even if heed is paid to the extra measures taken by the regions. No NH_3 emission ceiling is set for non-stationary sources. For NH_3 the emissions noted for road traffic, rail transport, inland shipping and farm tractors need to be taken into account in the case of stationary sources.

The NO_x emission factors for road traffic have been adjusted since the creation of the emission ceilings. New conclusions about the off-road sector also result in higher emissions for all three pollutants. These new conclusions lead to a breach of the VOC ceiling. The SO_2 ceiling is breached but the largest contribution to this is the consumption of heavy fuel oil for traffic between Flemish ports, which is still extremely uncertain. As a result of the new conclusions the ceiling for NO_x is seriously breached.

8.2 Stationary sources: Flanders

Table 51 shows the Flemish NEC and the emission projections in 2010 in the various scenarios (without measures, with measures and with additional measures) for the 4 pollutants.

Table 51: Emission forecasts for stationary sources in Flanders

(ktonnes)	2010 NEC	2010 without measures	2010 with measures	2010 with additional measures
SO_2	65.8	111.1	58.0	49.5-53.2
NO_x	58.3	88.1	63.4	57.3-60.2
VOC	70.9	79.1	67.4	62.6
NH_3	45.0	56.7	43.8	43.8

This reveals that the measures already taken since 2000, or those that will definitely be taken prior to 2010 for the four pollutants, have succeeded in achieving a significant emission reduction.

In the case of SO_2 the package of measures selected is sufficient for attaining the emission ceiling. There are still a number of measures available for reducing the emissions further. Some of these

measures will certainly still be taken, but the emission reductions may possibly be achieved only after 2010.

In the case of NO_x there is a policy deficiency of about 5 ktonnes NO_x with the current package of measures. This policy deficiency was not established in the programme the Flemish Government approved in 2003. The main causes are the higher estimates of emissions from non-industrial sources (which are a direct consequence of the updated energy forecasts) and the present, more realistic, assessments for the iron and steel sector. A number of measures are identified in this programme so as to contend with the policy deficiency. This generally involves measures for which there are lingering doubts about their technical feasibility or that imply a heavy economic burden. The most feasible additional measures cut emissions by about 3.2 ktonnes, which is not enough to attain the ceiling. In this case measures must also be taken over which even more serious question marks are hanging. This involves:

- a RAC installation in sinter plants and a SCR in the coke plant in the iron and steel production sector (information sheet VS9),
- flue gas recirculation and a SCR in sinter plants in the iron and steel production sector (estimated reduction potential: 1.8 ktonnes NO_x and 0,3 ktonnes SO_2)[44],
- SCR in steam and gas turbines of electricity producers (estimated potential 3 ktonnes NO_x),
- SCR in process and combustion units in the bulk chemical engineering sector (estimated potential 2.5 ktonnes NO_x),
- SCR in refinery cracking furnaces (estimated potential: 1 ktonnes NO_x).

An information sheet has been established only for the first of these measures, as these were selected according to the sectorial study and the intersectorial appraisal with a marginal cost of less than 5 €/kg. The other measures were selected in the intersectorial appraisal when the goal was an emission 10% under the NEC for NO_x (consequently, these are measures taken when other measures selected by preference are not feasible).

In view of the huge uncertainty about the technical and economic feasibility of these measures, another path may be followed: the deployment of economic instruments (information sheet VS65). This approach has the advantage that encouragement is also given for taking measures not described in the sectorial studies.

The intersectorial weighing already showed that costly measures should be taken in the case of NO_x: according to this study, any measures with a marginal cost of up to 6.6 €/kg. However, in practice a number of measures that come under this heading are not technically feasible (such as a SCR in a sintering plant) or are much more costly than originally budgeted for, so that other, even more costly measures have to be taken.

For that reason, the Flemish Government has decided to introduce by 2008 or 2009 a temporary regulation NO_x levy for stationary sources with maximal recycling of revenues to costefficient reduction projects (also for stationary sources) unless in the consultation of the target groups a consensus is reached on alternative additional instruments and/or measures with the same reduction potential. These alternative instruments can either be another economic instrument or the imposing of often company specific measures through Vlrem or the individual environmental permit.

In contrast to the reduction programme in 2003, the most recent forecasts reveal that the VOC emission ceiling may be attained with the measures that are already applied or will certainly be applied during the 2000 – 2010 period. This positive trend is the result not only of the active application of measures but also of an improvement in the emission inventory so the impact of the measures applied can be taken into account more effectively. Consequently, the emission assessment was down for the

[44] The chapter on the iron and steel sector also refers to BICAR® injection as a potential technique. If an RAC is already decided upon, the additional reduction potential of BICAR® injection will be minimal.

entire 1990 – 2004 period, and so, accordingly, was the forecast for 2010. However, if the emissions for 1990 (137 ktonnes) are compared with the forecast for 2010 (67 kilotonnes), the goal to which Flanders committed itself in 1999 is maintained, including a 50% or so reduction in VOC emissions.

In the case of NH_3, too, the measures already taken are sufficient to attain the emission ceiling. This conclusion also applies when emissions from non-stationary sources are factored in. Further reductions are possible only via a continuing active application of the package of measures already decided upon, but no quantification of the possible reduction potential is currently available.

8.3 Stationary sources: Wallonia

Table 52: Overview for SO_2 emissions from stationary sources in Wallonia

valeurs chiffrées exprimées en kt de polluant		dépassement en valeur absolue	pourcentage dépass. par rapport au plafond	
SO2				
émissions 2004	45.919	16.919	58%	
plafond NEC	29.000		0%	
scenario BAU 2010	37.944	8.944	31%	
scenario mesures envisagées	30.554	1.554	5%	
scenario mesures additionnelles	24.357	-4.643	-16%	
potentiel additionnel				6.197
pourcentage de mesures additionnelles				25%
à mettre en œuvre pour atteindre le plafond				
Potentiel mesures du fédéral (mes. Addit.)				
Potentiel S fuel lourd à 0,6 % dans l'industrie		2.615		
Potentiel S dans gasoil à 0,05 % ds résid., tert. et agric.		1.767		

Table 53: Overview for NO_x emissions from stationary sources in Wallonia

valeurs chiffrées exprimées en kt de polluant		dépassement en valeur absolue	pourcentage dépass. par rapport au plafond	
NOx				
émissions 2004	66.295	20.295	44%	
plafond NEC	46.000		0%	
scenario BAU 2010	60.072	14.072	31%	
scenario mesures envisagées	53.741	7.741	17%	
scenario mesures additionnelles	44.637	-1.363	-3%	
potentiel additionnel				9.104
pourcentage de mesures additionnelles				**85%**
à mettre en œuvre pour atteindre le plafond				

Table 54: Overview for VOC emissions from stationary sources in Wallonia

valeurs chiffrées exprimées en kt de polluant		dépassement en valeur absolue	pourcentage dépass. par rapport au plafond
COV			
plafond NEC	28.000		
scenario sans contrôle	36.946	8.946	32%
scenario CLE	29.124	1.124	4%
scenario additionnel	26.872	-1.128	-4%

Plafond NH_3

Emissions de l'année 2004 : 25 694,4 t

Emissions BAU 2010 : 25.734 t

Aucun changement n'a été opéré au programme de réduction NEC à l'horizon 2010 (AGW du 25 mars 2004) et l'évolution favorable due à la réforme de la politique agricole commune (PAC) suffit à atteindre et respecter le plafond NEC pour ce polluant.

Néanmoins, pour atteindre les plafonds NEC 2020 (en négociation actuellement), il sera nécessaire d'adopter des mesures de manière rapide car elles portent principalement sur les équipements des bâtiments d'hébergement des animaux, lesquels ont une durée de vie dont il faut tenir compte.

Plafond SO_2

Dans l'état actuel des choses, il sera encore nécessaire d'adopter quelques mesures "additionnelles" afin de remplir les obligations en matière de réduction des émissions de $_{SO2}$.

Plafond NO_x

Dans l'état actuel des choses, il sera très difficile de remplir les obligations en matière de réduction des émissions de NO_x. Il serait nécessaire de mobiliser une part très importante de mesures additionnelles. Le coût de ces mesures pourrait être prohibitif pour l'économie wallonne. Il convient dès lors de travailler tant sur les mesures d'accompagnement des mesures additionnelles que sur les mesures permettant de limiter plus encore les émissions, afin de tenter d'atteindre le plafond pour la date prévue, même si cet objectif est ambitieux au regard de la situation de départ.

Plafond COV

Dans l'état actuel des choses, il sera nécessaire d'adopter des mesures "additionnelles" afin de remplir les obligations en matière de réduction des émissions de COV. Ces mesures sont peut-être déjà intégrées dans les permis environnement des industries concernées mais il est trop tôt pour avoir le retour d'expérience en terme d'efficacité de ces mesures; c'est la raison pour laquelle, par prudence, nous avons mis ces mesures dans les mesures additionnelles.

8.4 Stationary sources: Brussels

Table 55: Overview of emissions from stationary sources in Brussels

(in ktonne)	2010 NEC	2010 without measures	2010 with measures	2010 with additional measures
SO_2	1.4	1.57	0.86	0.51
NO_x	3	4.22	3.17	3.01
VOS	4	6.40	4.92	4.73
NH_3	-	-	-	-

The region complies with its ceilings of sulphur emissions, in the wake of the reduction of the sulphur content in heating fuel oil from 0.2 to 0.1 %.

NO_x will be sharply reduced in the BCR thanks to among others the extensive denitrification of waste incinerator flue gas. With these measures the region may however slightly exceed the limits.

The overstepping of the limits is closely tied to the expected boom in cogeneration, whose emissions must be reduced via the use of catalysis. This point is currently under study by IBGE's "authorization-environment permit" department. An additional necessary measure is the strengthening (if feasible) of the royal decree on NO_x and CO emission standards for boilers on the market. These measures would nearly enable us to attain our regional ceiling. Moreover, all the measures designed to reduce consumption pull in the same direction. This key point is the main thrust of the latest Air-Climate Plan diagnosis i.e. the need to boost energy-saving measures.

VOC emissions have also considerably fallen since 1990. However, the region will probably not respect its assigned ceiling. Its elbow room in this area is quite limited. All the additional technical measures will not enable us to reach the ceiling. Also, the residual emissions hotspots are the ones about which there is a great deal of uncertainty.

In that connection, household consumption of solvents accounts for nearly 40% of total emissions. The measure contained in the Air-Climate Plan (prescription no. 55; regulate and inform: product standards for solvents) will be reinforced by the introduction in 2007 of a survey on the lifestyle habits of

Brussels inhabitants. The survey will give a better idea of the potential for reduction and will improve the awareness campaign.

In light of its very low emissions, the Brussels Region has no target for reducing NH_3.

8.5 Belgium

Table 56 summarises the emission projections for Belgium, both for stationary and non stationary sources and compares them to the national emission ceilings.

Table 56: Emission projections for Belgium

(ktonnes)	**2010 NEC**	**2010 With measures**	**2010 With additional measures**
SO_2	99	89.7	74.7 – 78.4
NO_x	176	196.2	175.49 – 178.3
VOC	139	129.2	121.9
NH_3	74	70.2	70.2

This table shows that the Belgian emission ceiling for 2010 will be attained for three of the four pollutants (SO_2, VOC and NH_3). The NO_x ceiling is expected to be breached if no additional measures are taken. If all identified additional measures are being taken, the NO_x ceiling can be barely met.

Figures in Table 56 assume the emission factors for transport and the demarcation of the off road sector as they were used when establishing the NEC ceilings. Taking into account recent knowledge for these sectors leads to additional emission of ca. 63 ktonnes NO_x, 3 ktonnes VOC and 3 ktonnes SO_2. For both VOC and SO_2, this does not threaten the emission ceiling; for NO_x this leads to a much larger overrun of the ceiling.

NO_x has an impact on both the acidification of the environment and the formation of tropospheric ozone (ground-level ozone).

In the event of acidification any breach of the NO_x ceiling is offset by the fact that emissions in 2010 will be under the NEC ceiling for NH_3 (to a limited extent) and for SO_2 (to a much greater extent). Where the ceilings for non-stationary sources and stationary sources in Belgium would result in a potential acidifying emissions of 11,273 million aeq (acid equivalents), these emissions work out at 11,196 million aeq in the with measures scenario –so under the level associated with the NEC ceilings- and 10,273 million aeq in the with additional measures scenario.

In the event of tropospheric ozone forming any breach of the NO_x ceiling is offset by the fact that VOC emissions will be well under the NEC in 2010. What is more, Belgium is located in a VOC-sensitive area for ozone formation. This means that a reduction in VOC emissions invariably leads to a reduction in ozone concentrations, which is not always the case for a reduction in NO_x emissions (as a result of the complicated reaction mechanism resulting in ozone formation).

9 Annexes

Annex 1: Measures information sheet

Annex 2: Emission data and forecasts in NFR format (annex B of the recommendations of the Walloon Region on Implementation)

Annex 3: Socio-economic assumption as reported in the context of Decision 280/2004/EC of the European Parliament and the Council (updated for Brussels)

Annex 4: Definition of stationary sources for the VOC pollutant

Annex 5: Different methodologies for estimating emissions for the period 1990 – 2004 and projections for 2010 for the transport sector

Annexes 1-3 contain information that was requested in the recommendations that have been established by the CAFÉ Working Group on Implementation.

Annex 4 gives information on the demarcation of the sectors that have been considered in the Flemish programme for stationary sources.

Annex 5 gives information of the different methodologies that have been used for calculating emissions for non stationary sources.

10 References

- AMINAL, Sectie Lucht, Nota aan de MINA-raad en de SERV: Protocol van het verdrag over grensoverschrijdende luchtverontreiniging ter bestrijding van verzuring, eutrofiering en ozon in de omgevingslucht en de Europese richtlijn nationale emissieplafonds, september 1999
- AMINAL, Sectie Lucht, Protocol van het verdrag over grensoverschrijdende luchtverontreiniging ter bestrijding van verzuring, eutrofiering en ozon in de omgevingslucht en de Europese richtlijn nationale emissieplafonds: evaluatie van de adviezen van de MINA-raad en de SERV en evaluatie van de doelgroepenconsultatie, juli 2001
- AMINAL, Sectie Lucht, NEC-reductieprogramma: Emissiereductieprogramma voor het Vlaamse Gewest voor de polluenten SO_2, NO_x, VOS en NH_3 in het kader van Richtlijn 2001/81/EG, december 2003
- Ecolas, 'Evaluatie van het reductiepotentieel voor diverse polluentemissies naar het compartiment lucht in een aantal homogene subsectoren van de chemische industrie in Vlaanderen', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2002.
- VITO, 'Evaluatie van het reductiepotentieel voor diverse polluentemissies naar het compartiment lucht in een aantal homogene subsectoren van de chemische industrie in Vlaanderen, deel II', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2004.
- ECOLAS, 'Evaluatie van het reductiepotentieel voor diverse polluentemissies naar het compartiment lucht in een aantal homogene subsectoren van de chemische industrie in Vlaanderen, deel III', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, maart 2004.
- ECOLAS, 'Evaluatie van het reductiepotentieel voor diverse polluentemissies naar het compartiment lucht voor de raffinaderijen in Vlaanderen', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2002.
- Ecolas, 'Evaluatie van het reductiepotentieel voor diverse polluentemissies naar het compartiment lucht voor de non-ferro industrie in Vlaanderen', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2003
- VITO, 'Evaluatie van het reductiepotentieel voor diverse polluentemissies naar het compartiment lucht voor de ijzer- en staalindustrie in Vlaanderen', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2003
- VITO, 'Evaluatie van het reductiepotentieel voor diverse polluenten naar het compartiment lucht voor de elektriciteitsproductie in Vlaanderen', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2002
- VITO, 'Evaluatie van het reductiepotentieel voor diverse polluentemissies naar het compartiment lucht en problematiek van de implementatie van de Europese Richtlijn 1999/13/EG bij de productie van verf, lak, vernis, inkt en lijm en bij het industrieel gebruik van organische bedekkingsmiddelen en lijm in Vlaanderen', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2003.
- ERM, 'Evaluatie van het reductiepotentieel voor diverse polluentemissies naar het compartiment lucht en problematiek van de implementatie van de Europese Richtlijn 1999/13/EG in de sector van de automobielassemblage in Vlaanderen', studie uitgevoerd in opdracht van het Ministerie van de

Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2003.

- ERM, 'Evaluatie van het reductiepotentieel voor VOS-emissies naar het compartiment lucht: diverse sectoren', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2003.
- VITO, 'Evaluatie emissiereductiepotentieel voor VOS-emissies van de grafische sector', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2002.
- Ecolas, 'Evaluatie van het reductiepotentieel voor VOS-emissies naar het compartiment lucht en de problematiek van de implementatie van de Europese richtlijn 99/13/EG in de sector van de metaalontvetting en de oppervlaktereiniging in Vlaanderen', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, 2002.
- VITO, 'Energie- en broeikasgasscenario's voor het Vlaamse Gewest: Business As Usual scenario tot en met 2030', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, maart 2005
- VITO & Ecolas, 'Opstellen en uitwerken van een methodologie voor een intersectoriale afweging van de haalbaarheid en kostenefficiëntie van mogelijke maatregelen voor de reductie van diverse polluentemissies naar de lucht', studie uitgevoerd in opdracht van het Ministerie van de Vlaamse Gemeenschap, AMINAL, Afdeling Algemeen Milieu- en Natuurbeleid – sectie lucht, juli 2005
- VITO & Ecolas, Inzetbaarheid van economische instrumenten in het reductiebeleid voor NO_x, SO_2 en VOS-emissies in Vlaanderen, januari 2006
- "Review of the National Emission Ceiling Directive", Entec UK Ltd in opdracht van de Europese Commissie, DG Environment, juli 2005
- Recommendations on developing and reporting national programmes under the National Emission Ceilings Directive, WG on Implementation of the CAFE programme, april 2006
- *http://europa.eu.int/comm/environment/air/cafe/activities/necd.htm*
- VITO, Sustainability assessment of technologies and modes in the transport sector in Belgium (SUSATRANS)
- TNO i.s.m. TMLeuven, Emissies door niet voor de weg bestemde mobiele machines in het kader van internationale rapportering, juli 2005
- Ontwerp Mobiliteitsplan Vlaanderen, juni 2001
- Vlaams Klimaatplan 2006-2012, oktober 2006
- VITO, Evaluatie reductiepotentieel van mogelijke aanvullende maatregelen rond milieuvriendelijke motorvoertuigen- en brandstoffen
- VUB ism TNI, Invloed van het rijgedrag op de verkeersemissies: kwantificatie en maatregelen, maart 2002
- VITO, Wetenschappelijke beoordeling van het gebruik van waterstof als brandstof voor bussen, april 2003
- VITO, Wetenschappelijke beoordeling van gecombineerde systemen NOx katalysator en roetfilter voor bussen, juni 2005
- VUB-VITO-ULB, Bepalen van een ecoscore voor voertuigen en toepassing van deze ecoscore ter bevordering van het gebruik van milieuvriendelijke voertuigen, juni 2005

- VITO, Wetenschappelijke ondersteuning m.b.t. de installatie van roetfilters op vrachtwagens, juli 2006
- VITO, Potentieelberekeningen thema transport in het Vlaams Klimaatplan 2006-2012, juni 2006
- Vlaams stofplan 'Saneringsplan fijn stof voor de zones met overschrijding in 2003 en aanpak stofproblematiek in Vlaanderen", december 2005
- Econotec, Analyse prévisionnelle des émissions atmosphériques liées au secteur du transport en Région wallonne, Etude réalisée pour le Ministère de la Région wallonne/DGRNE, 2001
- Brussels Air-Climate Plan : http://www.ibgebim.be/francais/pdf/Air/PLANAC_complet.pdf
- Econotec, Technical and Economic Analysis of Brussels Air-Climate Plan: http://www.ibgebim.be/francais/contenu/content.asp?ref=2004
- Brussels Regional Development Plan: http://www.prd.irisnet.be/Fr/arrete_complet1.pdf
- Brussels Air Ordinance: http://www.ibgebim.be/DbDroit/download/19990325_O_QualAir.pdf
- Brussels "clean vehicle" decree of 3 July 2003,: http://www.ibgebim.be/DbDroit/download/20030703_agb_IntroVehPropre.pdf
- Bruxell'Air" : http://evelyne.huytebroeck.be/IMG/doc/20060512_dossier_presse_final_plan_Air.doc,
- Econotec, "Potential for reducing CO2 emissions in the Brussels Capital Region in 2008-2012": http://www.ibgebim.be/francais/pdf/Donnees/Climat_EtudePotentielReduction24-12-03.pdf