Flanders
Environment Report

MIRA

Indicator Report 2012

VLAAMSE MILIEUMAATSCHAPPIJ

Flanders
Environment Report

MIRA

Indicator Report 2012

MIRA STEERING COMMITTEE

President:
Pieter Leroy (Radboud University Nijmegen)

Secretary:
Philippe D'Hondt (VMM)

Members for the Flanders Council for Science and Innovation:
Danielle Raspoet (VRWI)
Chris Vinckier (KU Leuven)

Members for the Board of Secretaries-General:
Veerle Beyst (Research Centre of the Flemish Government)
Ludo Vanongeval (LNE Department)

Members for the Environment and Nature Council of Flanders:
Lieze Cloots (Bond Beter Leefmilieu Vlaanderen vzw)
Wim Van Gils (Natuurpunt)

Members for the Social and Economic Council of Flanders:
Ilse Loots (UA)
Peter Van Humbeeck (SERV)

Independent experts:
Jeroen Cockx (LNE Department)
Roger Dijkmans (VITO)
Rudy Herman (EWI Department)
Johan Peymen (NARA, INBO)

MIRA, VMM

Myriam Bossuyt
Johan Brouwers
Caroline De Geest
Nathalie Dewolf
Stijn Overloop
Bob Peeters
Igor Struyf
Line Vancraeynest
Erika Vander Putten
Hugo Van Hooste
Sofie Janssens, *administrative support*
Marina Stevens, *administrative support*
Marleen Van Steertegem, *head unit MIRA*
Philippe D'Hondt, *head department Air, Environment and Communication*

Flanders
Environment Report

MIRA

Indicator Report 2012

Marleen Van Steertegem, final editing

VLAAMSE MILIEUMAATSCHAPPIJ

Vlaamse overheid

Contents

INDICATOR REPORT 2012 IN BRIEF

1 Sectors

Households

Due to the mild winter of 2011, the heating demand of households were 33 % lower compared to 2010. This led to lower energy consumption (-19 %) and lower emissions of greenhouse gases (-22 %) in 2011. Between 2000 and 2011 the total energy consumption of households has decreased from 230 PJ to 205 PJ (-11 %), but the fluctuations between the years can be explained by the (winter) climate. Flanders is looking to achieve a significant decrease in the energy consumption of its building stock through measures such as roof or attic insulation and the replacement of single glazing and inefficient heating systems. In 2011, 24 % of dwellings had no roof or attic insulation, 8 % of dwellings had only single glazing, and 31 % of gas boilers and 69 % of oil-fired boilers still had poor efficiency.

The decrease in the emissions of PAHs (polycyclic aromatic hydrocarbons) and dioxins in 2011 can be ascribed to the lower heating demand resulting from the mild winter. Of the total household emissions of dioxins in Flanders, 24 % comes from building heating and 76 % from illegal waste incineration in the open air (2011 figures).

On average, each inhabitant of Flanders produced less than 150 kg residual waste in 2011. The results per municipality ranged between 73 and 299 kg residual waste collected per capita.

Industry

Over the past decade, the environmental impact of industry decreased while activities increased (the gross added-value of industry was 10 % higher in 2011 than in 2000). In the period 2008-2010, industrial activity fluctuated due to the financial-economic crisis, and this is reflected in the figures for the environmental impact.

In 2011, energy consumption was still 4 % higher than in 2000. This is due mainly to the increasing use of energy sources as raw material (so-called non-energetic energy consumption), which was 21 % higher in 2011 than in 2000. The specific energy consumption for heating and heating processes (energetic energy consumption) fell by 6 % over the same period. During the period 2000-1011, emissions of various air pollutants also decreased: PM2.5 by 11 %, acidifying substances by 47 %, ozone precursors by 39 %, CO_2 by 10 % and greenhouse gases by 20 %. Discharges containing oxygen-binding substances and nutrients to surface water almost halved during that period: for example, chemical oxygen demand (COD) fell by 44 % and nitrogen by 45 %. The discharge of heavy metals in waste water decreased by between 41 and 78 %.

These trends can be ascribed to the use of less environmentally-polluting fuels, end-of-pipe technique, improved processes, organisational and structural company changes, the use of combined heat and power (CHP) and energy savings, whether as the result of sectoral environmental policy agreements or stricter emissions thresholds.

Energy

Gross domestic energy consumption in Flanders (GDEC) in 2011 was 1 % above the level for 2000. In 2010, there was a noticeable increase (+9 % compared to 2009) due to increasing commercial activity after the financial-economic crisis, and exceptionally cold winter months. In 2011, energy consumption by all sectors fell due to lower heating requirements, improved energy efficiency and/or a lower activity level.

Between 2003 and 2009, structural changes and improved energy efficiency delivered a significant reduction in the energy intensity of Flanders. The financial-economic crisis of 2008-2009 slowed this trend but thanks to a mild winter and lower non-nuclear power production, 2011 again saw a generally downward trend. A reduction in energy intensity is also helping Flanders to meet its targets for renewable energy and to reduce its greenhouse gas emissions. After Finland, Flanders has the highest energy intensity of the EU 15.

During the period 2000-2011, the energy sector was able to reduce emissions of most air pollutants: ozone precursors (-66 %), acidifying substances (-75 %), heavy metals (-76 %) and $PM_{2.5}$ (-89 %). The decrease in the emissions of greenhouse gases only started in 2008 (-20 % in the period 2000-2011). In 2011, the environmental impact fell by more than the reduction in the activity level of the energy sector.

The share of green energy in the total net electricity production increased from 0.4 % in 2000 to 8.0 % in 2011. Compared to gross domestic electricity consumption, domestic green power accounts for a share of 6.9 %. In 2010, this share was 5.3 %. Together with the share of power generated by CHPs of 19.7 %, the Pact 2020 target of 25 % environmentally friendly produced power was reached in 2010.

Agriculture

In the period 2000-2008, agriculture improved its eco-efficiency by reducing environmental pressure while the final production value remained constant. The environmental pressure then increased for a number of environmental themes, such as greenhouse gases, particulate matter and energy consumption, due to greater numbers of livestock since 2008 and greater energy consumption for greenhouse horticulture. Acidifying emissions and phosphorous discharges into surface water remained steady during the period 2008-2011. Therefore the environmental pressure from eutrophication is still high.

On 8 % of the agricultural area, cultivation is more environmentally friendly than legally required, including the organic agricultural area. The organic agricultural area also includes the agricultural area being converted to organic cultivation and in 2011 reached its highest level since 1994 at 0.7 % of the total agricultural area. The European average (EU-27) is 5.3 % (2010 figure).

Transport

The environmental performance of the new Flemish vehicle fleet improved during 2008-2011. Encouraged by federal incentives, in 2011 the target 2015 for CO_2 emissions from new passenger cars was already achieved in Flanders. However, the subsidies also encourage the purchase of diesel vehicles (because diesel vehicles emit on averages less CO_2 that petrol vehicles). This led to increased emissions of nitrous oxides and particulate matter. In 2012, the federal subsidies were abolished for budgetary reasons. In Belgium, average CO_2 emissions from new company cars in 2011 were still higher than for new private vehicles. Company cars also use diesel more often.

Further tax reforms taking into account all emitted pollutants therefore seem appropriate.
In March 2012, Flanders took a first step by reforming the traffic registration tax taking into account the emissions of both CO_2 and other pollutants.

Trade & services

The importance of the trade & services sector increased over the period 2005-2011. The gross value added increased by 11 % and the number of persons employed by 9 %. The environmental pressure was decoupled from activities. In 2011, the NMVOC emissions were at the same level as in 2005, emissions of ozone-depleting substances fell by 71 % and emissions of greenhouse gases by 17 %. The decrease in both the energy consumption and the greenhouse gases emission in 2011 can largely be explained by the mild winter in 2011.

2 Environmental themes

Dispersion of VOCs

Volatile organic compounds (VOCs) play a role in photochemical air pollution as a precursor. NMVOC emissions in Flanders are falling continuously. The emissions target for 2015 for stationary sources of the MINA plan 4 (2011-2015) have been achieved since 2009. Emissions from non-stationary sources need to decrease further to meet the target on time.

The average benzene concentration in the ambient air is well below the European Air Quality Directive target for 2010.

Dispersion of POPs

Emissions of dioxins and polycyclic aromatic hydrocarbons (PAHs) from the heating of dwellings with solid fuels (wood and coal) and the illegal incineration of waste need continued attention. Awareness raising (e.g. LNE campaign *'Stook slim'*), product standardisation for stoves and the banning of strongly polluting devices are important measures here.

Half of PAH emissions are caused by transport. Since 2000, PAH emissions from transport increased by half, mainly from growing transport flows and the increasing use of diesel and catalytic converters.

Many PAHs – benzo(a)pyrene being the best known – are mutagenic and carcinogenic. The target value of 1.0 ng B(a)P/m^3 has been achieved everywhere in Flanders.

The quality of watercourse sediments has improved in recent years in terms of concentrations of polychlorobiphenyl (PCB) and organochloride pesticides, but 22 % of all measurement locations are still contaminated or heavily contaminated. For PAHs, the contamination of watercourse sediments has not improved and 42 % of the measurement locations are contaminated or heavily contaminated.

Dispersion of heavy metals

Emissions of heavy metals into the air have decreased since 2000. However, the trends in 2010 and 2011 are not clear. Between 2003 and 2011, there was a change for the better in the concentrations of heavy metals in the air at most measurement stations. The European limit value for lead and the Flemish limit value for cadmium were achieved to throughout Flanders in 2011. The European target values for arsenic, cadmium and nickel must be achieved from 31 December 2012. These values are still not being achieved at some locations. In Hoboken, for example, some 3 000 inhabitants of Hoboken are exposed to too high concentrations of arsenic.

The presence of heavy metals in the surface water and in watercourse sediments is showing a generally favourable trend. But there are still many cases of standards being exceeded. For surface water this is especially the case for arsenic (19 %) and zinc (15 %), and for watercourse sediments copper (41 %) and zinc (40 %).

Dispersion of pesticides

The 'pressure on aquatic life from crop protection agents' indicator weights the quantity of the active substance in each crop protection agent sold each year in terms of its toxicity for aquatic organisms and persistence in the environment. In 2010, the indicator value was more than 60 % lower than in 1990. The MINA plan 3+ (2008-2010) target value was, therefore, met.

Favourable trends can also be seen for the presence of pesticides in surface water and watercourse sediment. Examples include diuron, dichlorvos, endosulfan, hexachlorocyclohexane and atrazine, not coincidentally substances for which restrictions on use or prohibitions were introduced. However, some pesticides are still quite often present in too high concentrations.

Dispersion of particulate matter

The average annual PM_{10} concentration gives a illustration of the long-term exposure to particulate matter in the ambient air. The strong downward trend from the 1990s has not continued in recent years. In the period 2009-2011, the annual average PM_{10} concentration stagnated at 29 µg/m³. The limit value of 40 µg/m³ from the European Air Quality Directive is being achieved everywhere since 2008. The annual average $PM_{2.5}$ concentration fluctuated between 2009 and 2011 at around 19 µg/m³, thus achieving the target in MINA plan 4 (2011-2015). However, the health guideline value of 10 µg/m³ $PM_{2.5}$ of WHO is well below all currently measured values.

Reaching the daily average target value for the PM_{10} concentration continues to be problematic. The number of days in 2011 when the daily average PM_{10} concentration was too high was twice the figure for 2010 and, therefore, climbed again above the limit value applying since 2005.

The chemical composition of particulate matter has a considerable impact on health effects. In 2012, an emissions inventory for elemental carbon (EC) was carried out for the first time. Since 1995, EC emissions have halved due to the decrease in transport emissions.

Nuisance

The results of the Written Environmental Investigation (WEI) in 2008 show that noise, odour and light are major sources of nuisance for the population. Noise was the most important source with 10.3 % of people suffering serious to extreme nuisance in 2008. There was a decrease for noise and odour nuisance compared to 2001 and 2004 but not for light.

Subjective factors, such as the zeitgeist and media attention, were excluded in the calculation of potential nuisance. Some 15 % of the population experiences potential nuisance from road traffic.

Eutrophication

Manure processing helps the agricultural sector to keep manure within the legal limits. In 2011, 19 % of the nitrogen from animal manure was kept outside the Flemish agricultural area thanks to manure processing and export. Nitrogen emissions into the air and the nitrogen and phosphorus pressure on surface water remain much too high. The nitrate concentration is too high at 28 % of measuring points of surface water in agricultural areas. The average phosphorus concentration in agricultural areas is 0.4 mg P/L, while the standard for small streams is 0.1 mg P/L. The contribution by agriculture is essential to meet the targets for surface water, groundwater and nature.

Acidification

The emissions targets 2015 in MINA plan 4 (2011-2015) were met for ammonia in 2005 and sulphur dioxide in 2010. A substantial effort will still be needed before 2015 for emissions of nitrogen oxides (NO_x). About half of NO_x emissions come from transport (diesel car emit more NO_x than petrol vehicles). The further reduction in NO_x emissions should ensure that Flanders meets the European standards for NO_2 concentrations in the air. In 2012, the European Commission granted an extension until 2015 for attaining the annual NO_2 limit in two zones of Antwerp.

Despite a reduction in acidifying emissions, acidifying deposition is still too high in different areas of Flanders to protect nature. The critical load for acidification is exceeded in 32 % of the total area of nature. Efforts are still needed to meet the target 2015 of 20 % in the MINA plan 4 (2011-2015).

Photochemical air pollution

2011 was a favourable ozone year, both for the exceedance days as the excess for health and vegetation. The European target value for 2010 (maximum 25 days per calendar year, with the highest 8-hour average ozone concentration exceeding 120 µg/m³ for the day, averaged over 2010, 2011 and 2012) remains achievable, given that the summer of 2012 was again meteorologically favourable. The European long-term target for the protection of public health will only be achieved if the emissions of ozone precursors are further reduced, not only in Flanders, but in Europe and throughout the world. The high NO_x emissions in particular continue to be a bottleneck.

Depletion of the ozone layer

The MINA plan 3+ (2008-2010) aimed to reduce the emission of ozone-depleting substances by 2010 by at least 74.5 % with respect to the emissions in 1999. Emissions were 28 % and 35 % below this target in 2009 and 2010, respectively. Observations from satellites point in the direction of a recovery of the density of the ozone layer, but it is still too early to interpret this as a definitive recovery.

Climate change

As a result of a clear decrease with respect to 2010, greenhouse gas emissions in 2011 resumed the downward trend initiated in 2005. CO_2 emissions – for 83 % due to the use of fossil fuels - fell in 2011 below the 1990 level for the first time. This can to a large extent be ascribed to the exceptionally mild winter months which saw heating requirements one-third lower than in 2010. The effects of the prolonged crisis also played a role, as did the implementation of energy-saving measures and the switch to more sustainable energy sources.

European emissions trading (ETS) now regulates 42 % of Flemish greenhouse gas emissions. The bulk of European ETS installations can be found in the industry and energy sector. As in most other EU member states, more free emissions allowances were extended to industrial installations, with the exception of power producers, than were really needed. This had an important negative effect on the price of emissions rights. The surplus averaged 1.8 % during the period 2005-2011.

In Belgium it is now on average 2.3 °C warmer than in the pre-industrial period. The temperature increase is significant over the four seasons but is most pronounced in the spring. With an annual average temperature of 11.6 °C, 2011 was the absolute record year since measurements began in 1833. Since the 1990s, we have had on average one heat wave per year. Heat waves can lead to significantly higher excess death rates. Belgium has seen a slow but significant increase in annual average rainfall, notably in the winter months. In 2011, science was able to show for the first time that human activities contribute to the observed intensification of extreme periods of precipitation in the northern hemisphere. The past decade also showed a clear trend in Uccle in the number of days of heavy precipitation (at least 20 mm/day). Over six decades, the average number has increased from three to six per year. The coast showed a clear, significant increase in the annual average sea-level.

Surface water quality

The pollutant load of domestic origin that the Flemish surface waters have to deal with decreased further in the period 2000-2011 due to the systematic expansion and improvement of the public waste water treatment network. The load on the surface water from companies fell noticeably but there has been no further reduction in recent years. The nitrogen and phosphorus losses from agriculture were lower in 2011 than in the early 2000s, but the reduction is less pronounced than for households and companies.

The physicochemical quality of the surface water has improved since 2000 for a number of substances, as has the watercourse sediment quality. However, the standards are still being exceeded in both cases. The biological quality of the surface water also improved but the good state aimed for is still far off.

Considerable efforts are still needed in order to reach the final objective. Further expansion and improvement of the public water treatment system and the approach to nutrient losses from agriculture are needed. Moreover, the watercourses must be restored to a more natural state, e.g. remeandering and nature-friendly river banks.

Water quantity

Total water use (excl. cooling water) showed little or no change over the period 2000-2006. In 2006-2009, there was a clear decrease, which however did not continue in 2010. In 2000-2010, the use of tap water and groundwater decreased. Domestic tap water use fell from 110 to 99 l per person per day. Government initiatives such as permits, levies and awareness campaigns seem to have had an effect. Furthermore, the price of tap water has increased.

Falling groundwater levels can cause problems for companies, drinking water companies, agriculture and nature. Nearly 37 % of the analysed groundwater levels showed no statistically significant trend in the 2000-2011 period, nearly 44 % showed a decrease and nearly 20 % an increase. Climatological conditions often influence phreatic layers but in many places too much groundwater is being pumped from deeper layers. Because the trends often differ greatly according to the layer and the area, a differentiated policy of groundwater levies and permit should offer a tailored approach.

Since 1970, the number of recorded floods per decade has increased markedly in Belgium, (Western) Europe and throughout the world. The economic damage from floods has also increased over past decades. This increase is caused by the increase in population and prosperity, but probably also because of better data collection. There is still no final proof that climate change is the reason for a trend in floodings on a continental scale.

Soil quality

12.9 % (175 967 ha) of the soil in Flanders is sealed. At 7.4 %, Belgium is the country with the highest soil sealing in Europe (38 countries). The Flemish policy for tackling increasing soil sealing is still in the study phase.

11 % of the major erosion problems in Flanders have been tackled. The area of erosion-sensitive crops grew by 3 % during 2007-2011. The erosion policy is in development, with new measures introduced in 2011, mostly based on voluntary action.

The soil in Flanders is contaminated by hazardous substances from all kinds of human activities The cost of soil remediation (with conformity certificate) in 2011 was estimated at 134 million euros. The estimated amount for the period 1997-2011 was some 1.4 billion euros.

Waste

In 2011, 524 kg of household waste were collected per inhabitant, 6 % less than in 2000. Flanders is still one of the leaders in Europe. In 2010 the amount of primary industrial waste (excl. construction and demolition waste, sludge and contaminated soil) decreased by one-fifth compared to 2004.

The share of non-selectively collected waste is low: residual waste accounts for 29 % of total household waste, and non-selectively collected industrial waste 11 % of all primary industrial waste (excl. construction and demolition waste, sludge and contaminated soil). The amount of residual household waste, however, has stagnated since 2009. The decrease of non-selectively collected industrial waste between 2005 and 2008 did not continue in 2009 and 2010.

3 Consequences for people, nature and economy

The environment, people & health

The number of DALYs reflects the number of years of healthy life that a population loses due to death or disease, taking into account the seriousness and duration of the disease. In Flanders, the burden of disease from a series of environmental pollutants (including particulate matter, dioxins and heavy metals) accounted for some 8 % of the total burden of disease. This means that five healthy days are lost per inhabitant each year or slightly more than one lost healthy life year given lifelong exposure to current levels. For sensitive persons, such as asthma patients, the impact will be greater.

At an international (WHO, European Union) and regional level (Flanders), policy seeks to reduce the exposure to pollutants. There is a clear reduction for a number of POPs in breast milk, and of lead in newborns and young people.

The environment & nature

After years of a clear increase in the number of overwintering waterfowl in Flanders, recent years have seen a levelling-off or reduction in these numbers for most species. This may be a result of the improved ecological quality of the watercourses, making them less rich in food so the food supply falls.

In Flanders, there is growing evidence of the current impact of climate change on nature. Some dragonflies fly earlier in the season and their flight period lasts longer. Pollen production is starting earlier for a number of trees, including birch, and various grass species.

When the MINA plan 4 (2011-2015) started, the ‘effective nature’ area was 63 329 ha or 90 % of the plan target.

The environment & economy

After a slight reduction in the resources for the environment in 2009 and 2010 as a result of cost savings within the Flemish Government, expenditure increased in 2011 and 2012. More than half of this government expenditure went to ‘water and watercourse sediments’.

In Belgium, the share of sustainable investment products with respect to the total capital invested increased from 9.0 % in 2010 to 9.6 % in 2011. The capital accrued in sustainable savings increased by 118 % but with a market share of 1.27 % is still a marginal phenomenon.

The Index for Sustainable Economic Welfare (ISEW), a new welfare indicator for Flanders, was developed in response to the shortcomings of the gross domestic product (GDP). The difference between the GDP and the ISEW increased in the period under study. While GDP grew by 33.8 % between 1990 and 2009, ISEW fell by 16.3 %.

HOW TO READ THIS REPORT

A selection of environmental indicators

The content of the MIRA Indicator Report is familiar: a selection of environmental indicators with the most current data covering the entire environmental domain. The indicator report is also intended as a handy reference work for both the (environment) expert and the interested citizen. It is the flagship of the Flanders Environment Report from the Flemish Environment Agency (see the inset Threefold Task of the Flanders Environment Report).

The indicators are selected and described by the staff of the Environment Reporting unit (MIRA) of the Flemish Environment Agency. In this way, we hope to make a useful contribution to the environmental debate in Flanders. The MIRA steering group, set up by decree, is responsible for managing the content of Flanders environment reporting.

A good environmental indicator is policy-relevant, scientifically sound and measurable (see inset Selection criteria for indicators in MIRA). When it came to selection of the indicators, the first criterion was continuity; a large number of indicators from previous editions can also be found in this report. The Flemish Government monitors the achievement of the 20 targets from the Pact 2020, the future plan for Flanders, using a set of indicators. The Pact 2020 reflects the common vision, strategy and long-term actions of the Flemish Government and the social partners. Since 2010, various indicators have been included in the indicator report and are identified by the Pact 2020 stamp.

The indicators are always based on the latest data, generally up to and including 2011. This means that both the financial-economic crisis of 2008-2009 and the recovery of the economy in 2010 are included in the indicator. In the discussion of the evolution of the indicators we have, therefore, also paid extra attention to the analysis of the possible effects of the crisis on the pressure on the environment. It is known that the environment can benefit from the crisis in the short term: the decrease in activities also ensures a reduced pressure on the environment. In contrast, there is a possible negative effect in the longer term because necessary investments in the environment come under pressure when companies and the government have fewer resources available.

Threefold task for the Flanders Environment Report

The task of the *Flanders Environment Report (MIRA),* as determined by decree, is threefold:
- a description, analysis and evaluation of the current state of the environment;
- an evaluation of the environmental policy conducted to date;
- a description of the expected environmental developments in case of an unchanged policy and a changed policy according to a number of scenarios that are thought relevant.

Furthermore, the report must be well publicised. MIRA provides the scientific foundation for environmental policy planning in Flanders. The study of the state of the environment is given form in the environmental indicators reporting, printed and on the website. Environmental indicators give the policy makers and citizens an answer to questions concerning the state of the environment, list the underlying causes and show how the environmental situation can be improved by additional environmental policy. In December 2009, the second scenario report, the Environment Outlook 2030 Flanders, was published in support of the MINA plan 4 (2011-2015).

Indicators with a quality guaranteee

The environmental indicators are the result of a multitude of supporting measurements, calculations and research by various institutions and organisations. The figures accompanying the indicators therefore also state the source of the data. One characteristic of environmental information is that the underlying figures are continuously being improved and extended. This increases the reliability of the information. This does, however, mean that historical figures can differ from previous reports. We are confronted increasingly with data sets which are difficult to obtain and/or late to arrive. This is a development that calls for attention and vigilance because good assessment - and therefore a good environmental policy - is to a large degree dependent on good, timely data.

In order to guarantee the transparency of the MIRA reports, the underlying data on resource use and emissions are included in the Core set of environmental data 2012 at the back of this report. This part also includes the so-called environmental profiles of the six sectors, with the sector's share in the various environmental themes. The Core set of environmental data 2012 can also be accessed using an interactive tool at www.environmentflanders.be.

Selection criteria for indicators in MIRA

Policy relevant: the indicator gives a representative picture of (a part of) the environmental problem. The Flanders Environmental Policy Plan (MINA plan) counts as an important assessment document, but new insights must also be translated into a strategy.

Target achievement: the indicator must enable (policy) objectives to be assessed.

Scientific soundness: the indicator must have a sound theoretical foundation, both in the technical and the scientific sense, and be based on international standards and consensus.

Data availability: the indicator is based on high-quality data which are updated at regular intervals according to reliable procedures.

Scope: in view of the fact that the report must give a description of the state of the environment in Flanders, the indicator must have a regional scope and/or significance.

Continuity: since the annual indicator reports must closely monitor the state of the environment, it is necessary/useful to provide continuity in the selection of indicators. Therefore indicators are preferably chosen that can be updated annually or at regular intervals. Furthermore, there must be room for innovation so that the most recent scientific developments can be included.

Smiley faces give expert opinion

Indicators give signals about how the environment is faring and whether we in Flanders are on the agreed course (see inset, Indicators as a reporting tool for (Flemish) environmental reporting). In order to allow the reader to rapidly form a judgement, the MIRA authors have given a final assessment in the form of a smiley for most of the indicators of the environmental themes and the consequences for people, nature and the economy:

☺ Positive development, with the target within reach, or favourable situation

😐 Unclear or limited evolution, but insufficient to reach the target, or neutral situation

☹ Negative development, moving away from the target, or unfavourable situation

? Insufficient information.

It is clear that these criteria allow for a certain latitude in terms of interpretation. The attribution of smileys is not an exact science but more an expert opinion. The 'earmarking' of indicators undeniably involves a danger of too much simplification. Hence, the main aim of the smiley is to urge the reader to read the corresponding indicator description.

The eco-efficiency indicator for the sector chapters shows how the sector is performing in the area of the environment. By comparing the (economic) activity and the environmental pressure it can be determined whether or not decoupling has occurred. In addition to the aspect of decoupling, the absolute scale of the environmental pressure must not be forgotten. Decoupling does not mean that the accumulation of substances in the environment has stopped and that the negative effects for human health and biodiversity have disappeared.

The indicators are evaluated at least against the objectives of the MINA plan 4 (2011-2015) (www.milieubeleidsplan.be). For some indicators, (policy) objectives are still missing or the historical dataset is still too limited, so that no evaluation is possible. The inclusion of these indicators in the report is a plea for further attention to data collection and evaluation by the research community and policy makers.

Indicators as a reporting tool for (Flemish) environmental reporting

An indicator in MIRA indicates, refers to and/or informs about activities, situations, phenomena and so on in the environment. The indicator is given meaning via the presentation of the context by means of (historical or natural) reference values and/or objectives. The origin of the objectives is always indicated and at least the objectives of the current MINA plan (Flanders Environmental Policy plan) are evaluated.

In order to ensure the policy-relevance of the (environmental) information, the discussion of the MIRA indicators aims to provide the best possible answers to the following questions:

- *What the indicator shows:* with a description of the historical evolution of the indicator, the objectives and the distance to the target, and the share of the target groups;
- *How can the evolution be explained:* with a critical evaluation of the evolution of the indicator based on measures taken by government and target groups, and independent developments;
- *How can this be improved:* with a description of possible measures required in order to reduce the distance to the target or eliminate it.

A report in three parts, with the DPSIR chain as familiar theme

The DPSIR chain *(driving forces, pressure, state, impact, respons)* has proven its value for the description and analysis of environmental problems. This analysis framework has the additional advantage that users are presented with a familiar structure which should allow them to find the required information quickly.

The MIRA Indicator Report 2012 consists of three parts, ordered according to the DPSIR chain:
1. *Sectors:* with a description of the activities and the environmental pressure of 6 sectors: households, industry, energy, agriculture, transport and trade & services;
2. *Environmental themes:* with a description of 15 different environmental problems, ranging from dispersion issues through eutrophication and climate change to waste;
3. *Impacts:* with a description of the impact of the environmental disruptions for 3 domains: health, nature and the economy.

Each (environmental) theme is described using carefully selected indicators for the main components of the DPSIR chain. The indicators are ordered according to the different components and, by way of information, the component is always indicated next to the title of the indicator.

Even more indicators - and other information - at www.environmentflanders.be

The indicator-orientated environment and nature reporting has in the meanwhile been extensively expanded in Flanders. In addition to a selection of key indicators in the printed MIRA Indicator Report 2012, a more extensive set of indicators can be accessed in the Facts & figures section at www.milieurapport.be (in Dutch). The website always contains the most recent data.

The five indicators for Environment & nature have been adopted in their entirety from Biodiversity Indicators 2012. This publication and a more extensive set of nature indicators can be accessed at the website for the Nature Report (NARA) from the Flemish Research Institute for Nature and Forest: www.biodiversityindicators.be or via www.nara.be.

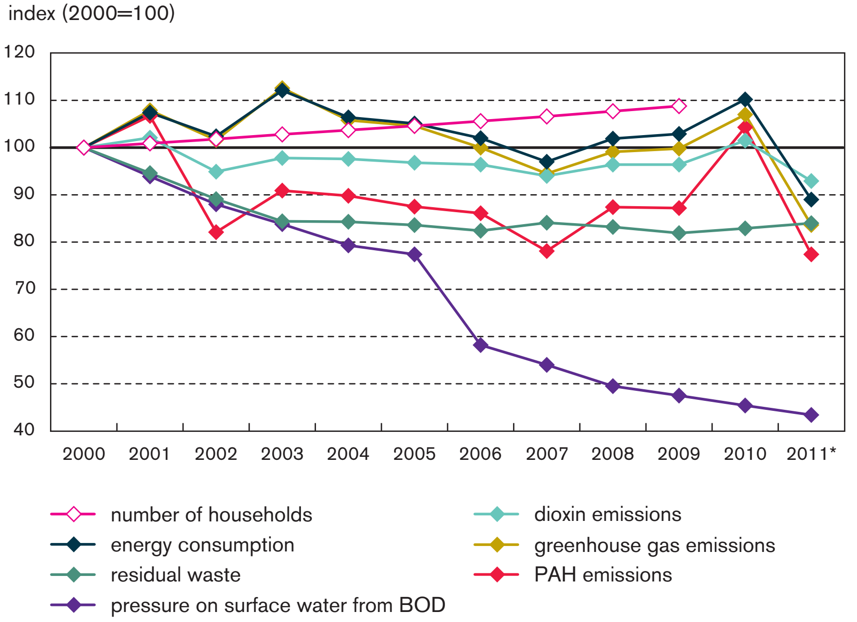
Indicators are really only the tip of the iceberg and are supported by extensive data collection and a solid scientific basis. The information and knowledge available for the various sectors, environmental themes and consequences for people, nature and the economy can be accessed at www.environmentflanders.be

Indicator Report
2012

1
Sectors

Eco-efficiency of households

PACT 2020 DPSIR



* provisional figures

Source: MIRA based on ADSEI, Flanders Energy Balance VITO, OVAM, VMM

Pressure on surface water continues to decrease

The number of households increased by 9 % in the period 2000-2009. The pressure on the surface water with biochemical oxygen demand (BOD) decreased by more than half between 2000 and 2011. This decrease is due to the expansion and improvement of public waste water treatment network. The quantity of residual waste decreased by 16 % between 2000 and 2003 and remained fairly stable in the following years thanks to the successful selective collection.

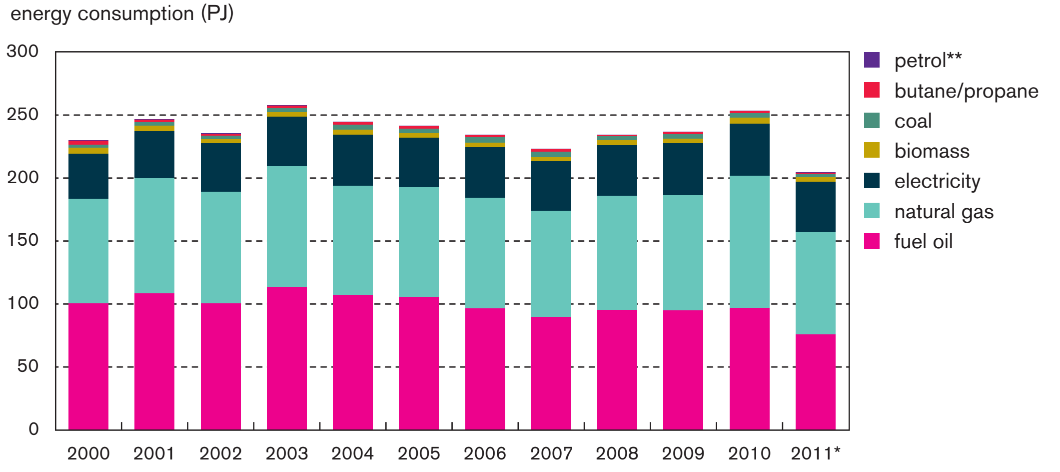
Emissions by households decrease due to lower heating demand in 2011

The energy consumption and greenhouse gas emissions by households are largely related to the heating of buildings and vary according to the climatological conditions. In the period 2007-2010, there was no longer a decoupling between the number of households versus the use of electricity and greenhouse gas emissions. In 2011, however, there was a marked decrease due to the lower heating demand. Between 2009 and 2010, the heating demand increased by 46 % as the result of the very harsh winter, and in 2011 it decreased by 33 % as the result of the mild winter. The decrease in the emission of polycyclic aromatic hydrocarbons (PAHs) and the emission of dioxins can also be explained by the lower heating demand in 2011. Of the total emission of dioxins by households in Flanders in 2011, 24 % came from the heating of buildings and 76 % from illegal burning of waste in the open air.

	2000	2006	2007	2008	2009	2010	2011*
number of households (x 1 000)	2 392	2 526	2 550	2 577	2 601	..	..
dioxin emissions (mg)	32 552	31 374	30 584	31 387	31 376	33 056	30 251
energy consumption (PJ)	230	234	223	234	237	253	205
greenhouse gas emissions (ktonnes CO_2-eq)	12 915	12 911	12 210	12 800	12 883	13 822	10 800
residual waste (ktonnes)	1 138	939	958	948	933	943	952
PAH emissions (kg)	83 201	71 604	65 015	72 746	72 585	86 761	64 411
pressure on surface water from BOD (ktonnes O_2)	35	20	19	17	16	16	15

Energy consumption by households

PACT 2020 DPSIR



* provisional figures
**energy consumption by off-road vehicles (lawnmowers, leaf blowers, quads, etc.)

Source: MIRA based on Flanders Energy Balance VITO

Energy consumption in 2011 lower due to mild winter

Households use energy for the heating, cooling and ventilation of buildings, the production of warm water, lighting, and the use of electric appliances. In 2011, the share of the households accounted for 13 % of the gross domestic energy consumption in Flanders.

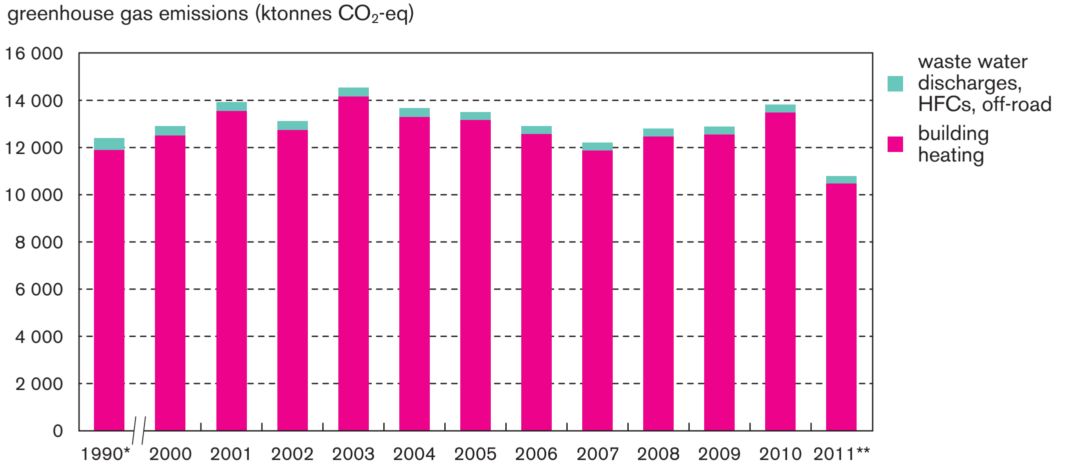
The total energy consumption of the households has decreased from 229.9 PJ in 2000 to 204.6 PJ in 2011 (-11 %). The energy consumption has fluctuated over the years, partly as a result of the varying temperatures in the winter months. Overall, the energy consumption increased by 7 % in 2010 and decreased by 14 % in 2011 as compared to 2009. During a very cold winter, as in 2010, the heating demand increases (+26 % with respect to 2009), whereas a relatively mild winter, as in 2011, causes the opposite effect (-16 % with respect to 2009). The use of fuel oil, natural gas, coal and wood followed the same trend, a 9 % increase in 2010 and a 16 % decrease in 2011 with respect to 2009. The households use these fuels (total share of 80 % in energy consumption) mainly for home heating. The electricity consumption decreased by 2 % between 2007 and 2011.

Through measures, such as the installation of roof or attic floor insulation and the replacement of single glass and inefficient heating installations, the Pact 2020 wants to achieve a significant decrease in the energy consumption of buildings. In 2011, 24 % of the houses were not yet equipped with roof or attic insulation, 8 % had only single glass and 31 % of the natural gas boilers and 69 % of the fuel oil boilers were still low-performance boilers.

energy consumption (PJ)	**2000**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011***
fuel oil	100.3	96.4	89.7	95.3	95.0	96.9	75.8
natural gas	83.1	87.9	84.1	90.5	91.3	104.9	81.0
electricity	36.1	40.1	39.5	40.4	41.2	41.4	40.4
biomass (wood)	4.4	3.7	3.3	3.8	3.8	4.6	3.3
coal	2.6	4.2	4.3	3.2	3.2	3.8	2.7
butane/propane	2.8	1.5	1.7	0.6	1.7	1.2	0.9
petrol**	0.5	0.5	0.5	0.5	0.5	0.5	0.5
total	*229.9*	*234.4*	*223.0*	*234.3*	*236.5*	*253.2*	*204.6*

Emission of greenhouse gases by households

DPSIR



* HFC emission figures are only available from 1995 onwards. 1995 emissions were used for 1990.
** provisional figures

Source: MIRA based on EIL (VMM)

Energy consumption of buildings determines the greenhouse gas emissions

Households accounted for 14.4 % in 2010, or 10 800 ktonnes CO_2 equivalents of the total Flemish greenhouse gas emissions. Of this, 10 466 ktonnes CO_2-eq (96.9 %) is the result of the burning of fuel mainly for the heating of buildings and warm water (for the shower and the dishwasher). The remaining 3.1 % are emissions originating from the discharge of waste water and septic tanks (2.4 %), off-road emissions from, among others, lawnmowers and quads (0.4 %), and emission of HFCs used as a coolant in refrigerators and air-conditioning installations (0.3 %).

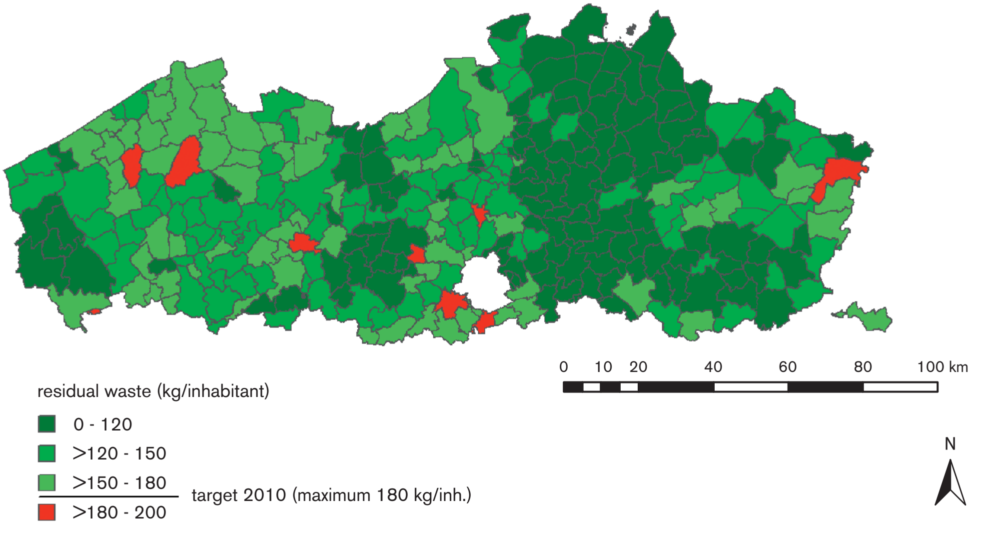
The emissions of greenhouse gases from households decreased by 12.8 % in 2011 with respect to 1990. The emissions are strongly dependent on the heating demand and can, therefore, be largely explained by the outside temperatures. In 2011, the heating demand was 33 % less than in 2010. Greenhouse gas emissions decreased by 22 % with respect to 2010.

Greenhouse gas emissions can be reduced, among other ways, by energy saving measures, by switching from fossil fuels with a high carbon content to fossil fuels with a lower carbon content, or by promoting the use of renewable energy sources.

greenhouse gas emissions (ktonnes CO_2-eq)	**1990***	**2000**	**2007**	**2008**	**2009**	**2010**	**2011****
CO_2	11 800	12 454	11 815	12 411	12 499	13 422	10 425
CH_4	292	198	161	154	155	168	148
N_2O	199	190	194	196	197	201	195
HFCs	99	73	41	39	31	31	31
total	*12 389*	*12 915*	*12 210*	*12 800*	*12 883*	*13 822*	*10 800*

Amount of residual waste from households

DPSIR



In 143 municipalities, a correction factor was applied on the basis of factors such as tourism, family size and age structure (Implementation Plan for the Environmentally Sound Management of Household Waste).

Source: OVAM

Big differences between municipalities

The MINA plan 4 (2011-2015) reiterates the target for household residual waste of the MINA plan 3+ (2008-2010): by 2015, a maximum of 150 kg household residual waste is to be collected per inhabitant at the Flemish regional level. This target has already been achieved since 2009: since that year the amount of residual waste has stagnated at slightly less than 150 kg per inhabitant.

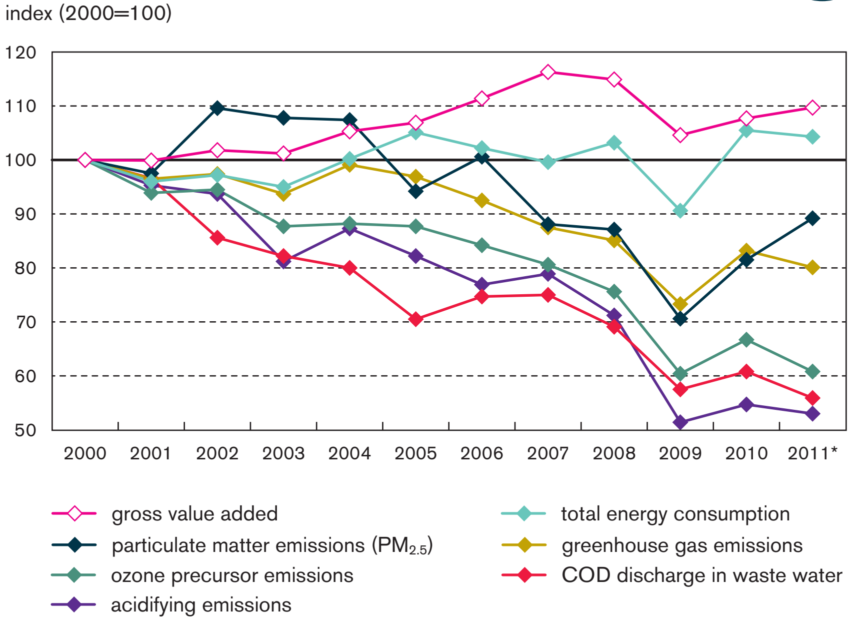
The amount of residual waste collected per municipality varied from 73 to 299 kg per inhabitant in 2011. 40 % of the municipalities collected less residual waste than the year before. In about one-third of those municipalities, there were decreases of 10 to no less than 87 kg per inhabitant. These significant decreases result, among other things, from the decline in the amount of bulk waste. In a growing number of municipalities, inhabitants in fact have to pay for the collection of bulk waste. This will become obligatory for all municipalities as from 1 July 2013. The selective collection of mixed plastics and hard plastics is also gaining in importance. 60 % of the Flemish municipalities collected more residual waste than in 2010. In about one-quarter of those municipalities, there were increases of 10 to even 80 kg per inhabitant.

Not all municipalities are reaching 2010 target

The Implementation Plan for the Environmentally Sound Management of Household Waste states that each municipality may collect no more than 180 kg of residual waste per inhabitant as of 2010. Factors such as tourism, family size and age structure, have an effect on the quantity of residual waste. For this reason, a correction factor was applied to 143 municipalities to evaluate the quantity of residual waste against the municipal targets. In 2011, 9 of the 308 municipalities had not yet achieved this target, which is one municipality less than in 2010. By contrast, 226 municipalities, after application of the correction factor, collected 150 kg residual waste per inhabitant.

Eco-efficiency of industry

PACT 2020 DPSIR



* provisional figures

Source: MIRA based on Flanders Energy Balance VITO, HERMREG, VMM

Environmental pressure decreases, except for energy consumption

In the period 2000-2011, industrial emissions and discharges clearly decreased. Only the industrial energy consumption in 2011 was higher than in 2000, mainly due to the increasing non-energetic use of fuels. In the period 2000 to 2007, in particular, industry succeeded in reducing its absolute environmental pressure while increasing its activity (gross value added +16 % in 2007 with respect to 2000). This was thanks to a variety of measures, such as the use of less environmentally harmful fuels, end-of-pipe techniques, process measures, organisational and structural process changes, energy-saving measures and CHPs. For the greenhouse gas emissions in the period 2000 to 2007, there is hardly any decrease in CO_2 emissions, but there is, above all, a strong reduction in CH_4 and N_2O emissions (-58 % and -65 % respectively).

In the years 2008 and, above all, 2009, industrial activity was determined by the financial-economic crisis, resulting in a decrease in gross value added (-10 % in 2009 with respect to 2007). Partly as a result of this, the absolute value of industrial emissions and discharges decreased considerably. In 2010 and 2011, the economy recovered, resulting in an increase in industrial environmental pressure in most industrial subsectors. In 2011, most emissions and discharges were again slightly lower than in 2010 despite a limited increase in activity. Exceptions are emissions into air of particulate matter and of most heavy metals.

	2000	2005	2008	2009	2010	2011*
gross value added (million euros)	37 089	39 632	42 599	38 790	39 951	40 690
total energy consumption (PJ)	662	696	683	600	699	691
particulate matter emissions ($PM_{2.5}$) (tonnes)	3 857	3 634	3 360	2 722	3 143	3 440
greenhouse gas emissions (ktonnes CO_2-eq)	24 687	23 929	21 012	18 095	20 545	19 784
ozone precursor emissions (tonnes TOFP)	127 843	112 133	96 647	77 170	85 238	77 737
COD discharge (tonnes O_2)	53 246	37 553	36 818	30 591	32 396	29 744
acidifying emissions (million Aeq)	2 061	1 694	1 466	1 060	1 127	1 093

Energy consumption by industry

PACT 2020 DPSIR

* provisional figures
** including the relatively insignificant consumption for low voltage and heat that cannot be attributed to the various subsectors

Source: Flanders Energy Balance VITO

No decrease in the industrial energy consumption

In 2011 at almost 44 %, industry was responsible for the largest part of the Flemish energy consumption. Mainly as a result of a strong increase in activity in the first years of the 1990s, industrial energy consumption increased significantly (+64 % between 1990 and 2000).

In 2009, total industrial energy consumption decreased by 12 % with respect to 2008 as a result of the reduced activity due to the financial-economic crisis (gross value added -9 %). In 2010 and 2011, the economy recovered again, resulting in an increase in energy consumption in nearly all industrial subsectors. For the total industry, the increase in the total energy consumption amounted to 15 % between 2009 and 2011, while the gross value added increased by 5 % in that period.

In 2011, the total industrial energy consumption was still well over 4 % higher than in 2000. This is caused by increasing non-energetic energy consumption (+21 % between 2000 and 2011). Non-energetic energy consumption is found mostly in chemicals, which uses energy sources as raw material for various processes (for example, natural gas for the production of ammonia in synthetic fertiliser production, naphtha as the basis for plastics). This non-energetic energy consumption represented 43 % of the total industrial energy consumption in 2011.

Energetic energy consumption, in contrast, decreased by almost 6 % in the period 2000-2011, whereas the industrial activity increased (gross value added +10 %). This is indicative of a higher energy efficiency in the various industrial combustion processes.

total energy consumption (PJ)	1990	2000	2005	2008	2009	2010	2011*
chemicals	168.6	394.6	419.5	414.8	364.6	429.5	426.4
metal	119.7	121.7	127.6	109.5	89.1	107.3	101.5
foodstuffs	38.8	32.6	36.1	35.8	33.3	36.7	41.1
textiles	17.4	16.8	11.9	8.8	7.5	7.6	6.1
paper	11.6	12.2	12.7	12.8	11.9	15.7	17.3
other**	47.3	84.5	88.0	101.8	93.4	101.8	98.7
total	*403.4*	*662.3*	*695.8*	*683.4*	*599.8*	*698.6*	*691.0*

CO_2 emission by industry

PACT 2020 DPSIR

* provisional figures
** including the emissions from the waste & waste water sector

Source: VMM

Industrial CO_2 emissions in 2011 still above 1990 level

In 2009, the CO_2 emissions, by far the most important greenhouse gas, for the first time fell below the 1990 level. This was mainly the result of the lower industrial activity due to the financial-economic crisis. In 2010 and 2011, the economy recovered, also resulting in an increase in the total (energetic + non-energetic) CO_2 emissions in nearly all industrial subsectors. In 2011, the CO_2 emissions were still well over 5 % above the 1990 level. The chemicals and metal subsectors had the largest share in the CO_2 emissions with 48 % and 29 % respectively.

In 2011, 15 % of the CO_2 emissions were attributable to non-energetic emissions originating from the use of energy sources as raw material in a production process (chemicals) and from the oxidation of carbon during the conversion of iron ore into steel (metal).

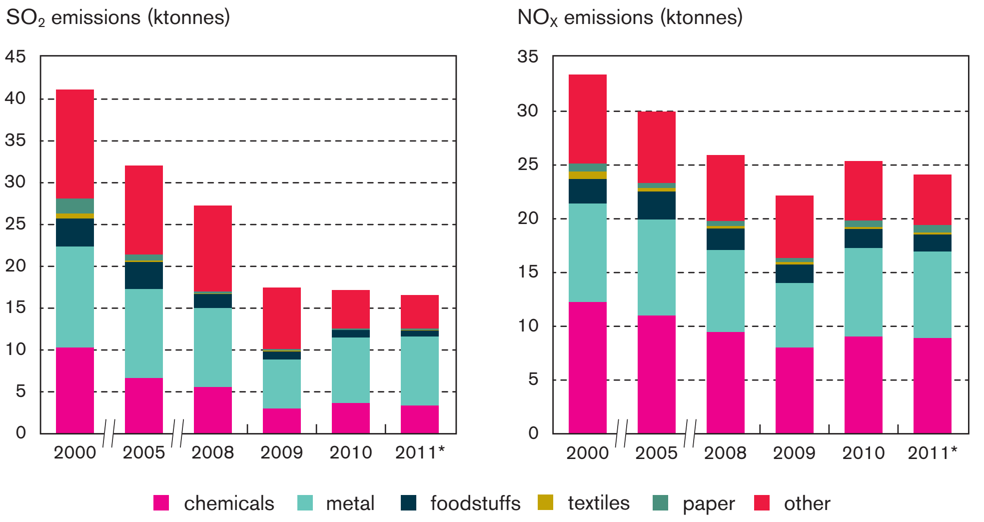
Majority of industrial CO_2 emissions under the European Emissions Trading System

A major part of the greenhouse gas emissions from the industry sector is regulated by the European Emissions Trading System (ETS). Through an extension of the area of application of ETS within industry, the share of the energetic CO_2 emissions under ETS increased from approximately 50 % in the first trading period (2005-2007) to around 90 % in 2011. A great deal of industrial process emissions are also covered by the ETS provisions. Since the introduction of this ETS in 2005, all of the industrial subsectors succeeded in reducing their CO_2 emissions between 2005 and 2009 (-7 % for all industry). However, in 2010 and 2011, partly as a result of the recovering economy, this downward trend was reversed (+20 % between 2009 and 2011).

CO_2 emissions (ktonnes)	**1990**	**2000**	**2005**	**2008**	**2009**	**2010**	**2011***
chemicals	5 392	8 579	9 447	8 719	7 753	8 400	8 241
metal	5 613	5 824	6 268	5 707	4 362	5 478	4 988
foodstuffs	2 331	1 413	1 503	1 376	1 217	1 416	1 554
textiles	794	586	375	258	225	238	157
paper	414	396	327	283	283	410	429
other**	1 894	2 375	2 179	2 284	2 037	2 093	1 956
total	*16 436*	*19 173*	*20 100*	*18 628*	*15 877*	*18 034*	*17 325*

Emission of SO_2 and NO_x by industry

DPSIR



* provisional figures

Source: VMM

No further decrease in the SO_2 and NO_x emission

In 2011, industrial SO_2 emissions were only 40 % of the emissions in 2000. The strong reduction in emissions from the chemicals and metal subsectors, on the one hand, and the financial-economic crisis in 2008 and 2009, on the other hand, were the main reasons for this decrease. From 2010, industrial activity recovered but total industrial SO_2 emissions remained more or less at the 2009 level. There was, however, a strong increase in SO_2 emissions in the metal subsector between 2009 and 2011 (+40 %), which could possibly be explained by plant restarts or the renewed use at full capacity of large installations. SO_2 emissions from the other industry subsector decreased by 55 % between 2009 and 2011. This was mainly due to the application (since 1 January 2010) of tighter SO_2 emission limit values for the processing of all types of clay in the glass and ceramics industry.

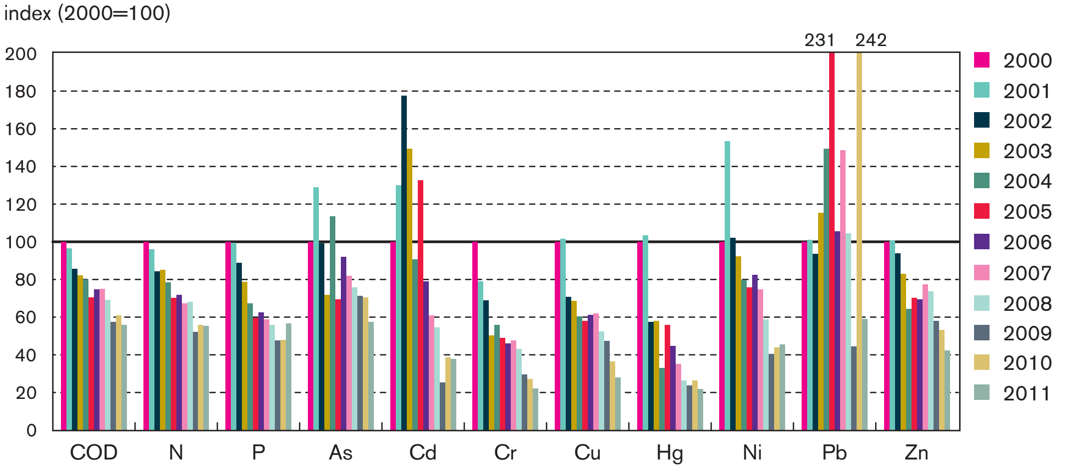
Industrial SO_2 emissions, which represented 44 % of the total emissions in Flanders in 2011, can be reduced further by more widespread use of low-sulphur fuels such as natural gas, DeSOx installations and a higher energy efficiency.

Industrial NO_x emissions decreased much less sharply than the SO_2 emissions and, in 2011, they were still 72 % of those in 2000. The greatest decrease in emissions occurred in 2009 as a result of the financial-economic crisis. In recent years, industrial NO_x emissions have again increased partly due to the recovery of the economy. The increase between 2009 and 2010 was the most pronounced in the metal subsector (+38 %).

The industry has a 17 % share in NO_x emissions in Flanders. In chemicals, NO_x emissions have remained at the same level in recent years, despite an increase in production. This can be attributed to the Environmental Policy Agreement of 9 July 2009, which imposed an NO_x emissions ceiling of 9.8 tonnes to be reached by 2013 at the latest. This subsector continued to invest heavily in NO_x filters, low NO_x burners, catalytic converters and other measures, so that this target was reached in 2011. Also in 2009 and 2010, chemicals remained below this ceiling partly as a result of the reduced activity due to the financial-economic crisis.

Discharges of COD, N, P and heavy metals in industrial waste water

DPSIR



This concerns discharges at industrial sites, so that any treatment at a public waste water treatment plant is not taken into account.

Source: VMM

Industrial discharges in waste water decreased considerably

The industrial discharges of chemical oxygen demand (COD), nitrogen (N), phosphorus (P) and the eight heavy metals show a downward trend in the period 2000-2011. This decrease varies from 41 % for lead (Pb) to 78 % for mercury (Hg). This in spite of an increase in industrial activities, expressed in gross value added, of approximately 10 %.

Under the influence of policy measures (e.g. discharge standards, environmental tax on waste water discharges), a considerable number of companies have also made substantial efforts to reduce their discharges. The financial-economic crisis perhaps played a major role in reducing the pollutant loads in 2008 and 2009. Since 2010, the discharged pollutant loads have showed far less pronounced trends despite a slight increase in industrial activities. The increase in P-loads in 2011 is to be attributed to the discharge by a single company, as was the large peak in lead discharges in 2010.

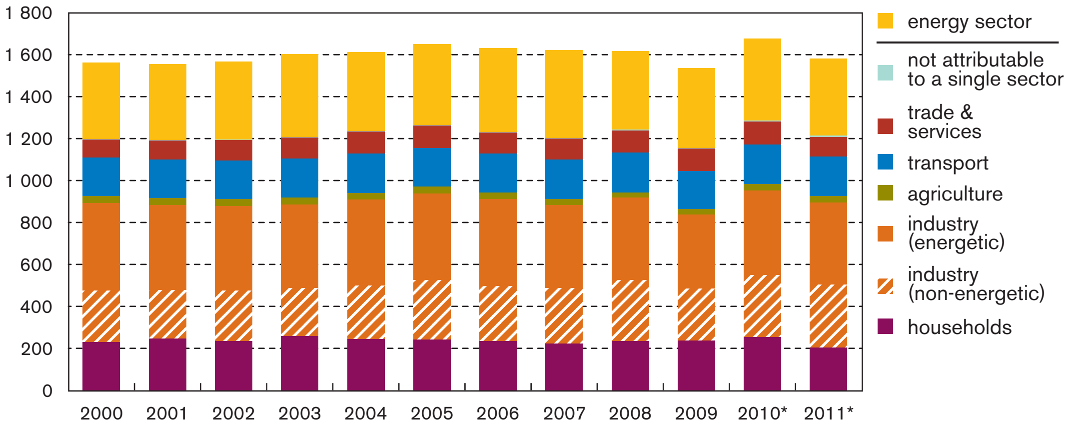
All major industrial subsectors succeeded in reducing their discharges between 2000 and 2011. The chemicals subsector represents a major part of discharges of nearly all substances, the metal subsector is significant mainly for a number of heavy metals, and the foodstuffs subsector is primarily responsible for the discharges of COD, N and P.

share in discharges 2011 (%)	COD	N	P	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
chemicals	33.8	38.0	48.5	35.7	50.4	34.6	19.6	59.4	48.5	2.4	32.3
metal	4.3	17.8	5.2	26.9	10.8	10.1	33.7	21.4	31.2	82.4	18.6
foodstuffs	38.0	27.5	35.0	5.5	0.7	7.4	13.8	5.5	5.8	0.9	17.8
textiles	7.1	3.3	2.9	1.0	0.3	26.8	13.8	2.2	2.3	0.3	5.5
paper	10.6	4.9	4.0	1.9	16.5	0.3	6.5	1.5	0.7	0.1	10.6
waste & waste water	2.9	3.5	1.1	1.9	19.9	3.4	4.9	7.7	8.3	6.9	6.7
other industry	3.4	5.2	3.3	27.0	1.5	17.5	7.7	2.4	3.2	7.1	8.4

Energy consumption per sector

PACT 2020

DPSIR



* provisional figures
2010 road traffic energy consumption not comparable with the 2000-2009 series due to model modifications

Source: MIRA based on Flanders Energy Balance VITO

Climate and activity level determining factors in energy consumption

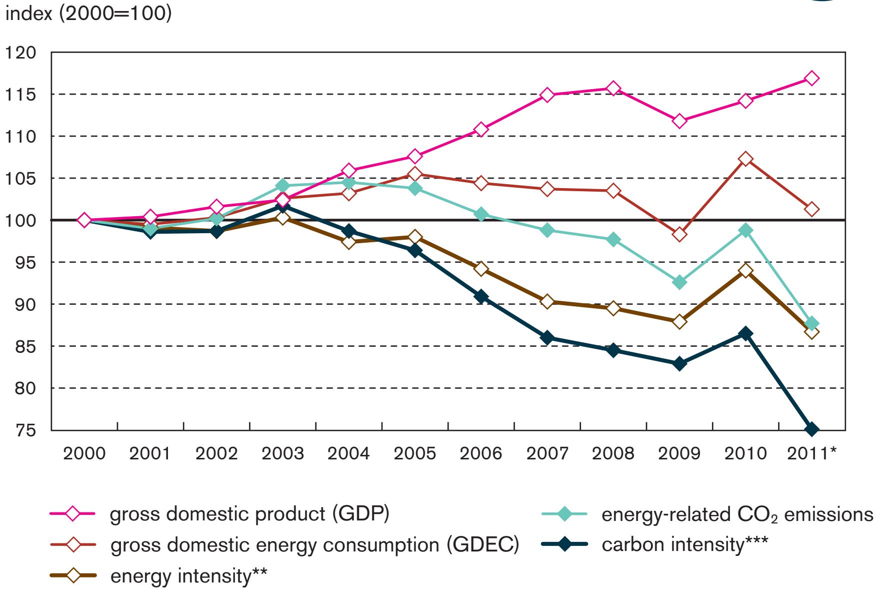
In 2011, the gross domestic energy consumption in Flanders (GDEC) exceeded the 2000 level by 1 %. In 2010, there was yet a remarkable and pronounced increase (+9 %) over one year. That increase was mainly due to the recovery of business activities after the financial-economic crisis and the impact of extremely cold winter months on the energy consumption of households, trade & services and (greenhouse) horticulture.

In 2011, all sectors recorded a decrease in energy consumption. However, as in 2007, the (winter) climate appears to be a major explanatory factor: a decrease in the heating demand – expressed in degree-days – by 33 % caused the energy consumption of households and trade & services to decline by 19 % and 14 % respectively. There is, however, also the effect of improved energy efficiency. This is illustrated by the fact that households, where more than four-fifth of the energy consumption is used for heating buildings, used 8.3 % less energy in 2011 than in 2007, whereas the difference in heating demand between these two years is only 2.5 %. In the energy sector, the own energy consumption and the conversion losses were reduced by 6 %, mainly due to a decrease in the output of oil refineries (-8 %) and reduced power generation in non-nuclear power plants (-16 %). The other sectors recorded a more modest decrease in 2011

energy consumption (PJ)	**2000**	**2005**	**2008**	**2009**	**2010***	**2011***
households	229.9	241.6	234.3	236.5	253.2	204.6
industry (non-energetic)	245.5	283.8	289.8	248.4	294.8	297.6
industry (energetic)	416.7	412.0	393.6	351.4	403.7	393.3
agriculture	32.7	32.8	25.7	27.7	30.9	29.9
transport	184.0	185.5	190.4	179.3	189.6	188.4
trade & services	86.5	104.9	104.8	107.7	109.2	94.2
not attributable to a single sector	1.1	3.8	3.8	3.6	3.9	4.8
energy sector	366.1	384.6	375.3	380.9	391.4	369.3
gross domestic energy consumption	*1 562.6*	*1 648.9*	*1 617.6*	*1 535.5*	*1 676.9*	*1 582.3*

Energy and carbon intensity in Flanders

PACT 2020 DPSIR



* provisional figures
** energy intensity = amount of gross domestic energy consumption (GDEC) per unit of gross domestic product (GDP; expressed in chain euros with the year 2000 as the reference)
*** carbon intensity = amount of CO_2 emitted as a result of energy consumption (incl. process emissions in industry and emissions as a result of the non-energetic consumption of fuels) per unit of gross domestic product (GDP; expressed in chain euros with the year 2000 as the reference)

Source: MIRA based on EIL (VMM), VITO and SVR

Flanders remains very energy-intensive despite decrease

Between 2003 and 2009, Flanders succeeded in creating a clear decoupling of economic growth and energy consumption thanks to both structural effects (shifts in the importance of sectors in the economy) and improved energy efficiency. The financial-economic crisis, however, slowed this trend in 2008 and 2009. In 2010, the trend was even abruptly interrupted by the extremely cold winter months, because industrial energy consumption increased faster than the general production level and because the energy consumption for transport increased faster than the transport flows themselves. In 2011, helped by a mild winter and reduced non-nuclear electricity generation, the overall downward trend initiated in 2004 could be restored. A reduction in energy intensity also helps Flanders in achieving the targets for renewable energy and reducing its greenhouse gas emissions.

However, the energy intensity of Flanders still remains high compared with most other EU Member States. Expressed in chain euros with reference year 2005, Flanders still scores much higher than the average for the EU-27 (6.4 PJ/billion euros in 2010) with 9.1 PJ/billion euros in 2010 and 8.4 PJ/billion euros in 2011. After Finland, Flanders has the highest energy intensity of Western European Member States (EU-15).

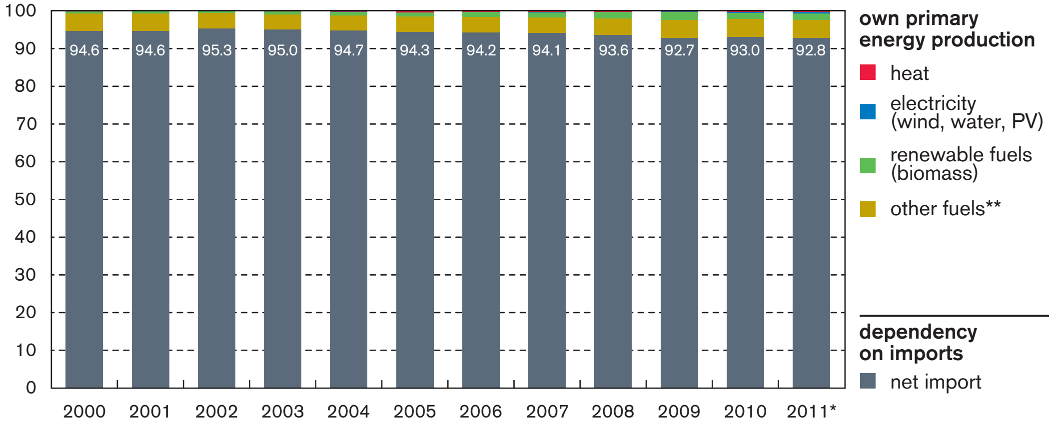
Just as the energy intensity, the carbon intensity was able in 2011 to return to the previously initiated reduction path. While both curves show a similar trend, the carbon intensity is systematically lower due to the shift to lower carbon fuels.

	2000	2005	2009	2010	2011*
gross domestic energy consumption (PJ)	1 562.6	1 648.9	1 535.5	1 676.9	1 582.3
*energy intensity** (PJ/billion euros)*	*10.8*	*10.6*	*9.5*	*10.1*	*9.4*
energy-related CO_2 emissions (ktonnes CO_2-eq)	73 484.9	76 262.1	68 063.7	72 590.3	64 464.2
*carbon intensity*** (ktonnes CO_2-eq/billion euros)*	*507.6*	*489.3*	*420.6*	*439.1*	*381.0*

Dependency on energy imports

PACT 2020 DPSIR

share in primary energy consumption (%)



* provisional figures
** residual fuels in chemical industry and non-renewable part of waste incineration
import dependence calculated with respect to the primary energy consumption, so including bunkers for international shipping and aviation

Source: MIRA based on Flanders Energy Balance VITO

Imports dominate the fulfilment of Flemish energy demand

Flanders has no known reserves of uranium, crude oil or natural gas and, therefore, imports most of the required primary energy sources: 92.8 % in 2011. The bulk of the own, primary energy production is still made up of other** fuels and biomass. Electricity from wind, water and PV – although the fastest growing part in recent years – accounted for not even 6 PJ out of a primary energy consumption of 1 956 PJ.

Flanders has some 39 billion tonnes of coal deposits in the Kempen basin. Of these, approximately 8 billion tons are believed to be technically exploitable. Due to the much cheaper prices on the world market, however, underground mining was stopped in 1992. Since then, Flanders has imported all its coal. The Kempen coal reserves contain also methane gas. Some 7 to 31 billion m³ methane gas are provisionally estimated to be located in the best exploitable areas. To investigate the practical and economic feasibility of methane gas exploitation, an application for an exploration permit was submitted to the Flemish Government in early 2013.

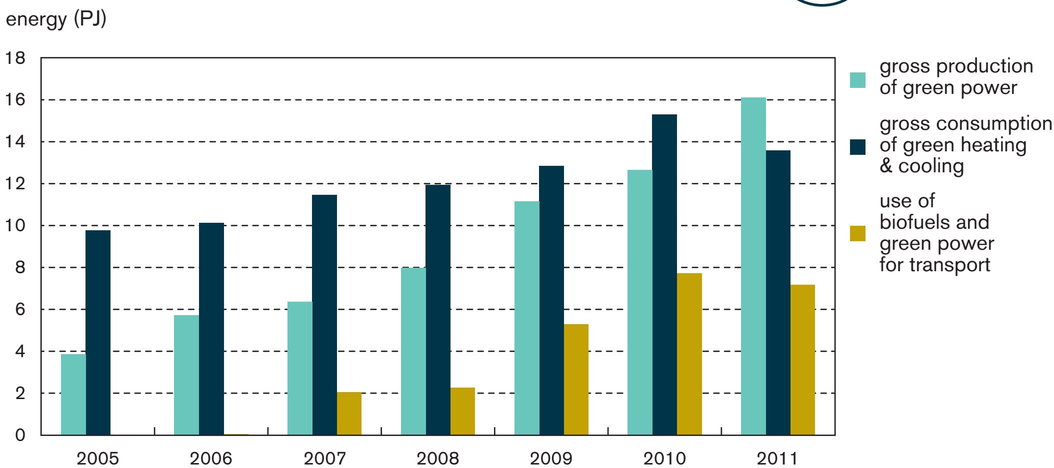
One-third local energy production

In Flanders, the move to energy production close to or by the consumer has also been started. The installation of CHPs, PV panels, wind turbines, solar thermal collectors, heat pumps, etc. increased the share of local energy production (power and heat) in the total Flemish energy demand from 32.9 % in 2008 to 35.3 % in 2010. In 2011, the share of local energy production was slightly lower: 33.4 %. This share also includes the heat produced in consumers' heating boilers fuelled by heating oil, natural gas, biomass, etc. The decreased heating demand in the mild winter months also contributed to a decreasing share in 2011.

energy (PJ)	**2000**	**2005**	**2008**	**2009**	**2010**	**2011***
primary energy production	100	115	133	138	140	141
net import	1 736	1 906	1 940	1 738	1 854	1 815
primary energy consumption	*1 836*	*2 020*	*2 073*	*1 876*	*1 994*	*1 956*

Renewable energy: green power, green heat and biofuels

PACT 2020 DPSIR



Datasets calculated in accordance with the definitions in European Directive 2009/28/EC

Source: Flanders Energy Balance VITO

3.8 % renewable energy in 2011

The European Renewable Energy Directive requires Belgium to increase the proportion of renewable energy in the gross final energy consumption from 2.2 % in 2005 to 13 % in 2020.

With green power, green heating & cooling, and green transport contributions of 7.5 %, 2.6 % and 4.0 % respectively, Flanders achieved a share of 3.8 % renewable energy in 2011. All three fractions have experienced clear growth since 2005. In 2011, however, the green heating & cooling and green transport contributions for the first time showed a decrease. For green heating & cooling, this decrease is attributable to the decrease in the total heating demand in 2011 due to the extremely mild winter months. For biofuels, the decrease in 2011 was the result of a decline in the admixed volumes of biodiesel and bio-ethanol, but also of a decrease in diesel sales.

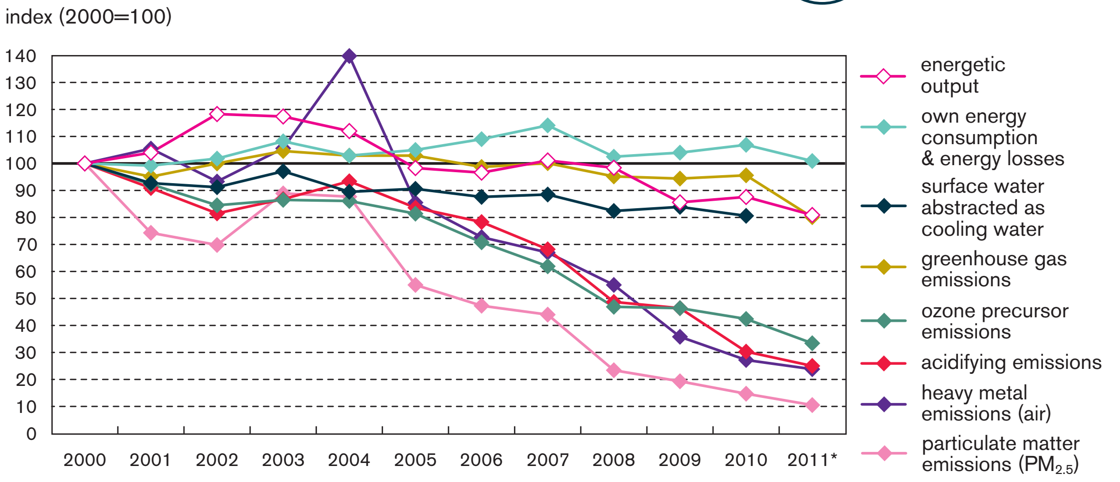
Green heating & cooling lagging behind

Flanders still has a long way to go towards the renewable energy target imposed on Belgium for 2020 (13 %). Especially the share of green heating & cooling is lagging behind, which is why the Flemish Government developed the Green Heat Action Plan. This plan provides, among other things, for operational support for (re)new(ed) installations with a capacity greater than 1 MW. For smaller installations, the subsidies for solar thermal collectors and heat pumps were raised.

		2005	2006	2007	2008	2009	2010	2011
green power	gross production (PJ)	3.8	5.7	6.3	8.0	11.1	12.7	16.1
	share in gross final electricity consumption (%)	1.8	2.6	2.9	3.7	5.4	5.7	7.5
green heating & cooling	gross final consumption (PJ)	9.8	10.1	11.5	11.9	12.8	15.3	13.6
	share in gross final energy consumption for heating & cooling (%)	1.6	1.7	2.1	2.1	2.4	2.6	2.6
green transport	final consumption renewable sources for transport (PJ)	0.0	0.0	2.0	2.3	5.3	7.7	7.2
	share in gross final energy consumption for transport (%)	0.0	0.0	1.1	1.2	3.0	4.2	4.0
total final energy consumption from renewable sources (PJ)		*13.6*	*15.9*	*19.8*	*22.2*	*29.2*	*35.7*	*36.9*
total gross final energy consumption (PJ)		*1 035*	*1 030*	*1 004*	*1 016*	*964*	*1 047*	*971*
share of renewable energy in the total gross final energy consumption (%)		*1.3*	*1.5*	*2.0*	*2.2*	*3.0*	*3.4*	*3.8*

Eco-efficiency of the energy sector

PACT 2020 DPSIR



* provisional figures

Source: MIRA based on VITO and VMM

Power & heat conversion losses weigh on environmental performance of energy sector

The energetic output of the energy sector (motor fuels, electricity, etc.) decreased after 2002. As a result of a decrease in the energy demand of the other sectors, the effect of the economic crisis was visible in 2009. After a limited increase in 2010, the decrease continued unabated in 2011.

Own energy consumption and losses in the conversion, transport and distribution of energy sources clearly lag behind this trend. With a share of 86 %, oil refineries mainly determine the output curve, but approximately 70 % of energy consumption and the losses in the energy sector are attributable to conversion losses in the generation of electricity and heat. For these last two, major output improvements are possible, for example through efficient use of residual heat and the use of more efficient conversion techniques and renewable energy sources, such as wind and solar power.

Emissions of most air pollutants more than halved

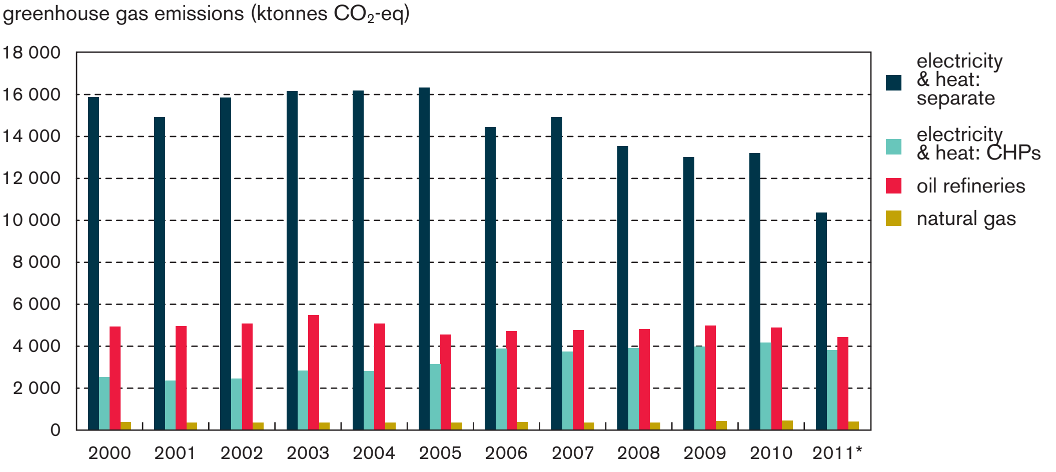
With respect to 2000, there is a clear and continued absolute decoupling for the emissions of ozone precursors (-66 %), acidifying substances (-75 %), heavy metals (-76 %) and particulate matter (-89 %). For greenhouse gas emissions, the decrease began only in 2008 (-20 %).

In 2011 the environmental pressure decreased generally stronger than the decline in the sector's activity level. That year, the additional effect of environment-related measures was greatest for the ozone precursors and particulate matter emissions with decreases of 28 % and 21 % respectively. However, the increased use of nuclear energy together with a decreasing activity in power plants running on fossil energy also played a major role in this respect.

	2000	2005	2008	2009	2010	2011*
energetic output (PJ)	1 803	1 772	1 774	1 544	1 579	1 459
own energy consumption & energy losses (PJ)	366	385	375	381	391	369
cooling water use (million m^3)	2 849	2 580	2 349	2 390	2 298	..
greenhouse gas emissions (ktonnes CO_2-eq)	23 757	24 444	22 614	22 416	22 704	19 033
ozone precursor emissions (tonnes TOFP)	64 272	52 318	30 145	29 849	27 275	21 480
acidifying emissions (million Aeq)	2 594	2 168	1 262	1 203	785	649
heavy metal emissions into the air (kg)	24 148	20 656	13 289	8 648	6 572	5 744
particulate matter emissions ($PM_{2.5}$) (tonnes)	1 704	938	399	329	250	179

Emission of greenhouse gases by the energy sector

DPSIR



* provisional figures

Source: MIRA based on EIL (VMM)

Greenhouse gas emissions 20 % below 2000 level

In 2011, the energy sector reduced its greenhouse gas emissions by almost 20 % compared to 2000. In 2010, the decrease was only 4 %. The highest reductions were achieved in the production of electricity & heat. Between 2000 and 2011, the use of coal in conventional thermal power plants decreased by two-thirds. Until 2010, this was compensated for by an increased use of the less carbon-intensive natural gas (+46 %) and carbon-neutral biomass (+614 %). In 2011, the use of biomass increased even further, whereas the use of not only coal but also natural gas decreased. Also, the total net power production decreased in 2011, by 5 %.

The decreasing emissions from conventional thermal power plants are partly offset by increasing emissions from CHP plants. However, this increase in emissions in the energy sector is less than the emission reductions in the other sectors where, thanks to the CHPs, fuels are no longer used to produce heat separately.

The emissions from oil refineries showed a rather fluctuating trend in the past decade. For the storage, transmission and distribution of natural gas, the leakage of methane from transmission and distribution lines remain the main emissions component with a share of 61 %.

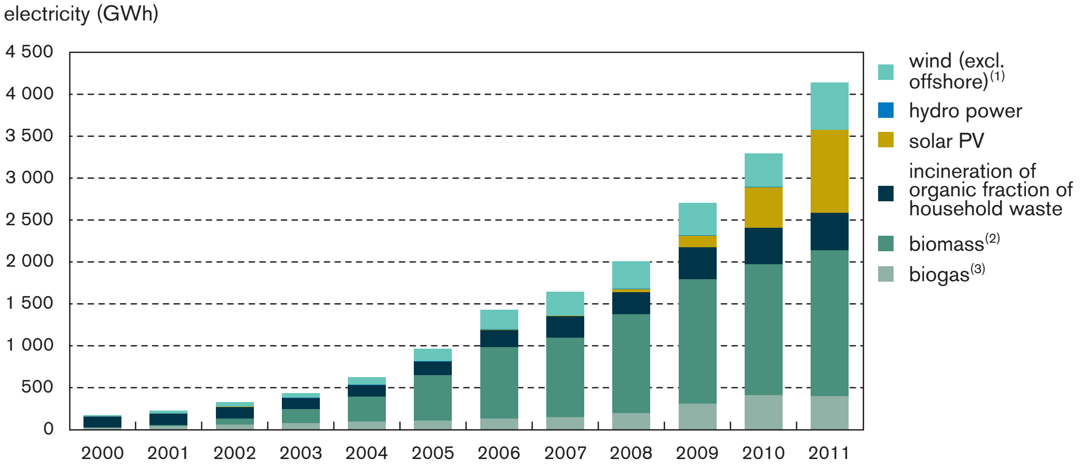
Majority of greenhouse gas emissions under the European Emissions Trading System

Even more than in other sectors, the greenhouse gas emissions by the energy sector in 2011 consisted mainly of CO_2 (98 %), mainly as the result of the combustion of fossil fuels. Most of the greenhouse gases emitted by the energy sector are regulated by the European Emissions Trading System (ETS): from 91 % in the first trading period (2005-2007) to an average of 94 % in the second trading period and even 98 % in 2011.

greenhouse gas emissions (ktonnes CO_2-eq)	2000	2005	2008	2009	2010	2011*
electricity & heat: separate	15 879	16 318	13 541	13 018	13 199	10 371
electricity & heat: CHPs	2 538	3 210	3 913	3 987	4 165	3 813
oil refineries	4 946	4 548	4 806	4 975	4 887	4 440
natural gas	393	367	353	436	454	409
total	*23 757*	*24 444*	*22 614*	*22 416*	*22 704*	*19 033*

Net electricity production from renewable energy sources (green power)

PACT 2020 DPSIR



(1) Offshore wind energy may not be included for the Flemish targets.
(2) co-combustion of solid and liquid biomass (wood, sludge, oil & fats, etc.)
(3) composting of organic waste and sludge, gasification of wood

Source: Flanders Energy Balance VITO

Green power represents 7 % of the electricity consumption

In 2011, the total net production of green power was one-quarter higher than in 2010. Fuelled by a favourable support mechanism, PV power production, in particular, recorded a strong increase: +102 % in just one year. On-land wind turbines also experienced a significant production increase of 42 %. As a result of the rapid development of solar and wind energy, the share of power production based on biological material systematically decreased from 90 % in 2000 to 73 % in 2010 and 62 % in 2011.

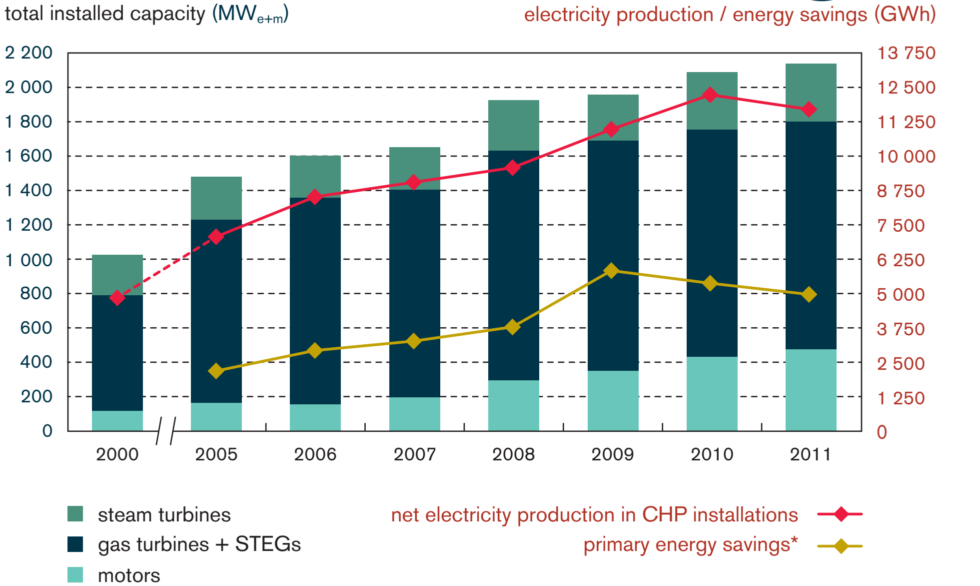
The share of green power in the total net electricity production increased from 0.4 % in 2000 to 6.1 % in 2010 and 8.0 % in 2011. Compared with the gross domestic electricity consumption, domestic green power today accounts for a share of 6.9 %. In 2010, its share was only 5.3 %. Together with the share of power generated in CHPs of 19.7 %, the Pact 2020 target of 25 % environmentally produced power was reached in 2010.

When the power used in the production plants themselves and the grid losses are also taken into account, the share of the gross green power production in the gross final electricity consumption can be calculated. This calculation is in line with the definition of the European Directive 2009/28/EC, which imposes an overall target of 13 % renewable energy consumption for Belgium. The share of the gross green power production in the gross final electricity consumption increased from 1.8 % in 2005 to 5.7 % in 2010 and 7.5 % in 2011. The relatively strong increase in the last year was not only a result of the increased gross production of green power (numerator) to 4 476 GWh, but also of a 3 % decrease in the power consumption (denominator).

net production green power (GWh)	2000	2005	2009	2010	2011
wind (excl. offshore)(1)	15.5	154.4	386.9	398.0	565.0
hydropower	2.2	2.3	3.3	3.4	3.1
solar PV	0.1	1.1	141.9	488.6	986.0
incineration of organic fraction of household waste	132.0	159.5	376.1	433.3	447.6
biomass(2)	0.0	543.8	1 489.2	1 563.0	1 738.9
biogas(3)	20.6	105.7	307.0	408.1	399.6
total	*170.4*	*966.8*	*2 704.4*	*3 294.2*	*4 140.1*

Production of electricity and heat by cogeneration (CHP)

PACT 2020 DPSIR



* by all CHP installations, calculated with Flemish reference outputs. Due to the degressive character of CHP regulation, this figure is substantially higher than the number of certificates issued.

Source: MIRA based on Flanders Energy Balance VITO

CHPs deliver 20 % of the power consumption

In cogeneration (combined heat and power, CHP) heat and power are simultaneously generated from primary energy sources (e.g. natural gas or biomass). The power is usually used to generate electricity. Since the end of 2004, the exploitation of the potential of CHP has been supported by a certificate system imposed on the electricity suppliers, resulting in a 45 % increase in the installed electrical capacity of CHPs between 2005 and 2011. The degressive character of the installation certificates also ensures that existing (inferior quality) installations are replaced on an accelerated basis.

In 2010, the power production in CHPs represented a share of 19.7 % in the gross domestic electricity consumption. This allowed the target of the Pact 2020 to be achieved in time. In 2011, the power production in CHPs was slightly less (-4 % with respect to 2010), in line with the decrease in gross power consumption (-3 %) and total gross power production (-5 %).

10 % primary energy savings

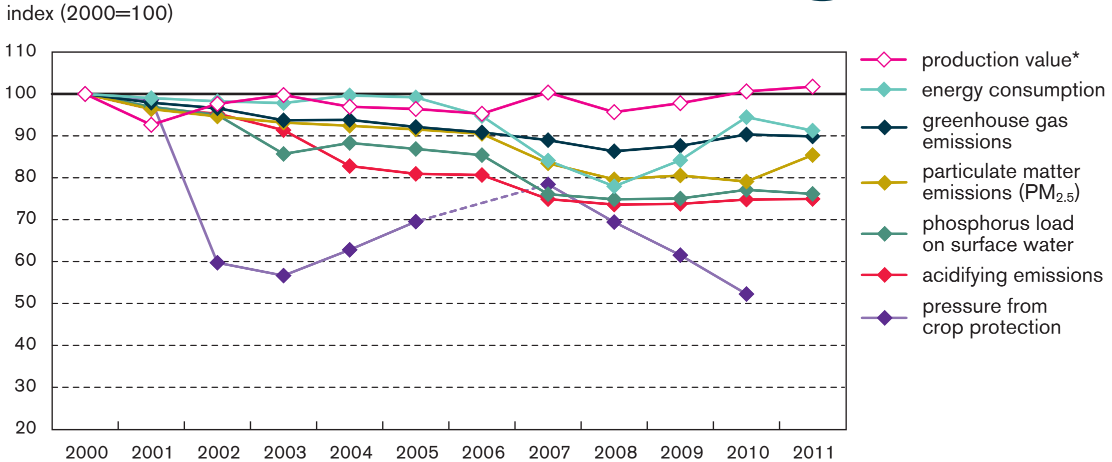
Between 2005 and 2011, the ratio of the useful output to energetic input of CHPs fluctuated around 80 % (79.6 % in 2011). This figure is much higher than the efficiencies of reference installations that generate only power: 25 to 55 %, depending on the fuel.

In 2011, after previous increases, the amount of primary energy saved in CHPs, as compared to separate generation of power and heat, decreased for the second year in a row. In relative terms, the primary energy savings between 2006 and 2009 increased from 8.1 % to 12.5 %. In 2010, the relative primary energy savings fell to 10.2 %, in 2011 they attained 9.8 %. In particular, steam turbines with direct drive (i.e. without power production) appear to adversely affect the relative energy savings.

	2000	2005	2009	2010	2011
total CHP capacity (MW_{e+m})	1 026	1 480	1 958	2 087	2 137
net power production in CHPs (GWh)	4 789	7 000	10 889	12 139	11 611
primary energy savings* in CHPs (GWh)	..	2 142	5 774	5 317	4 914

Eco-efficiency of agriculture

PACT 2020 DPSIR



* production value in constant prices of 2005

Source: MIRA based on AMS (LV), VMM, UGent, LNE, VITO

Livestock is the driving factor for environmental pressure

Between 2000 and 2008, environmental pressure from agriculture decreased more than the volume of the activities, expressed as production value. The increase in scale, environmental measures and the decreasing numbers of livestock since 2000 set the falling trend for the emissions. After 2008, the environmental pressure increased again for energy consumption, greenhouse gases and particulate matter, with an increasing production value. Acidifying emissions and the phosphorous load on surface water both stagnated. As a result, the eutrophication pressure from agriculture in absolute values remains at a high level.

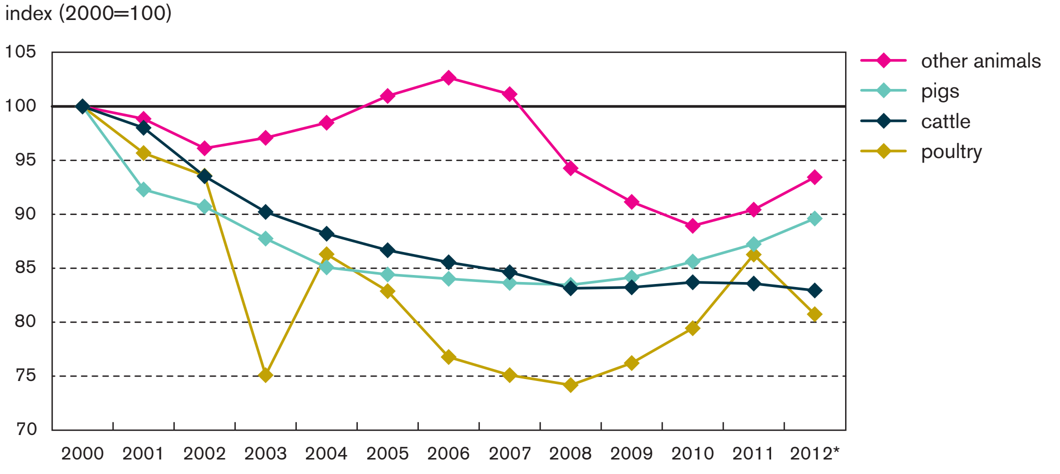
In the period 2000-2008, acidifying emissions decreased by 26 % and the phosphorous load on surface water by 25 %. The driving forces behind these decreases are the manure policy and the economic situation. This was reflected in shrinking numbers of livestock. The manure policy led to decreased use of chemical fertilisers, the application of low-emission techniques, a lower level of nutrient content in animal feeds and an increase in manure processing. The shrinking numbers of livestock also explain the reduction in the greenhouse gas (-14 % in 2008) and particulate matter (-20 % in 2008) emissions.

The increase in the numbers of livestock from 2008 and the expansion of combined heat and power (CHP) in greenhouse horticulture led to increasing emissions. CHPs in principle lead to efficiency gains as compared to the separate generation of electricity and heat. The efficiency can only be determined on a cross-sector basis, because the agricultural sector feeds electricity into the grid. Since 2010, agriculture has been a net producer of electricity. In 2001 the pressure on aquatic life from crop protection amounted to 52 % of the level in 2000. This fluctuating decrease is the result of the banning of the most toxic substances and changes in the product use.

	2000	2005	2007	2008	2009	2010	2011
production value* (million euros)	4 660	4 493	4 676	4 458	4 558	4 689	4 741
energy consumption (PJ)	30.4	30.1	25.5	23.7	25.6	28.7	27.7
greenhouse gas emissions (ktonnes CO_2-eq)	9 971	9 186	8 873	8 608	8 736	9 007	8 961
particulate matter emissions ($PM_{2.5}$) (tonnes)	2 522	2 313	2 286	1 957	1 958	1 870	1 911
phosphorous load on surface water (tonnes)	1 515	1 316	1 152	1 134	1 137	1 168	1 154
acidifying emissions (million Aeq)	3 715	3 007	2 783	2 735	2 741	2 779	2 785
pressure from crop protection (billion Seq)	33.9	23.6	26.6	23.6	20.9	17.7	-

Livestock

DPSIR



* provisional figures
Numbers are a snapshot taken around the month of May and, therefore, do not represent the average livestock density for that year. Other animals include equine animals, goats and sheep.

Source: FOD Economy

Fewer animals ...

The size of the Flemish cattle stock has been decreasing since 1996 due to improved efficiency (dairy stock) and the worsened economic situation (meat stock). In comparison with 2000, the number of cattle in 2012 had dropped by 17 %. The reduction in the pig stock started after 1999 as a result of the drop in prices (since 1998), the dioxin crisis (1999), the purchase agreement (2000-2004) and the stricter manure policy. The poultry stock underwent a major expansion up to 1998, which was followed by three stable years, but went down from 2000 onwards as a result of the manure policy, the dioxin crisis and fowl plague. The latter, in combination with low prices, is also the cause of a large temporary fall in 2003.

... more animals

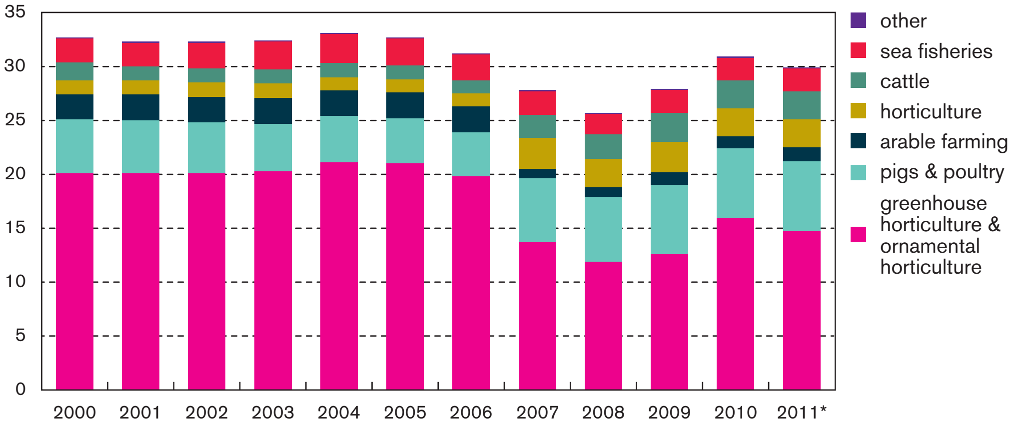
Since 2008, pig and poultry numbers have been increasing again due to the possibilities for expansion created under the manure policy since 2007. Provided there is more manure processing, a farm can increase its livestock numbers. This has led mainly to an increase in the number of poultry. Poultry manure is the simplest to process. This growth is accompanied by an increase in scale, so that the number of animals per farm continues to increase. Poor prices for pig meat, reflecting a growing volatility in the pricing, are accompanied by an increase in scale and expansion of the pig stock. The scale of the livestock numbers has been a driving force behind the increase in particulate matter and greenhouse gas emissions since 2008.

livestock (millions)	2000	2005	2008	2009	2010	2011	2012*
pigs	7.05	5.95	5.88	5.93	6.04	6.15	6.32
cattle	1.56	1.35	1.30	1.30	1.30	1.30	1.29
poultry	36.66	30.39	27.19	27.94	29.13	31.63	29.60
other animals	0.132	0.134	0.125	0.121	0.118	0.120	0.124

Energy consumption by agriculture

PACT 2020

DPSIR



* all figures for 2011 are provisional; figures for cattle, sea fisheries and other have been kept constant with 2010. The 'other' column includes off-road emissions in forestry and public green spaces.

Source: MIRA based on Flanders Energy Balance VITO

Increasing energy consumption in agriculture

The decrease in energy consumption since 2004 was completely reversed in 2009. Compared with 2008, the consumption in 2011 increased by 16 % due to increasing consumption in greenhouse horticulture, arable farming and cattle breeding. Two-thirds of this increase is attributable to greenhouse horticulture, the expansion of CHP plants that generate both heat and electricity for local use, but also for injection into the power grid. Since 2010, the agricultural sector has been a net electricity producer. For Flanders, this yields an efficiency gain, because the electricity is generated simultaneously with heat, which can both be usefully applied. In 2011, electricity consumption by agriculture amounted to 4.2 PJ, an 8 % increase with respect to 2000. With the Pact 2020, the Flemish Government aims to improve energy efficiency, also in agriculture.

Renewable energy and natural gas share increasing

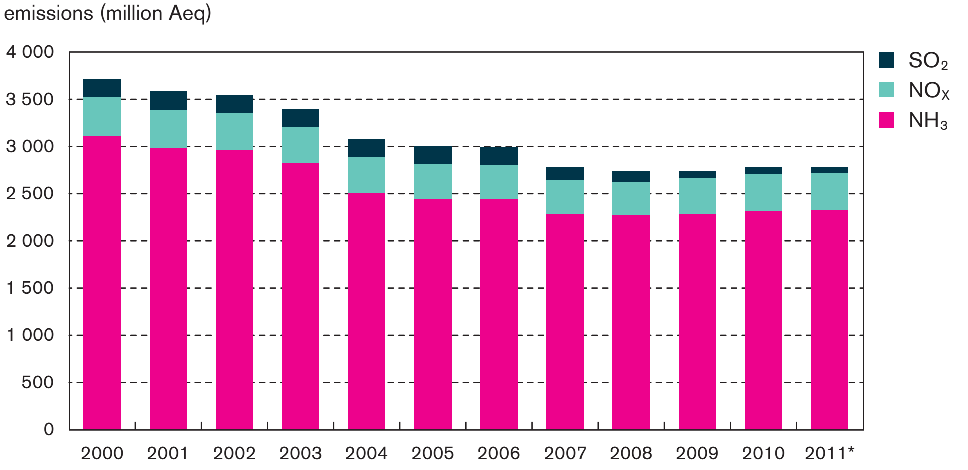
The use of natural gas has increased by a factor of 10 since 1990, at the expense of the use of coal and heavy fuel oil. In 2011, the proportion of biomass in the total energy consumption was 9 %.

In the Flemish Climate Policy Plan 2006-2012, the target proposed for greenhouse horticulture is to obtain 75 % of the energy from natural gas or renewable sources of energy by 2013. In 2011, this proportion for greenhouse horticulture (excl. CHP in collaboration with the energy sector) was 75 %, compared with only 26 % in 2000. This percentage includes the primary energy for electricity production to be sold to the grid. When the primary energy is limited to production for local use, the proportion amounts to 67 %.

energy consumption (PJ)	2000	2005	2007	2008	2009	2010	2011*
greenhouse horticulture & ornamental horticulture	20.1	21.0	13.7	11.9	12.6	15.9	14.7
pigs & poultry	2.3	2.4	0.9	0.9	1.2	1.1	1.3
arable farming	5.0	4.2	5.9	6.0	6.4	6.5	6.5
horticulture	1.3	1.2	2.9	2.6	2.8	2.6	2.6
cattle	1.7	1.3	2.1	2.3	2.7	2.6	2.6
sea fisheries	2.2	2.5	2.2	1.9	2.1	2.1	2.1
other	0.1	0.1	0.1	0.1	0.1	0.1	0.1
total	*32.7*	*32.8*	*27.9*	*25.7*	*27.7*	*30.9*	*29.9*

Emission of acidifying substances by agriculture

DPSIR



* provisional figures

Source: VMM

Share of agriculture in acidification increases

Emissions of potentially acidifying substances from agriculture decreased in 2011 by 57 % with respect to 1990 and by 25 % with respect to 2000. Ammonia emissions accounted for 83 % of the potentially acidifying emissions from agriculture in 2011.

Agriculture is the main source of acidifying emissions in Flanders with a share of 42 % in 2011. This share is increasing as a result of the greater decrease in emissions from other sectors.

Decrease in emissions stagnates after 2008

Until 2008, acidifying emissions decreased due to the declining livestock numbers, the lower nitrogen content of cattle feed, the low-emission application of animal manure on arable land and pastures, the construction of low-emission stalls and the switch to natural gas in greenhouse horticulture. After 2008, the emissions stagnated, because the slightly increasing livestock numbers, the manure processing and the expansion of low-emission stables kept each other in balance.

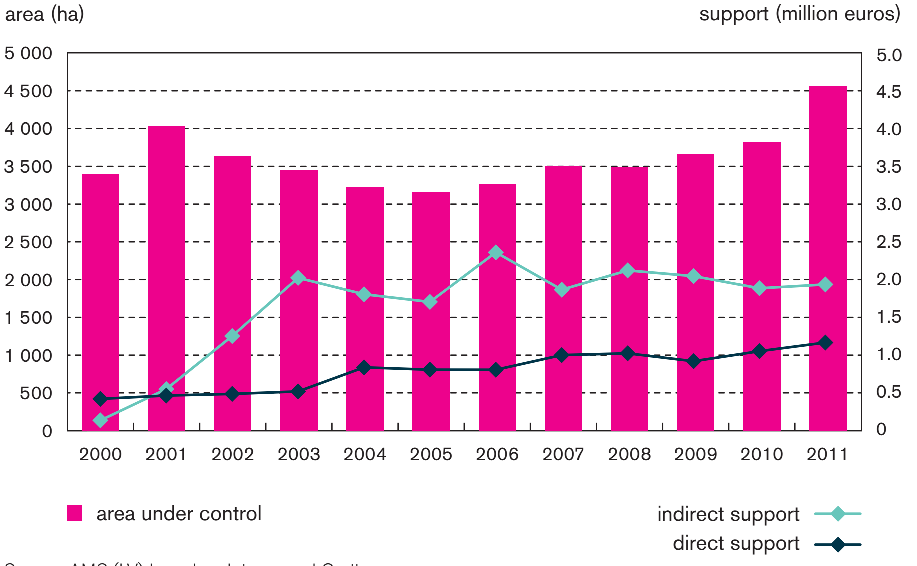
In 2011, ammonia emissions from agriculture amounted to 39 million kg. Thus, 93 % of the Flemish ammonia emissions come from agriculture. Partly as a result of this, the Flemish ammonia emissions remained below the emissions ceiling of 45 million kg ammonia for all sectors in 2010 (MINA plan 3+, 2008-2010). The emissions ceiling of 45 million kg has been retained for 2015 (MINA plan 4, 2011-2015).

A further decrease in emissions is, however, necessary to protect the vulnerable natural environment from excess nitrogen deposition. It is also necessary to achieve the conservation objectives of the Flemish Nature policy. With additional financial efforts, there is still room for limiting emissions through the expansion of low-emission stalls and reduction in the nitrogen content of cattle feed. Low-emission stalls not only result in a decrease in ammonia emissions, but also limit odour and particulate matter emissions. Finally, a regional permit policy around nature areas is instrumental in the implementation of the nature policy.

emissions (million Aeq)	**1990**	**2000**	**2005**	**2008**	**2009**	**2010**	**2011***
NH_3	5 070	3 107	2 442	2 268	2 286	2 313	2 321
NO_x	491	416	375	358	378	395	393
SO_2	897	192	189	109	77	71	70
total	*6 459*	*3 715*	*3 007*	*2 735*	*2 741*	*2 779*	*2 785*

Organic agriculture

DPSIR



Source: AMS (LV) based on Integra and Certisys

Increasing area ...

The organic agricultural area in Flanders was 4 563 ha in 2011, which is an increase of 19 % with respect to 2010 and 45 % with respect to 2005. The area thus reached its highest level since 1994, which represents 0.7 % of the total agricultural area. The increase in 2011 is mainly attributable to grassland and vegetable cultivation.

The organic area also includes the agricultural area being converted to organic cultivation. This amounts to 30 % of the total Flemish organic area. The share of organic agriculture in the Flemish agricultural land area in 2010 is, at 0.6 %, below the European average of 5.3 % (EU-27).

... through strong support and large demand

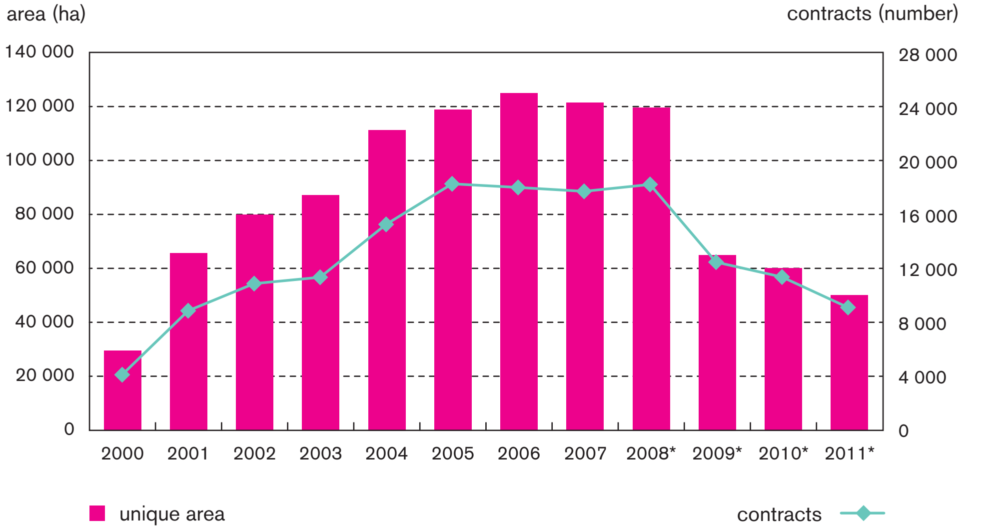
The increased area is a response to increasing government support and increasing market demand. In 2001, the Flemish Government spent 3.1 million euros on support for the organic agriculture sector, a 6 % increase with respect to 2010. Direct support to organic farmers was 0.9 million euros in 2011. Indirect support is focused on promotion, strengthening of sales, research, education and organisation of the sector. All support activities are carried out within the framework of the Flemish Government's Strategic Plan for Organic Agriculture 2008-2012.

The organic sector has suffered comparatively little from the financial-economic crisis. Stable prices and loyal, price-conscious customers contribute to this. 18 % of Belgians were frequent buyers in 2011. This indicates a stabilisation with respect to 2010. Consumer spending on organic products has been growing since 2006 and in 2011 reached its highest level since 2002. This growth was less pronounced in 2011. The organic market share amounted to 1.8 % and includes both food and non-food products. Belgian consumption is larger than the domestic production and 37 % of organic products were not purchased in supermarkets in 2011 (markets, specialty shops and farm shops).

	1994	2000	2005	2009	2010	2011
area under control (ha)	640	3 393	3 153	3 659	3 822	4 563
direct support (10^3 euros)	118	420	809	922	1 056	1 171
indirect support (10^3 euros)	-	133	1 713	2 057	1 895	1 946
consumer spending in Belgium (10^6 euros)	-	-	259	349	421	435

Agro-environmental measures

DPSIR



* The area under management agreements for small landscape features (SLFs) concerns only the area of the SLFs themselves. Before 2008, this meant the whole plot of land.

Source: AMS (LV)

8 % of the agricultural area under agro-environmental control

Agro-environmental measures are voluntary agreements that the farmer enters into with the authorities. In exchange for the extra efforts for the environment and nature, the farmer receives compensation. In 2011, there were 11 possible groups of measures. The area of agricultural land to which one or more agro-environmental measures apply (unique area) was 50 066 ha or 8 % of the Flemish agricultural area in 2011. Thus, 8 % was farmed in a more environmentally friendly manner than legally required.

The expenditures in the table indicate the payments under the contracts of the previous year. In 2011, the government spent 22.5 million euros on agro-environmental measures. 51 % of this budget went to water management agreements with reduced fertilisation, 8 % to leguminous crops and 9 % to field border management.

Climbers and fallers

Since 2006, the unique area has been decreasing due to the discontinuation of broadly applicable agro-environmental measures, such as cover crops. Such measures are actually part of normal agricultural practice, so that extra subsidies are no longer provided. The measure cover crops was again subsidised in 2012, as a supporting policy for the implementation of the tightened Manure Action Plan (MAP4). All measures experienced a shrinking or stagnating area in 2011 in comparison with 2010, with the exception of organic agriculture, confusion technique and orchards.

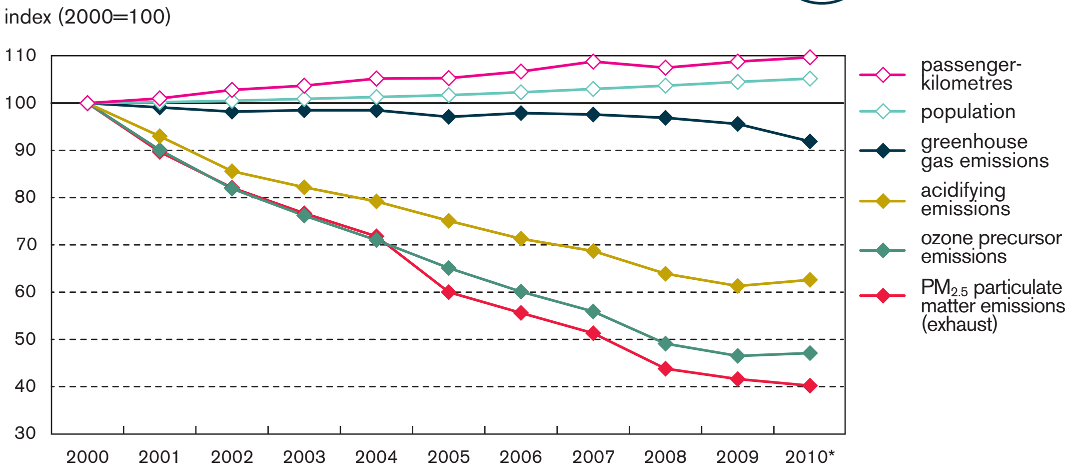
The measures for water with reduced fertilisation, confusion technique, leguminous crop and mechanical weed control were the most successful with 46 %, 16 %, 10 % and 8 % respectively of the unique agro-environmental measures area in 2011.

	2000	2005	2007	2008*	2009*	2010*	2011*
unique agro-environmental area (ha)	29 554	118 945	121 513	119 555	64 898	60 085	50 066
share in agricultural area (%)	4.6	18.9	19.5	19.2	10.5	9.7	8.1
number of contracts	4 119	18 326	17 767	18 279	12 499	11 391	9 125
spending (million euros)	1.2	14.6	19.9	22.8	24.7	21.1	22.5

Eco-efficiency of passenger transport

PACT 2020

DPSIR



* provisional figures
emissions from road traffic for 2010 are not comparable with the 2000-2009 dataset due to model modifications
emissions from road traffic for 2011 assumed identical with those for 2010, emissions from transport for 2011 not shown on figure

Source: MIRA based on ADSEI, De Lijn, FOD MV, NMBS, VMM

Absolute decoupling of emissions and passenger transport

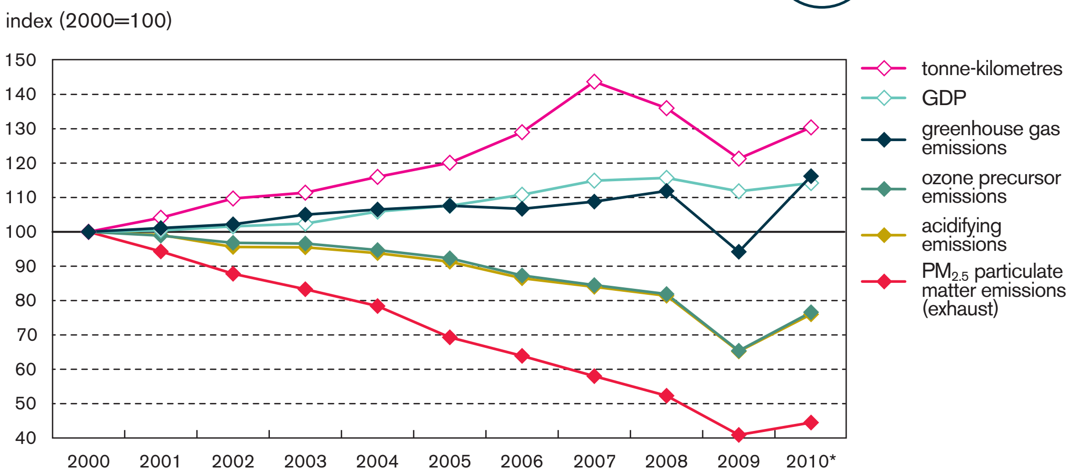
Since 2000, the number of passenger-kilometres (road and rail) has increased faster than the population. In 2008, passenger transport decreased by 1.2 % due to the financial-economic crisis, and then increased again.

In the last decade, there was an absolute decoupling of the emissions from passenger transport and the passenger-kilometres. The decrease in greenhouse gas emissions was due to the increasing use of energy-efficient vehicles and biofuels for road traffic. There were more energy-efficient vehicles on the market as a result of the compulsory standards that the EU imposes on car manufacturers for the CO_2 emissions from new cars. Federal tax incentives promoted the purchase of these vehicles. In 2010, the average CO_2 emissions from new cars in Flanders decreased from 147 g/km to 138 g/km. In early 2012, the tax incentives were abolished for budgetary reasons. The impact of this measure on the total CO_2 emissions will become clear later on. Renewable energy was responsible for 4.2 % of the total energy consumption of transport, passengers and freight together, in 2010. Biodiesel had the largest share of this and bio-ethanol was responsible for about one-tenth, green power remained marginal. In 2008, the share of renewable energy was only 1.2 %, while in 2009 this was 3 %. The emissions of ozone precursors, acidifying components and $PM_{2.5}$ from passenger transport continued to decrease due to the tightening of European emission standards for new vehicles and fuels. The lower number of passenger-kilometres in 2008 resulted in a larger decrease in emissions that year. For passenger transport, the emissions of ozone precursors and acidifying components were higher in 2010 than in 2009. The new calculation method in fact estimates the NO_x emissions from Euro 5 diesel vehicles to be higher than those of most of the other Euro classes, in line with actual driving conditions.

	2000	2005	2006	2007	2008	2009	2010*
population (million)	5.94	6.04	6.08	6.12	6.16	6.21	6.25
passenger-kilometres (billion)	66.81	70.36	71.26	72.67	71.82	72.68	73.28
greenhouse gas emissions (ktonnes CO_2-eq)	8 219	7 978	8 044	8 024	7 967	7 855	7 554
acidifying emissions (million Aeq)	1 031	774	735	708	659	632	645
ozone precursor emissions (tonnes TOFP)	87 208	56 763	52 451	48 786	42 831	40 557	41 033
exhaust particulate matter emissions ($PM_{2.5}$) (tonnes)	2 630	1 577	1 462	1 348	1 153	1 093	1 057

Eco-efficiency of freight transport

PACT 2020 DPSIR



* provisional figures
emissions from road traffic for 2010 are not comparable with the 2000-2009 dataset due to model modifications
emissions from road traffic for 2011 assumed identical with those for 2010, emissions from transport for 2011 not shown on figure

Source: MIRA based on ADSEI, FOD MV, NMBS, NV De Scheepvaart, PBV, SVR, VMM, W&Z

Only a relative decoupling of greenhouse gas emissions and freight transport

During the last ten years, the number of tonne-kilometres of freight transport (road, rail and inland navigation) increased more than the gross domestic product (GDP). The financial-economic crisis caused a reduction in the transport activity and also in the global GDP. The crisis had more impact on freight transport than on passenger transport. In 2010, the market recovered, but only partly.

Although trucks are also becoming more energy-efficient, the greenhouse gas emissions from freight transport increased due to an increase in activity. The emissions, however, increased more slowly than the tonne-kilometres. There was a relative decoupling. In 2009, there was a decrease in emissions due to the crisis. In 2010, the greenhouse gas emissions from freight transport exceeded the 2009 level. Not only the recovery after the crisis but also modifications to the method explained the higher emissions. In 2011, the European Commission also imposed standards for the CO_2 emissions from light duty vehicles for the first time, on average 175 g/km by 2017. The proposed standard of 147 g/km by 2020 remains to be approved by the European Council and the European Parliament.

For freight transport too, the emissions of ozone precursors, acidifying components and $PM_{2.5}$ (exhaust) decreased due to tighter European emissions standards. There was an absolute decoupling from the tonne-kilometres. The sharp decrease in acidifying emissions and emissions of ozone precursors in 2009 was due not only to the crisis, but also to the introduction of Euro V engines in trucks. These engines emit fewer nitrogen oxides than their predecessors. In 2010, the emissions were higher than in 2009 as a result of a higher estimate for the number of kilometres. This was due to the recovery in activity but also to changes made to the method. In 2010, the share of freight transport (excluding aviation and inland maritime shipping) in the total emissions from transport was 44 % for greenhouse gases, 59 % for acidifying substances, 57 % for ozone precursors and 48 % for particulate matter emitted via exhaust.

	2000	2005	2006	2007	2008	2009	2010*
GDP (billion euros)	144,8	155,9	160,5	166,3	167,5	161,8	165,3
tonne-kilometres (billion)	34,91	41,93	45,03	50,17	47,49	42,33	45,52
greenhouse gas emissions (ktonnes CO_2-eq)	5 035	5 415	5 370	5 477	5 634	4 745	5 851
ozone precursor emissions (tonnes TOFP)	70 831	65 367	61 845	59 859	58 003	46 298	54 247
acidifying emissions (million Aeq)	1 218	1 112	1 053	1 023	991	793	925
exhaust particulate matter emissions ($PM_{2.5}$) (tonnes)	2 227	1 544	1 424	1 291	1 165	911	992

Energy consumption by transport

DPSIR

* provisional figures

Source: MIRA based on Flanders Energy Balance VITO

Share of biofuels no longer increased in 2011

In the period 2000-2008, the energy consumption by transport still increased slightly. The financial-economic crisis led to a dip for all modes in 2009. The recovery of the economy led to an increase in the energy consumption of shipping and road transport again in 2010. Road transport was also affected by methodological changes. Inland navigation also recorded an increase in 2011. According to a provisional estimate, the total energy consumption by transport in 2011 was 188.4 PJ, or 11.9 % of the total energy consumption in Flanders. More efficient loading and a decrease in the use of diesel trains had a positive effect on the energy consumption of rail. In 2011, 75 % of the energy consumption of rail was electricity and 25 % diesel. In 1990 their respective shares were still more or less equal. The energy consumption of inland navigation followed the change in the activity, but the energy-efficiency has increased in the last ten years by approximately 10 %. The energy consumption of inland maritime shipping increased from 2004, but also inland maritime shipping became more efficient due to improved fuel efficiency and an increase in scale.

In 2000, diesel produced three quarters of the energy used by transport. Petrol was the other main fuel. In 2010, the share of diesel had increased to 83 %, mainly due to the dieselisation of the vehicle fleet and more freight transport. Petrol decreased to 11 %. Electricity, used almost exclusively by rail, remained constant at approximately 1.5 %. LPG decreased from 1 % to 0.6 %. From 2007, road traffic also used biofuels. Their share increased and was approximately 4 % in 2010. Heavy fuel oil and CNG remained marginal. The shares remained virtually unchanged in 2011. Biofuels did not increase any further due to the lower production of these sources of energy in 2011.

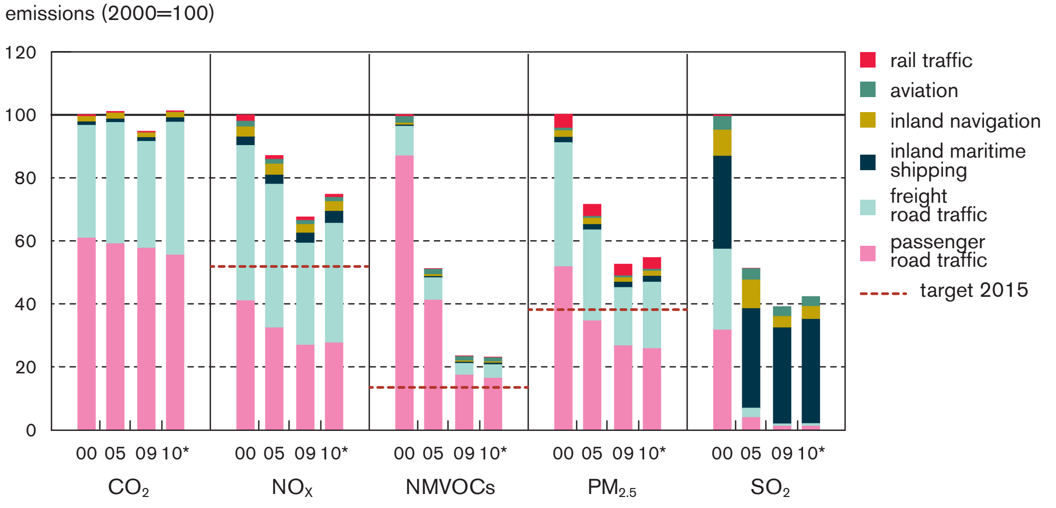
The use of efficient technologies and lighter vehicles can reduce the energy consumption. A modal shift to collective transport, rail and inland navigation can also contribute to this. Information and communication technology can help to reduce the transport flows.

energy consumption (PJ)	2000	2005	2006	2007	2008	2009	2010	2011*
road traffic	175.0	176.5	176.5	179.2	180.6	170.8	180.4	179.0
rail traffic	4.0	3.7	4.0	4.1	4.1	3.7	3.7	3.7
inland navigation	3.0	3.3	3.2	3.2	3.2	2.6	3.0	3.1
inland maritime shipping	1.9	2.0	2.0	2.3	2.4	2.1	2.6	2.6
domestic aviation	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total	*184.0*	*185.5*	*185.6*	*188.8*	*190.4*	*179.3*	*189.6*	*188.4*

* energy consumption by road traffic in 2011 only as a first estimate
energy consumption by road traffic in 2010 not comparable with the 2000-2009 series due to model modifications

Air pollutant emission by transport

DPSIR



* provisional figures
emissions from road traffic for 2010 not comparable with the 2000-2009 series due to model modifications
emissions from road traffic for 2011 assumed identical with those for 2010, emissions from transport for 2011 not shown on figure
sectoral breakdown for assessment against MINA transport targets differs from that used for assessment against NEC targets

Source: VMM

Further reduction in traffic emissions needed

The CO_2 emissions from transport have slightly fluctuated in recent years. The improved efficiency of vehicles has had a positive impact, but total CO_2 emissions did not decrease due to the increase in number of kilometres. Road traffic remained by far the most important source. Under the European Energy & Climate Package, Belgium is required to reduce its greenhouse gas emissions by 15 % between 2005 and 2020 for the non-ETS sectors, including transport. The third Flemish Climate Policy Plan will include measures to reduce emissions from these sectors for the period 2012-2020.

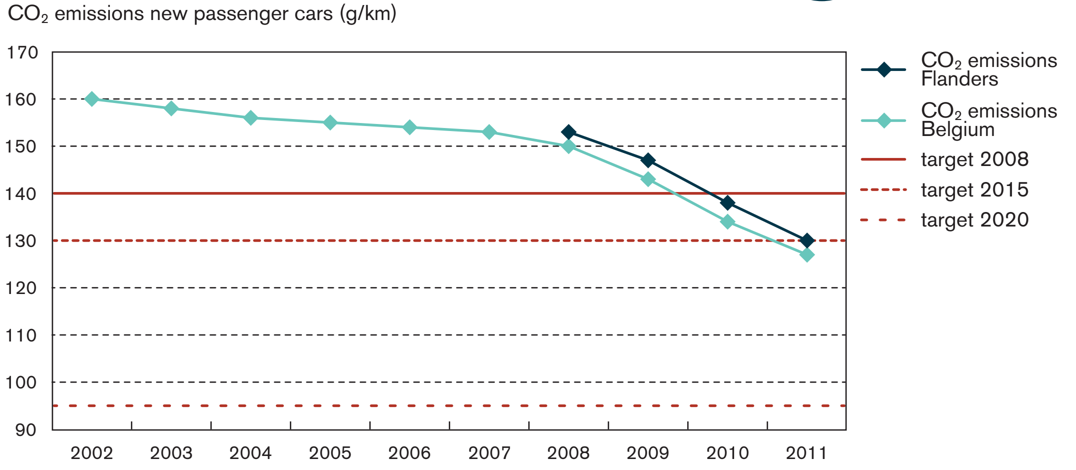
Due to the tightening of the environmental standards for vehicles, the NO_x, NMVOC and $PM_{2.5}$ emissions from transport decreased in the period 2000-2009. For NO_x, the decrease was less than expected due to the dieselisation of the vehicle fleet and the increased freight transport. Non-exhaust particulate matter emissions increased due to the increasing traffic and in 2010 already accounted for 33 % of the $PM_{2.5}$ emissions. Also the non-exhaust fraction has a harmful effect on health. However, more research is needed to assess the full impact and to derive useful measures. Successive EU directives have limited the sulphur content of fuels and consequently SO_2 emissions. In 2010, the majority of emissions exceeded the 2009 level. This is to be attributed to increased activity but also to various model changes.

The targets of the MINA plan 4 (2011-2015) call for a further reduction in transport emissions for 2010-2015: 31 % for NO_x, 41 % for NMVOCs and 30 % for $PM_{2.5}$. In addition to tighter Euro standards, the Flemish Air Quality Plan for NO_2, approved in early 2012, will contribute to this. This plan is aimed at the greening of vehicle taxes and the logistics sector. As a first step, the Flemish Government reformed the traffic registration tax in 2012. The new tax is more advantageous for new petrol vehicles, which emit less NO_x, than for new diesel vehicles.

air pollutant emissions	2000	2005	2006	2007	2008	2009	2010*
CO_2 (ktonnes)	13 128	13 256	13 267	13 361	13 456	12 437	13 282
NO_x (tonnes)	100 752	87 770	83 669	82 024	78 704	68 012	75 287
NMVOCs (tonnes)	28 963	14 813	12 888	10 749	7 891	6 754	6 650
$PM_{2.5}$ (tonnes)	6 027	4 308	4 072	3 854	3 551	3 168	3 283
SO_2 (tonnes)	3 428	1 751	1 646	1 682	1 519	1 339	1 447

CO_2 emission from new passenger cars

PACT 2020 DPSIR



The Dutch driver and vehicle licensing agency (RDW) was used as source for the emissions data for the years 2008-2011, because it is considered to be the most reliable. As a result, the average CO_2 emissions for 2008 are 2 g higher than the figure included in the previous report. The differences for 2009 and 2010 are negligible.

Source: VITO based on DIV and RDW

Target 2015 already reached in Belgium and Flanders

In the period 2008-2011, the average CO_2 emissions from new cars in Belgium decreased more than before. More fuel-efficient vehicle models appeared on the market. Furthermore, in 2007 the federal tax allowance for vehicles with emissions of less than 115 g/km changed over to a direct discount on purchase. Especially the share of new private cars with CO_2 emissions of less than 105 g/km increased sharply from 3 % in 2008 to 39 % in 2011. Almost half of all new private cars benefitted from a federal discount in 2011. Furthermore, from 2008 onwards the deductibility of company cars became dependent on the CO_2 emissions. In 2010, company cars that emit less than 60 g CO_2/km received additional benefits. With 127 g/km, Belgium met the 2015 target already in 2011. Flanders, which on average has heavier cars, also reached the target, albeit just barely. The federal incentive for fuel-efficient vehicles encouraged the purchase of diesel vehicles because, on average, they emit less CO_2 than petrol cars. This did, however, lead to higher NO_x and particulate matter emissions. Further tax reforms taking into account all emitted pollutants therefore seem appropriate.

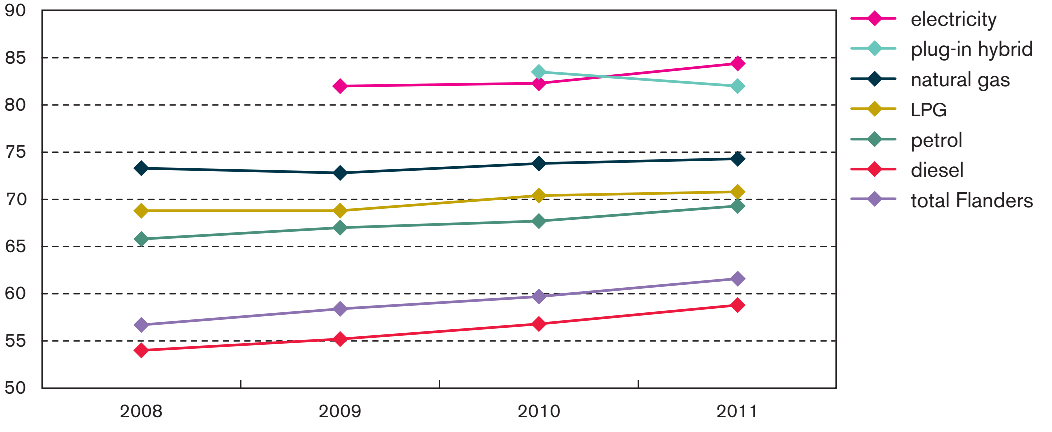
It remains to be seen whether the target for 2020 is feasible. In fact, since 2012 the federal incentives for fuel-efficient vehicles were abolished for budgetary reasons. A tax reduction of 30 % on the purchase price of electric passenger cars continued to apply in 2012. Since March 2012, the reformed Flemish traffic registration tax is valid. This tax is now also dependent on the CO_2 emissions. Electric and plug-in hybrid vehicles are exempt from traffic registration tax.

In Belgium, the average CO_2 emissions from new company cars still exceeded those from new private cars in 2011. The relative difference was approximately 10 g/km and has remained stable in recent years. Leased cars performed not much worse than private cars. Purchased company cars were especially less fuel-efficient.

CO_2 emissions new passenger cars Belgium (g/km)	**2008**	**2009**	**2010**	**2011**
leased cars	149	141	133	126
purchased company cars	163	156	147	142
all company cars	155	149	140	134
private cars	146	139	131	123

Ecoscore of new passenger cars

DPSIR



Source: Sergeant et al. (2012)

Diesel cars are the least environmentally friendly

The ecoscore is an indicator for the environmental performance of vehicles based on their noise nuisance and impact on climate change, ecosystems and health. The score takes into account not only the direct emissions that are released while driving but also the indirect emissions during the production and distribution of the fuel. The calculation method was recently modified using more realistic NO_x emission values. As a result, the ecoscore of the more recent and more fuel-efficient diesel vehicles in particular is lower than before.

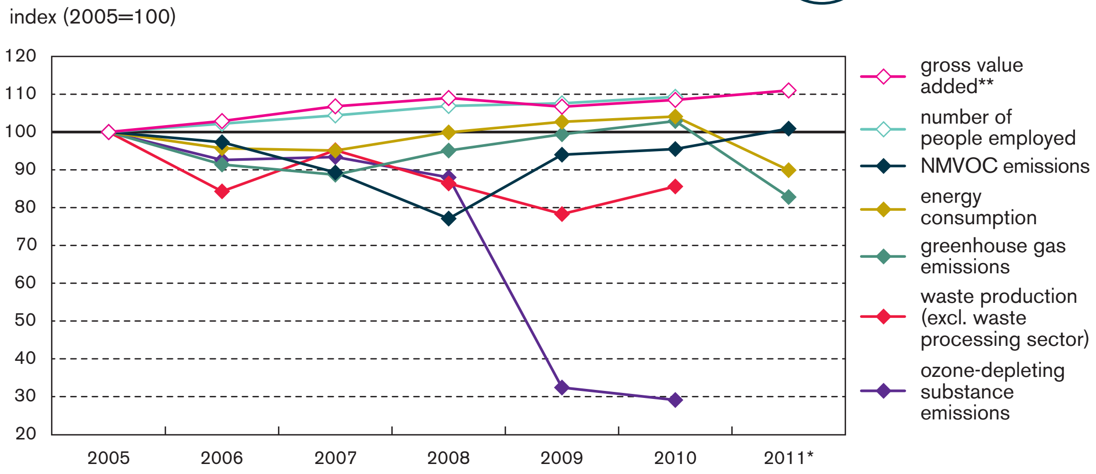
The environmental performance of new cars is continually improving. EU regulations require car manufacturers to produce cars with increasingly lower CO_2 emissions. In addition, particulate matter and hydrocarbon emissions from diesel vehicles and nitrogen oxide emissions from petrol cars decreased following the introduction of the tighter Euro 5 standard in 2009. In 2011, the average ecoscore of the new Flemish car fleet was 61.6, i.e. an increase of five units with respect to 2008. The average ecoscore of the complete Flemish car fleet was 53.4 in 2011. It remains to be seen whether the target of the MINA plan 4 (2011-2015), a score of 61 determined on the basis of the previous method, is feasible by 2015.

Of the various vehicle technologies, the battery-electric vehicle has the highest ecoscore. Harmful pollutants are emitted only during the production of the fuel, not during the actual driving. Plug-in hybrid vehicles, which partly run on electricity, score well too. These two types of electric vehicles are followed by natural gas vehicles. None of these three types of vehicles is yet being purchased in significant numbers in Flanders, so their impact on the overall Flemish ecoscore is still limited in 2011. LPG vehicles score only slightly better than petrol cars. Diesel cars are the least environmentally friendly. This is mainly due to their higher NO_x emissions. They do, however, show the most marked improvement since 2008. On the one hand, this is due to the higher proportion of new diesel cars with a built-in particle filter. This filter reduces the emission of particulate matter. On the other hand, the average CO_2 emissions from new diesel cars decreased slightly more than those from new petrol cars. New private cars were, on average, more environmentally friendly than new company cars in 2011. Company cars more often run on diesel and are on average heavier and more powerful.

ecoscore new passenger cars	2008	2009	2010	2011
private cars	57.7	59.5	60.9	63.2
leased cars	56.1	57.2	58.8	59.9
purchased company cars	54.5	56.1	57.2	58.7

Eco-efficiency of trade & services

PACT 2020 DPSIR



* provisional figures
** in chain euros with base year 2009
Due to changes in the calculation method for the number of people employed (NACE-BEL 2008 statistical nomenclature) and waste production, these data sets are only available from 2005 and 2004 respectively.

Source: MIRA based on HERMREG, Belgostat, EIL (VMM), Flanders Energy Balance VITO, INR and OVAM

Economic importance of trade & services increasing

The gross value added of the trade & services sector increased between 2005 and 2011 by 11 %. The number of people employed (employees and self-employed) increased between 2005 and 2010 by 9 %. The largest increases with respect to 2005 occurred in health care (16 %) and in offices & administration (service) (14 %).

Decreasing environmental pressure by trade & services sector

In 2011, energy consumption and the greenhouse gas emissions for trade & services decreased by 10 % and 17 % respectively with respect to 2005. This decrease is to be attributed mainly to the mild winter of 2011. Before 2005, NMVOC emissions decreased sharply but in the period under review they showed a rather stable trend. The decrease in NMVOC emissions over the last ten years is attributable to the use of the Best Available Techniques (BAT) by, amongst others, petrol stations (vapour recovery) and dry cleaning (refrigeration, active carbon filters). In 2010, greenhouse gas emissions decreased by 71 % with respect to 2005. Between 2008 and 2009, the emissions decreased significantly following a correction to the lifetimes of the most recent generation refrigerators using CFC-11-eq as blowing agent. Waste production (excluding the waste processing sector) shows a history of fluctuation but we can say there was an absolute decoupling in 2010 with respect to 2005 (-14 %).

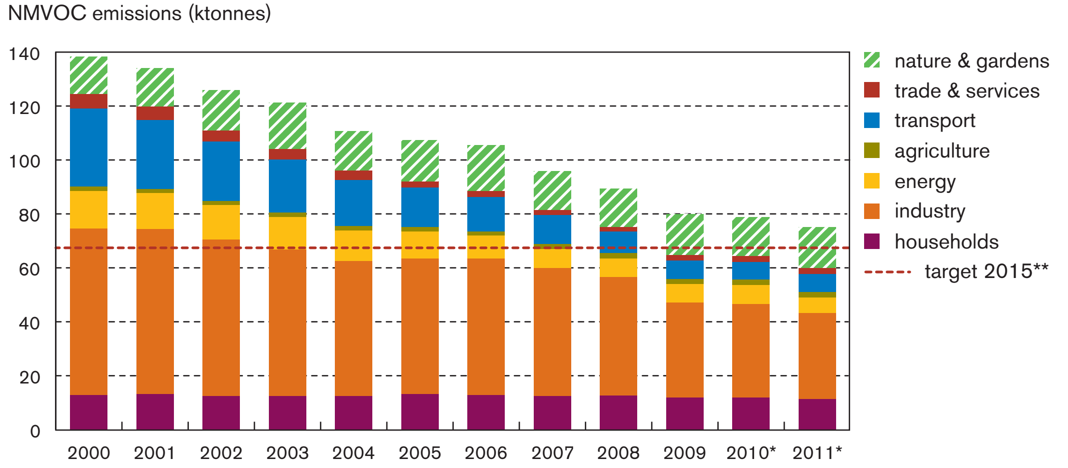
	2005	2006	2007	2008	2009	2010	2011*
gross value added (index with base year 2005=100)**	100	103	107	109	107	109	111
number of people employed (x 1 000)	1 806	1 846	1 886	1 932	1 944	1 975	..
NMVOC emissions (tonnes TOFP)	2 206	2 147	1 971	1 701	2 074	2 107	2 227
energy consumption (PJ)	105	100	100	105	108	109	94
greenhouse gas emissions (ktonnes CO_2-eq)	4 024	3 677	3 569	3 828	3 998	4 140	3 330
waste production (excl. waste processing sector) (ktonnes)	4 925	4 151	4 690	4 254	3 855	4 217	..
ozone-depleting substance emissions (tonnes CFC-11-eq)	147	136	138	130	48	43	..

Indicator Report
2012

2
Environmental themes

☺ Emission of NMVOCs into the air

DPSIR



* provisional figures, emissions from road traffic for 2010 are not comparable with the 2000-2009 dataset due to model modifications; emissions from road traffic for 2011 assumed identical with those for 2010
** excluding nature & gardens

Source: VMM

Decrease in NMVOC emissions from industry and energy

A number of non-methane volatile organic compounds (NMVOCs) are carcinogenic (benzene, vinyl chloride, etc.). In addition, NMVOCs play a role as ozone precursors in photochemical air pollution.

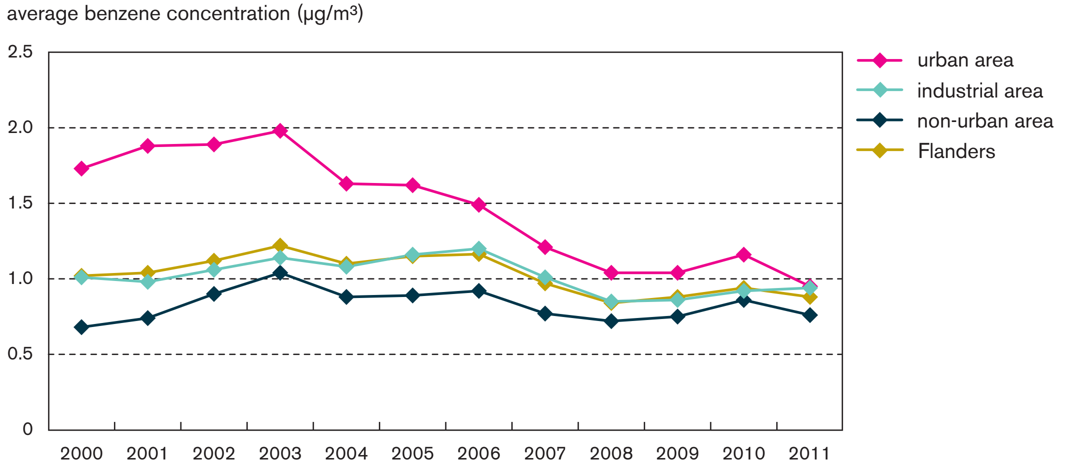
NMVOC emissions are continuing to decrease. The MINA plan 4 (2011-2015) establishes target values to be achieved by 2015 for both stationary sources (64.0 ktonnes) and non-stationary sources (3.9 ktonnes). The target value for stationary sources has been reached since 2009. Emissions from non-stationary sources need to be reduced further if the target value is to be achieved in a timely manner. NMVOC emissions from the transport sector have, however, decreased considerably over the last decade. This is to be attributed to the tightening of the environmental standards for vehicles, the use of catalytic converters and the decrease in the share of petrol cars in the passenger car fleet. The downside of the dieselisation of the passenger car fleet is higher NO_x emissions, which also play a role in photochemical air pollution and acidification.

The industry accounted for the largest share in NMVOC emissions with 31.9 ktonnes emissions in 2011. Between 2010 and 2011, these emissions decreased by 8 % across the different subsectors. This is partly due to production decreases and the improved accuracy of the emission estimates. However, also the increased shift to low-solvent products, the further implementation of leak detection and repair programmes (LDAR) and other measures imposed by the Flemish National Emission Ceiling (NEC) reduction programme and the EU's IPPC Directive all contributed to this trend. The energy sector contributed to a lesser extent, 5.7 ktonnes, but here too a sharp decrease was recorded between 2010 and 2011 (-17 %).

NMVOC emissions (ktonnes)	**2000**	**2003**	**2008**	**2009**	**2010***	**2011***
households	12.8	12.5	12.6	11.9	11.9	11.3
industry	61.7	54.2	43.9	35.1	34.7	31.9
energy	14.0	12.2	7.0	6.9	6.9	5.7
agriculture	1.6	1.5	2.0	1.9	2.1	2.1
transport	29.0	19.7	7.9	6.8	6.6	6.7
trade & services	5.3	4.0	1.7	2.1	2.1	2.2
nature & gardens	13.9	17.1	14.3	15.3	14.5	15.1
total	*138.2*	*121.2*	*89.4*	*80.0*	*78.9*	*75.0*

☺ Benzene concentration in the air

DPSIR



Source: VMM

Average benzene concentration target reached

Benzene is a carcinogenic volatile organic substance, which also plays a role as an ozone precursor in photochemical air pollution. Benzene is released through incomplete combustion of fuels. In 2011, the benzene concentration in the ambient air was measured at ten measurement stations in Flanders, distributed over urban, industrial and non-urban areas.

The benzene concentration decreased mainly between 1997 and 2000 and then increased slightly until 2003 (in industrial areas until 2006). The concentration then decreased again to an average of 0.88 µg/m³ in 2011. The highest benzene concentration is still measured in urban areas, but it is also here that, on average, the sharpest decrease has been recorded, narrowing the difference from the other type areas. The average benzene concentration is well below the target value 2010 of 5 µg/m³ imposed by the European Air Quality Directive (2008/50/EC). According to the World Health Organization, however, it is not possible to establish a safe level of benzene exposure.

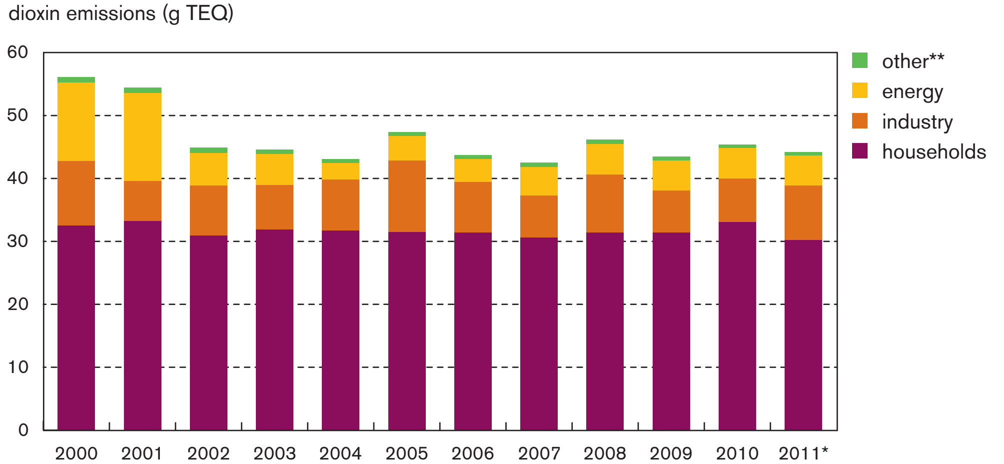
Moreover, actual individual exposure often exceeds the level that is expected according to the average benzene concentration. Exposure is increased when refuelling at petrol stations, at busy crossroads or indoors by inhalation of tobacco smoke or the use of certain glues. The Flemish Government Decree of 11 June 2004 regarding measures for combating health risks due to a contaminated indoor environment specifies a guide value of 2 µg/m³ as quality standard for benzene in the indoor environment, to reduce the health risks for inhabitants or users as far as possible.

A total of 388 tonnes of benzene was emitted in Flanders in 2011. The most important source of benzene emissions is road traffic (266 tonnes), followed by industry (74 tonnes). Industry emitted 15 % more benzene in 2011 than in 2010, an increase that is mainly attributable to the metal sector.

average benzene concentration (µg/m³)	2000	2003	2008	2009	2010	2011
urban area	1.73	1.98	1.04	1.04	1.16	0.95
industrial area	1.01	1.14	0.85	0.86	0.92	0.94
non-urban area	0.68	1.04	0.72	0.75	0.86	0.76
Flanders	*1.02*	*1.22*	*0.84*	*0.88*	*0.94*	*0.88*

Emission of dioxins into the air

DPSIR



* provisional figures
** other: agriculture + transport + trade & services

Source: VITO

Emission of dioxins remains unchanged

Dioxins are formed during the incomplete combustion of organic material in the presence of a source of chlorine. Dioxins can be ingested by humans via, among other things, food (e.g. dairy foods) and cause cancer, negative effects on growth and development, and various other disorders. The reduction of dioxin emissions, therefore, remains an important goal.

Between 2000 and 2002, dioxin emissions decreased by 20 % but since then have remained largely unchanged. In the 1990s, drastic remedial measures were taken, especially in the non-ferrous industry, the iron and steel industry and waste incineration, resulting in a significant decrease in industrial emissions.

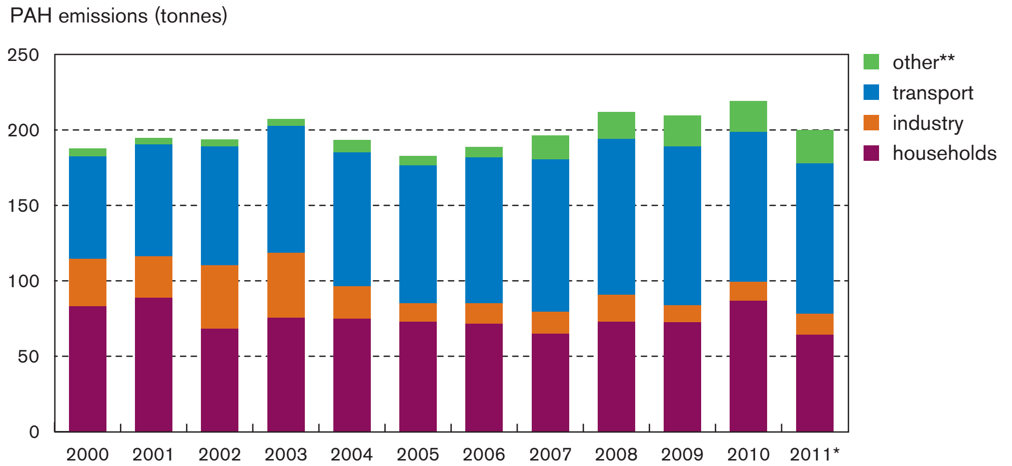
Households were responsible for the largest part (68 %) of dioxin emissions in 2011. Three-quarters of the household emissions come from private, illegal burning of waste in open fires and small barrels. The remaining household emissions come from building heating with solid fuels (coal, but mainly wood). These emissions from the heating of homes were 28 % lower in 2011 than in 2010. The reasons for this are the milder winter and the continuing shift to liquid and gaseous fuels.

Convincing public awareness campaigns, support for an ambitious and cost-effective product standardisation at the federal and European levels, and (tax) stimulation of environmentally friendly technologies are the most important instruments for further reducing household dioxin emissions. Thus, in 2012, the Flemish Government launched a large-scale awareness campaign *'Stook Slim'* to raise public awareness about the release of harmful substances during the burning of waste in open fires and the burning of treated wood in stoves used for building heating.

dioxin emissions (g TEQ)	**2000**	**2005**	**2008**	**2009**	**2010**	**2011***
households	32.55	31.52	31.39	31.38	33.06	30.25
industry	10.25	11.29	9.23	6.70	6.93	8.63
energy	12.40	3.91	4.87	4.75	4.80	4.75
other**	0.90	0.64	0.67	0.62	0.62	0.58
total	*56.11*	*47.36*	*46.15*	*43.45*	*45.41*	*44.21*

☹ Emission of PAHs into the air

DPSIR



* provisional figures
** other: energy + agriculture + trade & services

Source: VITO

PAH emission not decreasing

Polycyclic aromatic hydrocarbons (PAHs) are formed during the incomplete combustion of organic material. When ingested by humans (mainly via food), some PAHs can give rise to cancer. The further reduction of PAH emissions, therefore, remains an important goal.

Total PAH emissions in Flanders in 2011 were still 7 % higher than in 2000. Compared with 2010, however, emissions decreased by 9 % in 2011.

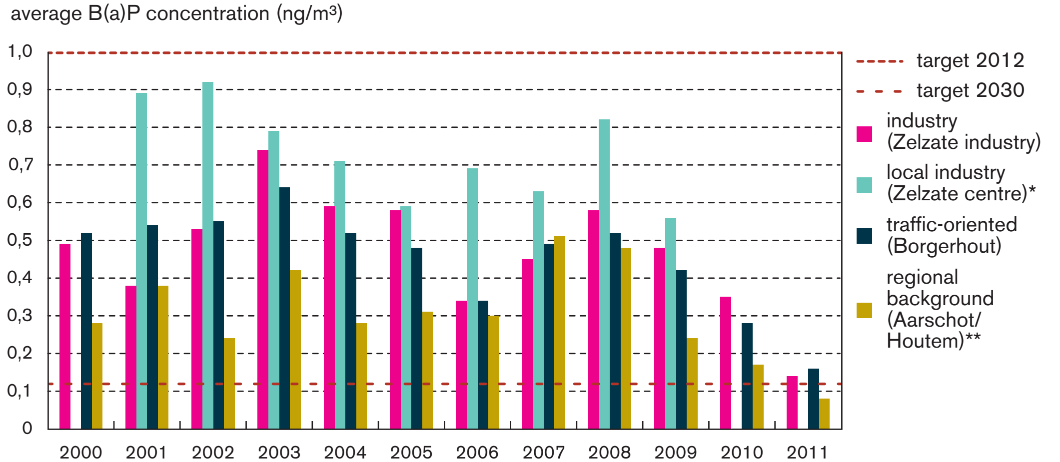
In 2011, households were responsible for 32 % of the total PAH emissions. The household sources are coal and wood-fired building heating (89 %) and the burning of waste in small barrels and open fires (11 %. Between 2010 and 2011, PAH emissions from building heating decreased by 28 %. The reason for this is the decreasing use of solid fuels thanks to the milder winter and the switch to more environmentally friendly fuels. However, the control of PAH emissions from both building heating with solid fuels (mainly wood) and the private, illegal burning of waste remains a point for attention. Emission reduction can be achieved, among other measures, by introducing specific regulations on heating buildings with solid fuels. Thus, new coal and wood stoves have had to meet minimum dust standards since October 2010. These standards will be tightened up step-by-step in the coming years, which will eventually have a positive effect on the emission of particle-associated PAHs.

Half of the PAH emissions are caused by transport. Since 2000, the PAH emissions from transport have increased by half, mainly as a result of the increasing transport flows and the growing use of diesel and catalytic converters. The latter are responsible for the increase in PAH emissions, more specifically of naphthalene. The phased introduction of higher euro classes will in most cases tighten up the emission standards for, among others, particulate matter and hydrocarbons from passenger cars, light duty vehicles and trucks. This is also expected to have a favourable impact on future PAH emissions from transport.

PAH emissions (kg)	2000	2005	2008	2009	2010	2011*
households	83 201	72 825	72 746	72 585	86 761	64 411
industry	31 363	12 245	17 919	11 271	12 419	13 894
transport	68 001	91 448	103 476	105 124	99 541	99 517
other**	5 284	6 096	17 599	20 545	20 297	22 259
total	*187 849*	*182 614*	*211 740*	*209 526*	*219 019*	*200 080*

☺ PAH concentration in ambient air

DPSIR



* no methodologically comparable measurements in 2010 and 2011; ** from 2009 no measurements in Aarschot but in Houtem (Aarschot is no longer considered as background, Houtem is)

Source: VMM

Sustained attention needed for public health

Since 2000, VMM has been measuring polycyclic aromatic hydrocarbons (PAHs) in the ambient air. B(a)P (benzo(a)pyrene) is one of the best known PAHs because of its carcinogenic properties and is used as reference for the total PAH concentration. Nitro-PAHs are secondary pollutants and result from photochemical reaction of PAHs. These secondary pollutants are usually more mutagenic and carcinogenic than the actual PAHs, but occur in smaller concentrations. The health hazard of nitro-PAHs for humans, animals and the environment is, therefore, of the same order of magnitude as that of PAHs.

The 4th Air Quality Daughter Directive (2004/107/EC) uses a target value of 1.0 ng B(a)P/m³ in the air as an annual average to be reached in 2012. In its Air Quality Guidelines, the World Health Organization indicates a cancer risk of 1 in 100 000 exposed people for a lifelong exposure to 0.12 ng B(a)P/m³ in the air. This can be used as a target value for 2030. For nitro-PAHs, there are as yet no target or limit values at the European or Flemish level.

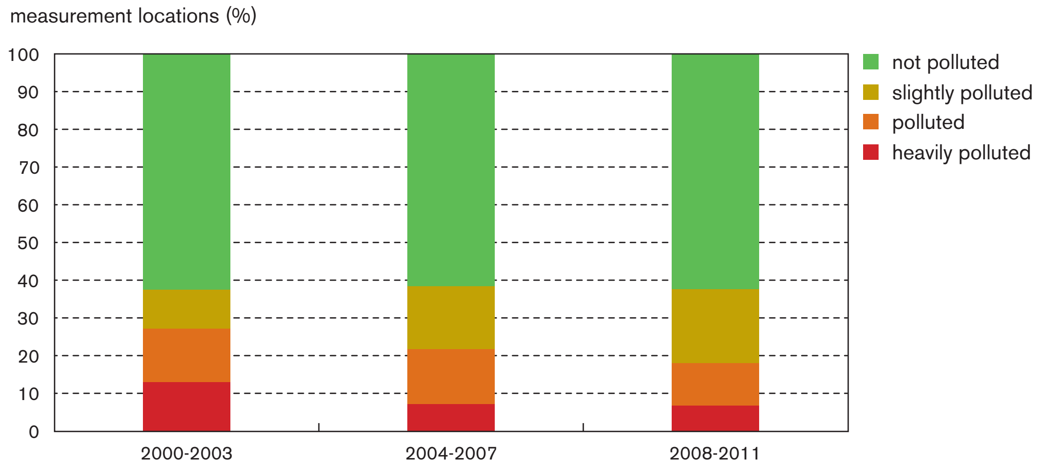
Average annual concentrations have fluctuated between 0.3 and 0.6 ng B(a)P/m³ in recent years. In 2011, they were everywhere less than 0.2 ng B(a)P/m³. Weather conditions and local conditions, such as wood burning for heating in residential areas, are major factors and can have a great impact on the B(a)P concentration in the surrounding area. In winter, higher concentrations are measured than in the summer, which is a consequence of building heating with solid fuels (coal, and mainly wood).

The concentration of nitro-PAHs broadly corresponds to that of PAHs, albeit less pronounced and not at all measurement locations. For some nitro-PAHs, we see an increase in summer as compared to winter due to the more favourable conditions for photochemical reactions (higher temperature and more UV light).

The policy on PAHs and nitro-PAHs is focused on reducing the emissions and, consequently, the concentrations. This is achieved, among other measures, by applying Best Available Techniques (BAT) for industrial installations and by introducing regulations on building heating with solid fuels. New coal and wood stoves have had to meet minimum dust standards since October 2010. These standards will be tightened up step-by-step in the coming years.

PCBs in watercourse sediments

DPSIR



Source: VMM

PCB pollution decreasing but standards still often exceeded

Polychlorobiphenyls (PCBs) were once used in, among other things, transformers and condensers. Due to leaks or improper dismantling of these appliances, PCBs have escaped into the environment. Some PCBs are toxic and can, when ingested by humans and animals, have harmful effects on health, such as developmental disorders and immune system dysfunctions. Some PCBs are also carcinogenic.

The monitoring of the watercourse sediment quality has been running for more than ten years and many of the measurement locations have already been sampled more than once in that period. In order to find out to what extent the watercourse sediment quality has changed in that period, 240 measurement points were selected that had been sampled in the period 2000-2003, 2004-2007 and in 2008-2011 (see figure). The percentage of heavily polluted measurement locations has almost halved, whereas the percentage of unpolluted or slightly polluted watercourse sediments has increased.

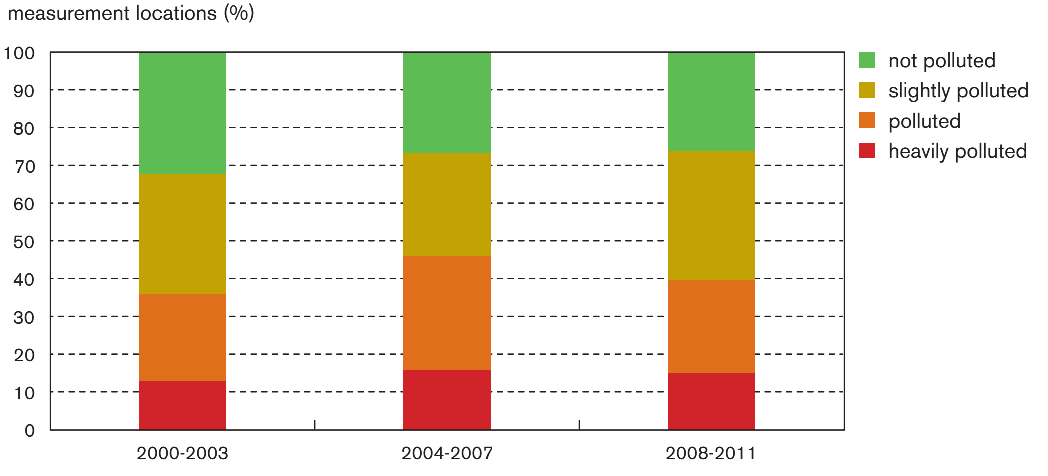
The measurement results from all sampled measurement locations for the period 2008-2011 (more than the aforementioned 240) indicate that 61 % of the measurement locations show no deviation from the reference value for PCBs and are, therefore, considered not to be contaminated. 17 % of the measurement locations are slightly contaminated, 12 % are contaminated and 10 % are heavily contaminated. Individual PCBs are often the cause of the standards being exceeded. For a few PAHs, that is the case in more than 30 % of the watercourse sediments investigated.

Improvements in the watercourse sediment quality can have various causes:

- removal of sediment (although remediation does not always lead to an improvement in the watercourse sediment quality because the historic contamination has sometimes penetrated deep into the sediment);
- due to reduced discharges of toxic substances, the newly formed watercourse sediment – in other words the top layer of sediment – is less contaminated;
- due to the changed physico-chemical quality of the water column, for example a higher oxygen concentration, release of toxic substances from the watercourse sediments into the water column can occur.

☹ PAHs in watercourse sediments

DPSIR



Source: VMM

No noticeable improvement

Polycyclic aromatic hydrocarbons (PAHs) are formed during the incomplete combustion of organic material. When ingested by humans (mainly via food), some PAHs can cause lung and digestive system cancers.

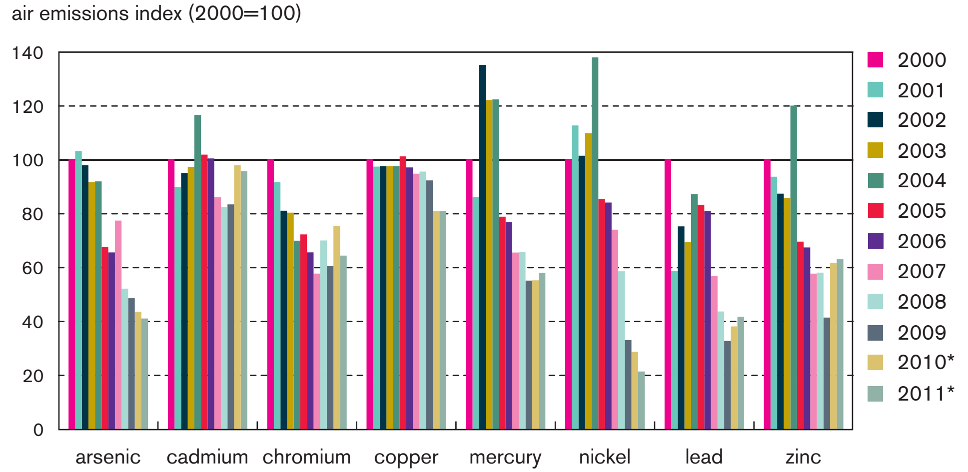
The monitoring of the watercourse sediment quality has been running for more than ten years and many of the measurement locations have already been sampled more than once in that period. In order to find out to what extent the watercourse sediment quality has changed in that period, 240 measurement points were selected that had been sampled in the period 2000-2003, 2004-2007 and in 2008-2011 (see figure). In contrast to, for example, organochlorine pesticides and PCBs, the PAH contamination of the Flemish watercourse sediments has not improved.

The measurement results of all sampled measurement locations for the period 2008-2011 (more than the aforementioned 240) indicate that 26 % of the measurement locations show no deviation from the reference value for PAHs (sum of the six Borneff PAHs) and are, therefore, considered not to be contaminated. 32 % of the measurement locations are slightly contaminated, 27 % are contaminated and 15 % are heavily contaminated.

Individual PAHs are often the cause of the standards being exceeded. For a few PAHs that is the case in about one quarter of the watercourse sediments investigated.

Emission of heavy metals into the air

DPSIR



* provisional figures
emissions from road traffic for 2010 not comparable with 2000-2009 series due to model modifications; emissions from road traffic for 2011 assumed identical with those for 2010

Source: VMM

Predominantly decreasing emissions

All emissions of heavy metals into the air have decreased since 2000. In the middle of the 2000s, the decrease seemed to stagnate somewhat. In 2008 and 2009, the emissions of most metals decreased again. The financial-economic crisis probably had something to do with this. The trends in 2010 and 2011 are not clear-cut.

Industrial emissions of all heavy metals decreased significantly in the period 2000-2009. The recent increase in the total cadmium and zinc emissions is caused mainly by the metal sector. When considering the whole period 2000-2011, the emissions of all heavy metals by the energy sector have decreased. The energy sector accounts for a major part of the mercury emissions, mainly from oil refineries and waste incineration.

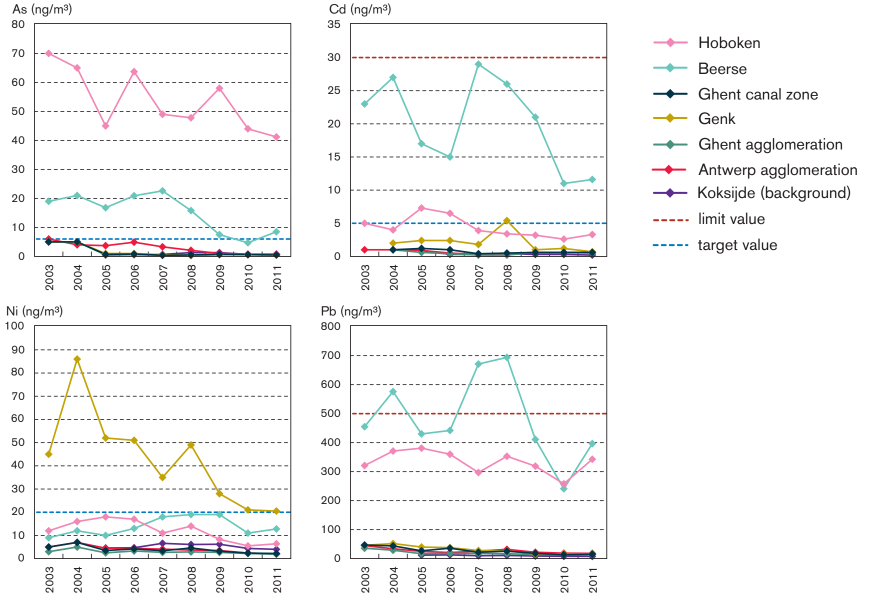
The transport sector has a particularly large share in the copper emissions, mainly because of brake wear. With the exception of lead, the emissions of heavy metals from transport did not decrease in the period 2000-2009. Due to major model modifications, the figures for 2010 are difficult to compare with those of previous years. For 2011, the figures had to be kept constant at 2010 levels. These problems also have their impact on the total emissions of a number of heavy metals in Flanders. The impact is especially significant for copper and chromium and, to a lesser extent, for zinc and lead.

Emissions of heavy metals from households are mainly attributable to building heating. They do not show any pronounced trend in the period 2000-2010. In 2011, they were markedly lower than in 2010. The heating demand in 2011 was also lower than in 2010.

emissions 2011* (%)	arsenic	cadmium	chromium	copper	mercury	nickel	lead	zinc
households	12.1	9.5	6.6	8.8	12.9	4.2	3.5	5.1
industry	73.8	66.1	32.5	6.5	42.5	56.1	72.2	47.0
energy	11.1	17.9	12.7	2.1	41.0	21.0	5.6	2.6
agriculture	1.4	1.2	2.0	0.6	1.4	9.7	4.3	1.2
transport	0.3	3.4	44.6	81.8	0.3	5.2	14.1	42.6
trade & services	1.3	1.9	1.5	0.2	1.9	3.7	0.3	1.4

Heavy metals in the air

DPSIR



Source: VMM

No limit values exceeded, only future European target values exceeded locally

The presence of heavy metals in the air can be a health hazard. In monitoring their concentrations, most attention goes to places where problems can occur. The measurement stations in Hoboken, Beerse and Genk are therefore located in the vicinity of (non-)ferrous companies. All figures here are based on measurements in PM_{10} particulate matter and at the measurement station with the highest concentrations and a complete time series.

Between 2003 and 2011, there was a change for the better in the concentrations of heavy metals in the air at most measurement stations. This means there is a general improvement in air quality. The total emissions in Flanders decreased significantly for the majority of heavy metals. The decreasing concentrations in the industrial areas are the result of emission-reduction measures but also of the financial-economic crisis. The concentrations in 2011 were often higher than in 2010. This may have been caused by the greater frequency of southwestern winds which carried more contaminated air over the measurement stations.

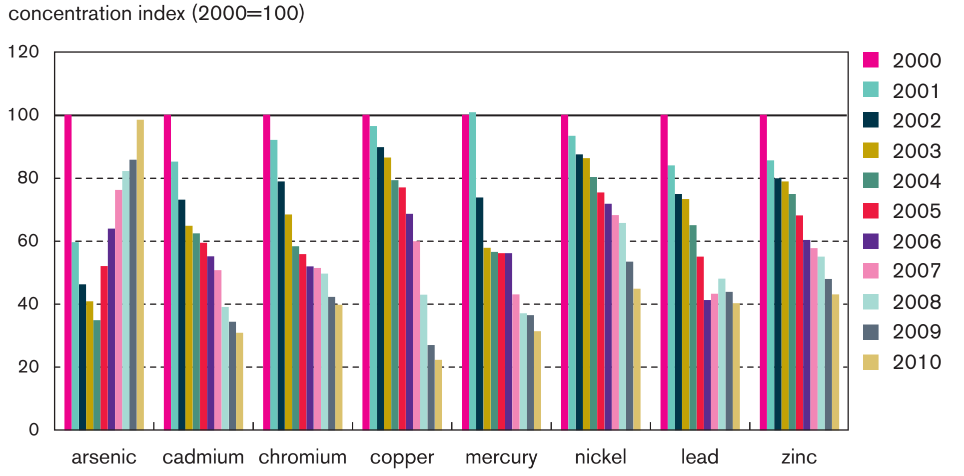
The European limit value for lead and the Flemish limit value for cadmium were achieved everywhere in Flanders in 2011. The European target values for arsenic, cadmium and nickel came into effect on 31 December 2012. In 2011, the target value for arsenic was exceeded at all four measurement stations in Hoboken and at one of the three measurement stations in Beerse. The target value for cadmium was exceeded at two of the three measurement stations in Beerse. The target value for nickel was exceeded at two of the four measurement stations in Genk. Problems with heavy metals in the air are thus limited to local areas in the sector downwind of the companies concerned. In cities and background areas, the concentrations of heavy metals in the air are much lower than in industrial environments.

In 2011, the numbers of inhabitants exposed to concentrations above the target values were as follows:

- Hoboken: some 3 000 inhabitants exposed to too high arsenic concentrations;
- Genk: some 300 inhabitants exposed to too high nickel concentrations;
- Beerse: some 90 inhabitants exposed to too high cadmium concentrations.

Heavy metals in surface water

DPSIR



The values in the figure are moving average total concentrations where the value for year x is the average of x-1, x, x+1. Concentrations are expressed relative to the value for 2000.

Source: VMM

Favourable trend for nearly all metals

Metals are by definition not degradable and (bio)accumulate in the aquatic environment. At higher concentrations, they can become toxic for aquatic organisms. Metals occur in surface water in dissolved and bonded forms.

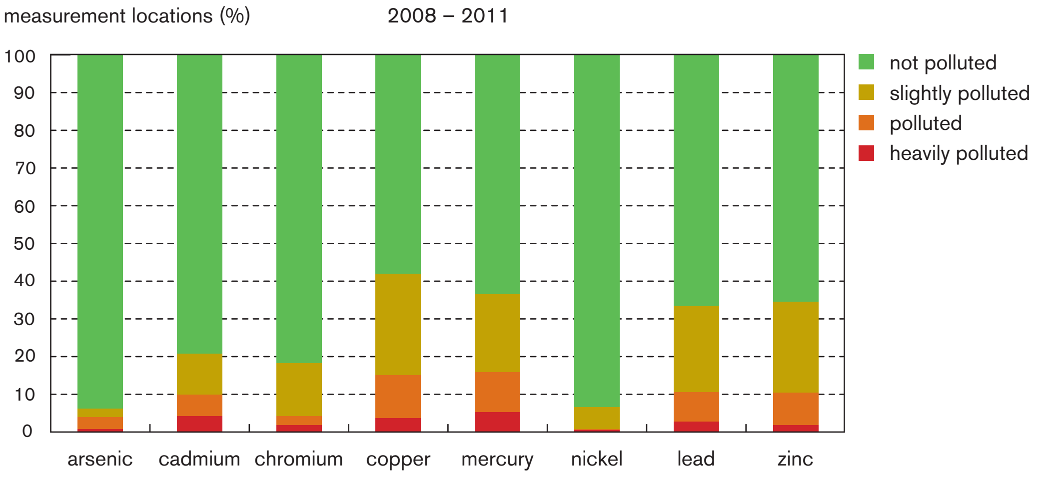
The average total concentrations of nearly all heavy metals have decreased significantly in the last decade. The decreases vary from 55 % for nickel to 78 % for copper and are the result of the efforts of companies and the expansion of the public waste water treatment. Arsenic is the sole exception to these positive trends. The recent increase in the arsenic concentrations does not occur everywhere. Increasing concentrations are observed at a number of measurement locations in the coastal region where the supply of arsenic-rich groundwater may be a possible cause. An increase in arsenic concentrations was also recorded at a few other measurement stations, e.g. in the Sea Scheldt. The cause of this increase is unclear.

Zinc, arsenic and cadmium exceed the standards most often

Of the eight standard heavy metals, arsenic (19 %), zinc (15 %) and cadmium (7 %) exceeded the standard most often in 2011. The most important source of zinc in surface water is corrosion of construction materials, while for arsenic and cadmium it is soil erosion. The standards for nickel, copper, chromium, mercury and lead are rarely, if ever, exceeded. Further, the high percentage of measurement stations, where the standard for cobalt (59 % in 2011) is exceeded, is remarkable. The known discharges of cobalt do not seem to be able to fully explain this high percentage. Natural background concentrations could possibly also play a significant role.

☹ Heavy metals in watercourse sediments

DPSIR



Source: VMM

Copper and zinc exceed the standards most often

The physico-chemical evaluation of the watercourse sediment includes, among other things, a study for the presence of heavy metals. The indicator shows the assessment of watercourse sediment measurement locations for the eight standard heavy metals against the reference values. The division into classes is based on the deviation with respect to the reference value. This value is determined from the geometric average of 12 carefully selected reference watercourses in Flanders. The measurement results are also evaluated against the environmental quality standards specified by decree for watercourse sediments. These standards are guideline values. They specify the environmental quality level that must be reached or maintained as much as possible. They do not qualify as remediation criteria or as remediation targets.

The measurement results for the period 2008-2011 indicate that mainly cadmium, copper, mercury, lead and zinc cause pollution. This pollution is partly the result of historic contamination. Copper and zinc exceed the standards the most, which is the case at 41 and 40 % of the measurement locations respectively.

Predominantly positive changes

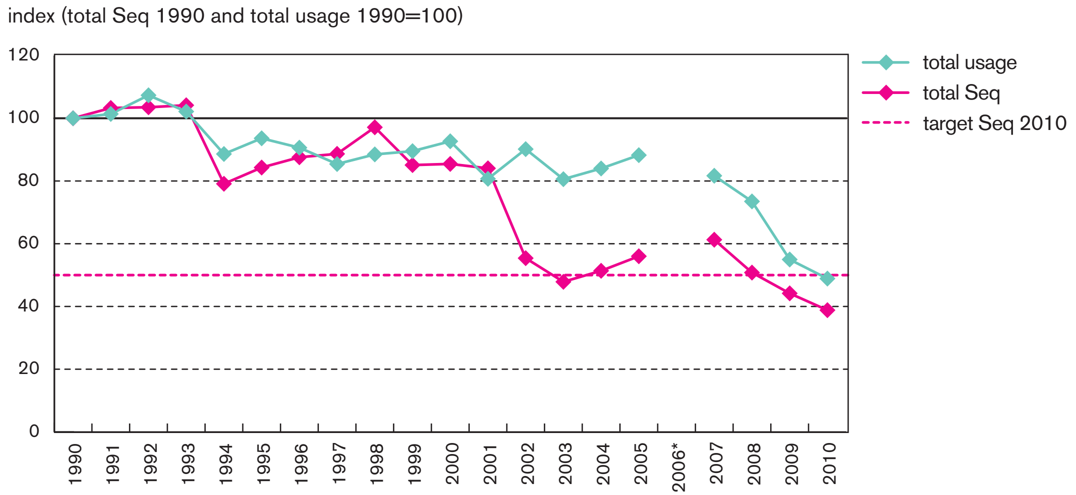
The monitoring of the watercourse sediment quality has been running for more than ten years and many of the measurement locations have already been sampled more than once in that period. A trend analysis based on 241 measurement points sampled in the periods 2000-2003, 2004-2007 and in 2008-2011 shows that the situation has improved for most metals.

The quality of a watercourse sediment can change:

- by removing sediment (although remediation does not always lead to an improvement in the watercourse sediment quality because the historic contamination has sometimes penetrated deep into the sediment);
- due to reduced discharges so that the newly formed watercourse sediment – in other words the top layer of sediment – is less contaminated;
- due to the changed physico-chemical quality of the water column, for example a higher oxygen concentration, release of toxic substances from the watercourse sediments into the water column can occur.

☺ Pressure on aquatic life from crop protection agents

DPSIR



* There are no sales figures available for 2006.

Source: UGent, FOD VVVL

Target reached

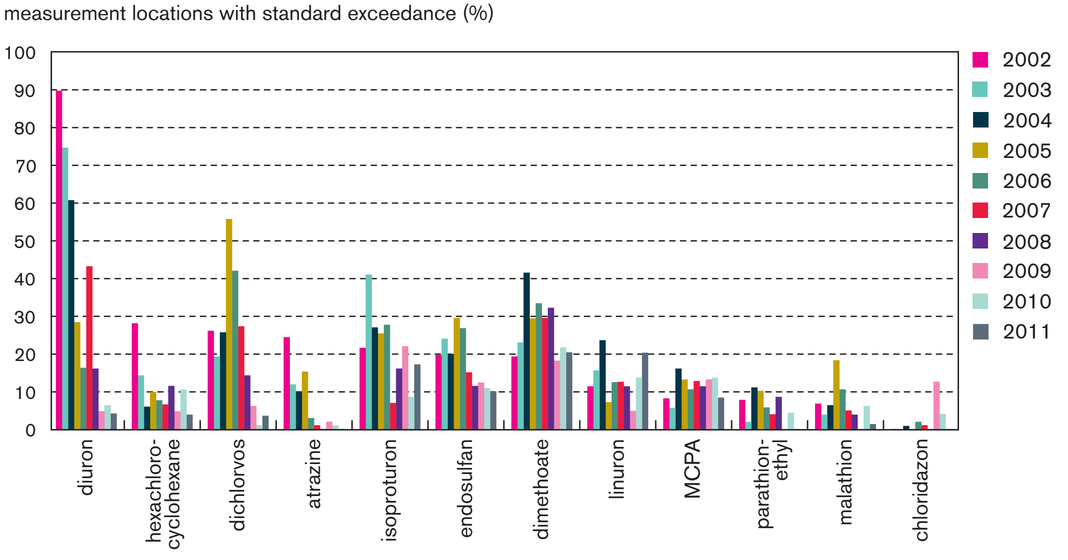
In the period 1990-2010, the use of crop protection agents in Flanders has almost halved. The introduction of integrated and biological crop protection, limitation of use through stricter residue controls, an improved range of crop protection agents, new technological developments (spray installations), better dosages, more efficient formulations and the aim of zero usage by public administrations are the basis for this decrease. However, the toxicity of crop protection agents and the time needed for them to degrade are to a great extent substance-specific.

The ‘pressure on aquatic life from crop protection agents’ indicator weights the quantity of the active substance in each crop protection agent sold each year in terms of its toxicity for aquatic organisms and persistence in the environment, and is expressed as the sum of the dispersion equivalents (Seq). It is therefore a measure of the risks for aquatic life associated with the use of crop protection agents. The MINA plan 3+ (2008-2010) aimed at a reduction of 50 % in 2010 with respect to 1990. The MINA plan 4 (2010-2015) aims at a further decrease in the period 2010-2015.

In 2010, the indicator value was more than 60 % lower than in 1990. The target of the MINA plan 3+ was, therefore, met. The pressure on aquatic life has decreased more than the total use of crop protection agents. In addition to the causes that explain the change in the total use, there is indeed the federal policy that takes the most toxic substances out of circulation. In the decrease from 2001 to 2002, for example, the banning of lindane (an insecticide) played a major role. Also the phasing-out of diuron (a herbicide) has had a noticeable effect on the total indicator value. The decrease from 2007 to 2008 has a lot to do with the banning of paraquat (a herbicide). The decrease in 2010 is to be attributed mainly to a decrease in the use of flufenoxuron (an insecticide) and fenoxycarb (an insecticide).

Pesticides in surface water

DPSIR



The figure shows only those pesticides that caused the standard to be exceeded at least once in more than 10 % of the measurement locations in the period 2002-2011.

Source: VMM

Generally favourable developments, but still some problematic substances

Pesticides that find their way into the surface water can be toxic for aquatic organisms. Peak concentrations can cause acute effects, such as mortality. Concentrations that are too high for an extended period can cause chronic effects, such as reduced reproduction. That is why the standards for pesticides are twofold: a maximum concentration to avoid acute effects and an average concentration to avoid chronic effects.

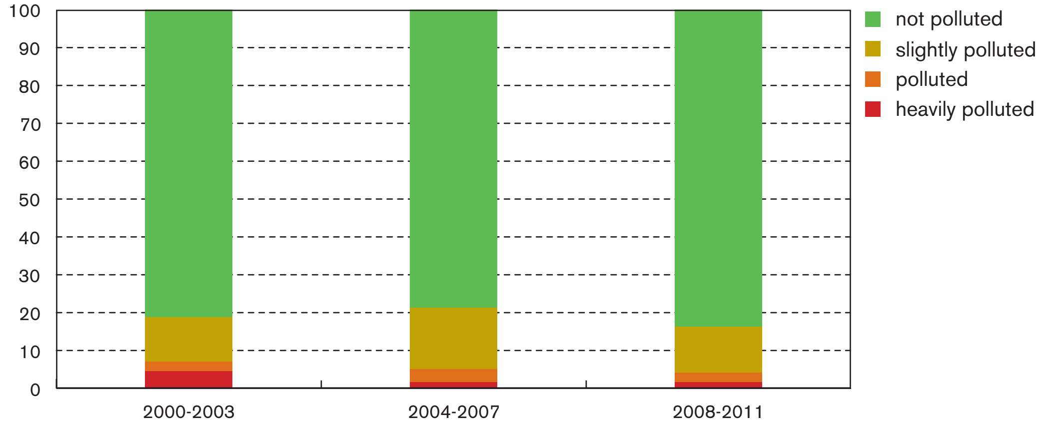
The situation has noticeably improved for a large number of substances that caused a large number of the standard exceedances in the period 2002-2004. This concerns, for example, diuron (a herbicide), dichlorvos (an insecticide), endosulfan (an insecticide), hexachlorocyclohexane (an insecticide) and atrazine (a herbicide). It is no coincidence that these are substances for which restrictions on use and/ or prohibitions were introduced.

There are no official standards for all pesticides. Their concentrations can be tested against ecological reference values that are established according to methods similar to those for the official standards. A few of these substances are responsible for a large number of exceedances of these reference values. In 2011, the maximum concentrations of diflufenican (a herbicide) were too high in about 60 % of the sampled measurement locations; for flufenacet (a herbicide) and carbendazim (a fungicide) the maximum concentrations were too high in approximately 20 % of the measurement locations. Acute effects on aquatic life are to be expected in these surface waters. For oxadiazon (a herbicide), the average concentration in 2011 was too high in almost 30 % of the measurement locations and, for diflufenican, it was too high in about 93 % of the sampled measurement locations. Chronic effects can therefore occur there.

A statistical trend analysis per measurement location for 17 pesticides was for the first time carried out in 2012. The large number of measurement results below the detection limit and the many outliers (peak concentrations) complicated the trend detection. It was, however, found that oxadiazon and terbutylazine (herbicides) showed a significant increase at a relatively large number of measurement locations.

☹ Pesticides in watercourse sediments

DPSIR



Source: VMM

Favourable development, some persistent problematic substances

A large number of organochlorine pesticides (OCPs, mostly insecticides) have a tendency to bind with particulate matter in the water column. When these particles settle, the pollutants attached to them end up in the watercourse sediment. They can stay there for a long time. The measurement results are classified by quality on the basis of the comparison with the reference value of all the OCPs and evaluated against the environmental quality standards specified by decree for watercourse sediments.

82.5 % of all measurement locations sampled in the period 2008-2011 showed no deviation with respect to the reference value for OCPs and were, therefore, considered to be not contaminated.

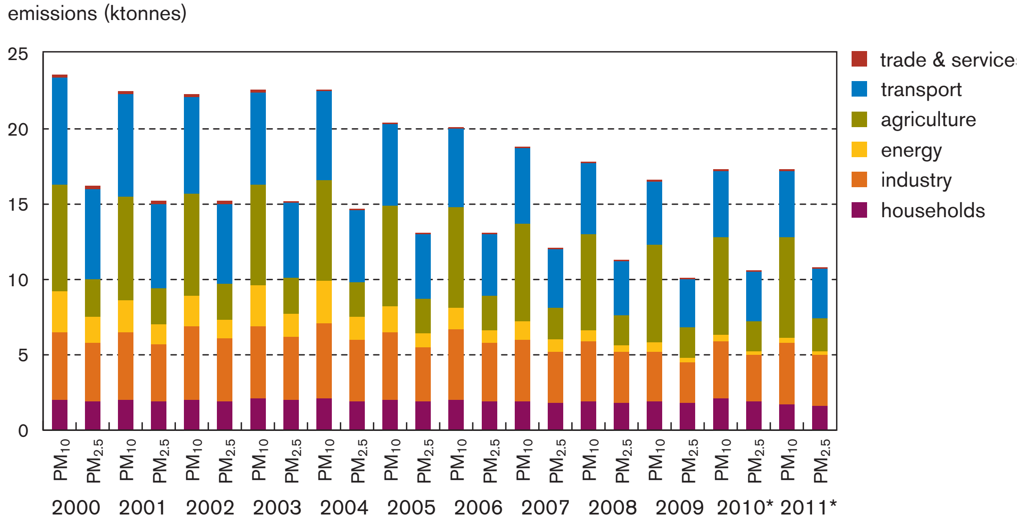
However, there are certain individual substances that exceed the standard quite often. Thus, the standard for some degradation products of DDT (an insecticide) is exceeded in more than half of the measurement locations. Hexachlorobenzene (a fungicide) is nearly everywhere present in concentrations above the standard.

The monitoring of the watercourse sediment quality has been running for more than ten years and many of the measurement locations have already been sampled more than once in that period. In order to find out to what extent the watercourse sediment quality has changed in that period, 240 measurement points were selected that had been sampled for OCPs in the periods 2000-2003, 2004-2007 and in 2008-2011. The percentage of measurement locations with heavily polluted watercourse sediment has more than halved. The percentage of not polluted or slightly polluted sediments has increased slightly.

Improvements in the watercourse sediment quality can have various causes:
- removal of sediment (although remediation does not always lead to an improvement in the watercourse sediment quality because the historic contamination has sometimes penetrated deep into the sediment);
- due to reduced discharges of toxic substances, the newly formed watercourse sediment – in other words the top layer of sediment – is less contaminated;
- due to the changed physico-chemical quality of the water column, for example a higher oxygen concentration, release of toxic substances from the watercourse sediments into the water column can occur;
- pesticides also degrade, although for some of them this can take many years (e.g. DDT).

Emission of particles

DPSIR



* provisional figures
emissions from road traffic for 2010 not comparable with 2000-2009 series due to model modifications; emissions from road traffic for 2011 assumed identical with those for 2010

Source: VMM

Agriculture, transport and industry are the main sources of particulate matter emissions

The inhalation of increased concentrations of particulate matter (PM_{10} and $PM_{2.5}$) is harmful to health. Primary particles are emitted directly into the air from a variety of sources (e.g. vehicle exhausts). In addition, secondary particulate matter can be formed by the chemical reactions of precursor substances. Agriculture remains the main source for both PM_{10} and $PM_{2.5}$. Transport and industry come in second and third.

The MINA plan 4 (2011-2015) includes only emission targets for $PM_{2.5}$. These targets apply for transport emissions (transport sector plus off-road and fisheries), with maximum 2.3 ktonnes by 2015, and for stationary sources, with 6.0 ktonnes by 2015. Provisional results indicate that the emissions are still well above the MINA plan targets. Following the review of the Göteborg Protocol in May 2012, the NEC targets will probably be expanded with targets for particulate matter. This may take place in 2013.

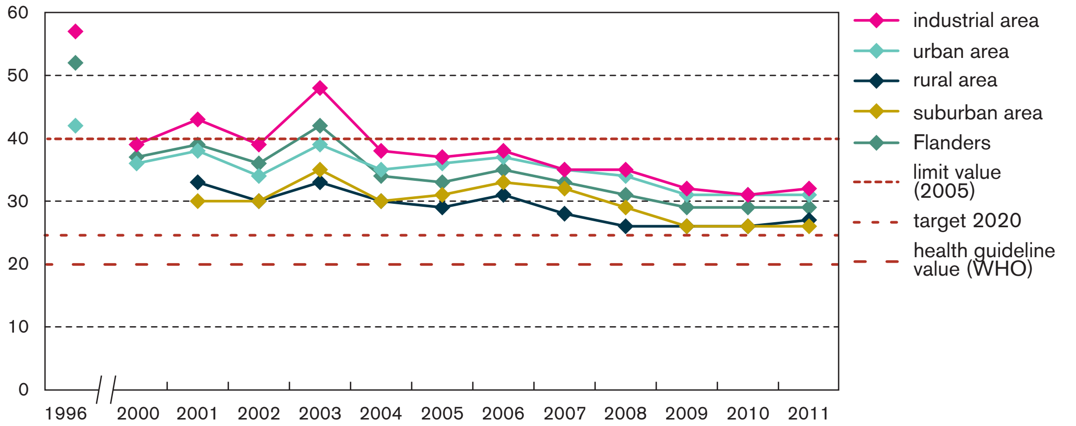
First emission figures for elemental carbon

The emissions of elemental carbon have been determined for the first time. Elemental carbon (EC) is a fraction of the particulate matter that is specifically formed during incomplete combustion reactions. The compilation of this emission inventory follows the international trend of paying increasing attention to the composition of particulate matter. The chemical composition has in fact an impact on the resulting effects on health of particulate matter. Since 1995, the emissions of elemental carbon have almost halved. This decrease is mainly attributable to a decrease in the transport emissions. However, these emissions still account for about half of all EC emissions. Agriculture emissions, which include, among others, emissions from agricultural vehicles and heating of e.g. greenhouses and animal stalls, represented 20 % of the EC emissions in 2009.

EC emissions (tonnes)	1995	2000	2005	2007	2008	2009	2010*	2011*
households	445	438	436	403	415	411	451	363
industry	654	422	427	445	494	407	439	460
energy	189	147	84	75	28	29	18	11
agriculture	681	713	655	620	605	622	606	611
transport	4 054	3 073	2 241	1 975	1 778	1 577	1 598	1 596
trade & services	46	48	35	35	28	28	27	21

Annual average PM_{10} concentration

PACT 2020 DPSIR



Source: VMM

Annual average PM_{10} concentrations are stagnating

The annual average PM_{10} concentration gives an illustration of the long-term exposure to particulate matter in the air. The inhalation of this particulate matter can have an effect on health. The sharp decrease recorded in the 1990s has not continued in recent years. The annual average PM_{10} concentration has hardly changed in the period 2009-2011.

Limit value reached, targets still within reach

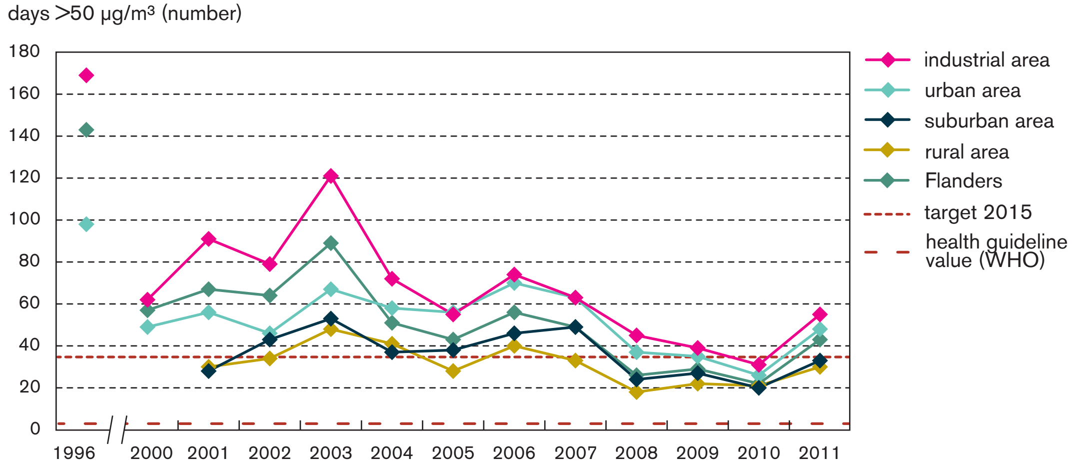
The limit value of 40 µg/m³ imposed by the European Air Quality Directive (2008/50/EC) has been met everywhere since 2008. The target for 2020 as stated in Pact 2020 and the MINA plan 4 (2011-2015) is a reduction of 25 % with respect to 2007. This corresponds to a maximum concentration of 24.8 µg/m³ in 2020. In 2011, the gap was reduced on average by half in Flanders (based on all measurement stations). This decrease occurred almost exclusively in 2007-2009, after which the annual average PM_{10} concentration stagnated. For the type areas, only the averages of the suburban and rural areas come close to this target. The health guideline value of 20 µg/m³, as specified by the World Health Organization (WHO), is still far from being achieved.

PM_{10} concentration (µg/m³)	2000	2007	2008	2009	2010	2011
industrial area	39	35	35	32	31	32
urban area	36	35	34	31	31	31
rural area	..	28	26	26	26	27
suburban area	..	32	29	26	26	26
Flanders	*37*	*33*	*31*	*29*	*29*	*29*

PACT 2020

DPSIR

☹ Daily average PM_{10} concentration



Source: VMM

Number of days >50 µg/m³ increasing again

The daily average PM_{10} concentration plots the short-term exposure of the population as well as the peak concentrations of PM_{10} in the ambient air. The peak concentrations are expressed in days with a daily average PM_{10} concentration >50 µg/m³. This number of days has decreased slightly since 2006. In 2011, however, there was an increase in the number of days when it was exceeded, probably because the meteorological conditions were less favourable.

EU limit value not yet reached

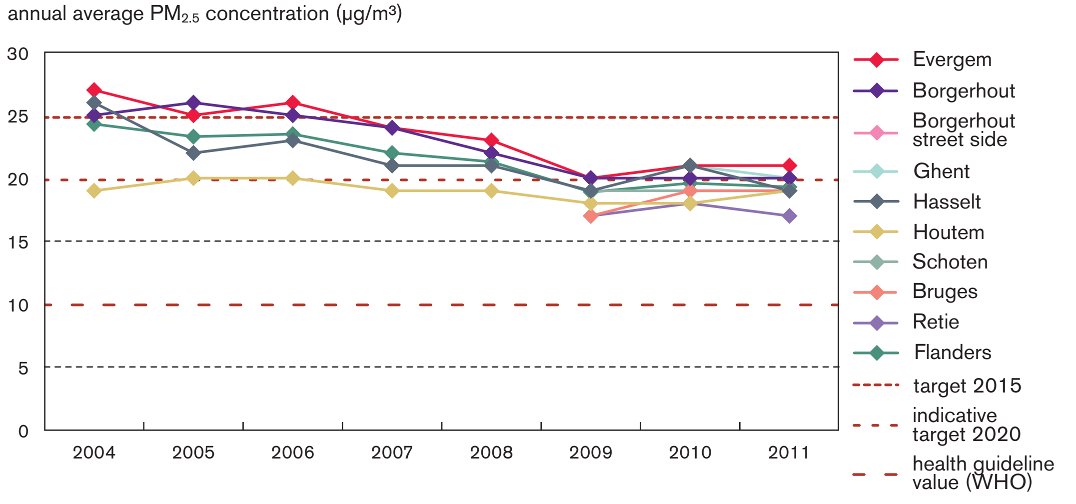
Since 2005, the European Air Quality Directive (2008/50/EC) has imposed a limit value for PM_{10} in ambient air of maximum 35 days with a daily average PM_{10} concentration of more than 50 µg/m³. Because this daily limit value was not met, Belgium was referred to the European Court in April 2011. This limit value has been incorporated into the Pact 2020. In the MINA plan 4 (2011-2015), the same limit value is formulated differently as a target for 2015, namely the 'percentage of the population that is exposed for more than 35 days to concentrations of more than 50 µg/m³ is to drop to 0 %'. In 2011, it was not only exceeded at individual measurement stations (17 of the 35 stations), but also the averages for the urban and industrial type areas and the average for Flanders exceeded the limit value.

The World Health Organization (WHO) maintains that there is no safe threshold value for exposure to particulate matter, but it nevertheless specified a number of guideline values. For the daily average PM_{10} concentration, this corresponds to a maximum of three days exceeded per year. Just as with the annual average PM_{10} concentration, this guideline value is still well below the currently measured values.

days >50 µg/m³ (number)	**2007**	**2008**	**2009**	**2010**	**2011**
industrial area	63	45	39	31	55
urban area	63	37	35	26	48
suburban area	49	24	27	20	33
rural area	33	18	22	21	30
Flanders	*49*	*26*	*29*	*22*	*43*

Annual average $PM_{2.5}$ concentration

DPSIR



based on telemetric measurement network

Source: VMM

Target 2015 met in 2011

Due to their small dimensions, $PM_{2.5}$ particles can penetrate deep into the lungs and in this way introduce other pollutants that cling to the particles, into the human body. The World Health Organization (WHO) maintains that there is no safe threshold value for exposure to particulate matter. For $PM_{2.5}$ it specifies a guideline value of 10 µg/m³ for the annual average concentration. Limit and target values are also specified in the European Air Quality Directive (2008/50/EC). The target value for 2010 is 25 µg/m³. This target value will become a limit value in 2015. The MINA plan 4 (2011-2015) has adopted this value as target for 2015. The European Directive also specifies an indicative limit value of 20 µg/m³ for 2020. This value may still be reviewed in 2013. The annual average $PM_{2.5}$ concentrations decreased in the period 2004-2008. In the period 2009-2011, they fluctuated around 19 µg/m³. The target for 2015 was reached already in 2011. In five of the nine measurement stations, the annual average in 2011 was lower than the indicative target for 2020. The health guideline value of the WHO is, however, well below all currently measured values.

Urban background concentration

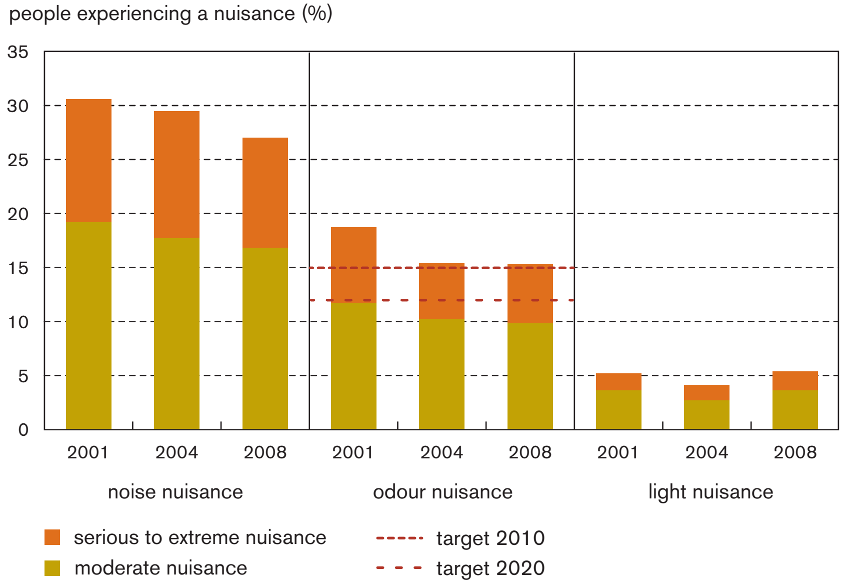
To protect human health in urban environments, Europe also specified limit and target values for the average exposure index (AEI). This index includes the three-year running average of the annual average $PM_{2.5}$ concentrations in the urban background areas. Since 2009, VMM has been carrying out additional measurements to determine this AEI (see table). In 2015, the AEI can be a maximum of 20 µg/m³. The target in 2020 is a percentage decrease with respect to the AEI in 2011 and is dependent on the AEI in 2011 (the higher the AEI in 2011, the higher the percentage decrease required in 2020). Based on these measurements, a reduction percentage of 20 % was determined for 2020 with respect to 2011. This corresponds to an AEI of maximum 16 µg/m³ in 2020.

AEI annual averages (µg/m³)	Bruges	Borgerhout	Schoten	Ghent
2009	17*	20	19	20
2010	19	20	19	21
2011	19	20	19	20

* between 50 and 90 % data. For calculating the AEI, only measurement stations with more than 90 % available data per year are included.

Reported nuisance from noise, odour and light

DPSIR



Source: AMINABEL (2001, 2004), LNE (2008)

Noise is the main source of nuisance

The degree to which inhabitants of Flanders experience a nuisance from sound, odour and light can be shown with the nuisance indicator. LNE carries out a written survey, the Written Environmental Investigation (WEI), at regular intervals to determine this indicator. The 4th WEI survey (WEI-3) has been planned for 2013.

Noise is the most important source of nuisance with 10.3 % of people suffering serious to extreme nuisance in 2008. Too much light (light nuisance) caused the least serious to extreme nuisance, namely 1.8 %. For noise and odour, this is a decreasing trend. For light nuisance, there has been no noticeable increase or decrease.

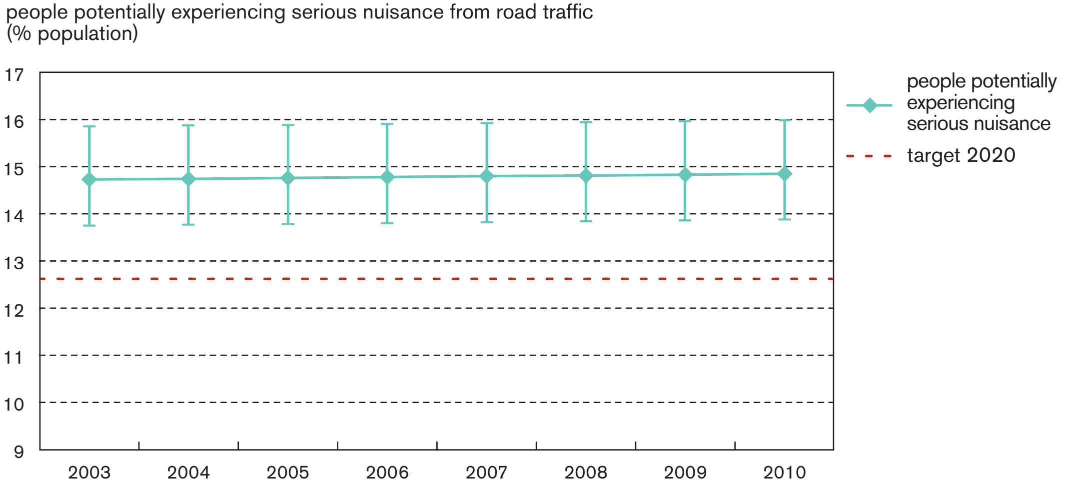
Target for reported odour partly tightened

The MINA plan 3+ (2008-2010) gives targets only for reported odour nuisance. For 2010, this target was a maximum of 15.0 % of the population experiencing a nuisance (i.e. the total number of people experiencing a moderate, serious or extreme nuisance). The number of people experiencing a serious to extreme nuisance must not exceed 3.0 % of the population. In 2008, the number experiencing a nuisance was 15.3 % of the population and the number experiencing a serious to extreme nuisance 5.5 %.

The MINA plan 4 (2011-2015) again proposed targets for reported odour nuisance. The target for the number experiencing a nuisance is a maximum of 12.0 % of the population in 2020. By 2020, the proportion of Flanders inhabitants experiencing a serious nuisance must decrease to 4.5 %.

😐 Potentially serious nuisance from noise

DPSIR



Error bars indicate the 95 % confidence intervals (CI).

Source: UGent - INTEC (2011)

Total potential serious nuisance

Subjective factors always play a role in the experience of noise. These factors are influenced by the zeitgeist, media attention, etc. To represent nuisance without these factors, the potential nuisance is calculated. The proportion of the total number of people potentially experiencing serious nuisance was 13.5 % of the population in 2010 (table). This is a slight increase with respect to 2006 and 2007, when the potential nuisance was relatively low due to a sharp decrease in the nuisance from aviation noise. Since then, both air traffic and road traffic have caused an increase in the potential nuisance. The curve for the total number of people potentially experiencing nuisance is, on the whole, rather flat. In addition to road traffic, other sources such as industry contribute to the total potential nuisance.

People potentially experiencing nuisance from road traffic

The percentage of people potentially experiencing serious nuisance from road traffic fluctuated around 15 % of the population in the period 2003-2010 (figure). This period does, however, exhibit a slightly upward trend, which is probably due to the lack of a clear policy on noise nuisance from road traffic.

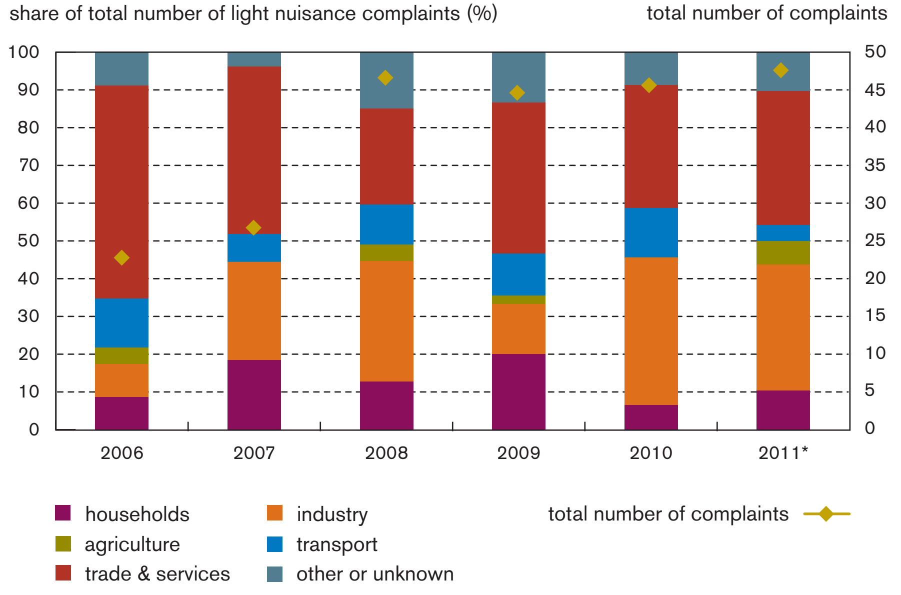
The fact that the share of potential nuisance from a specific source is higher than the share of the total potential nuisance is an extrapolated correction based on a known paradox in the reported nuisance. The respondents in fact place the specific and the total nuisance in a different context, which yields a different nuisance percentage.

The MINA plan 4 (2011-2015) specifies that the number of people potentially experiencing serious nuisance from road traffic is to drop by 15 % from 2010 to 2020. According to the calculation method used, this corresponds to a drop to 12.7 % in 2020. European Regulation EC 1222/2009 (25/11/2009), which came into effect on 1 November 2012, requires new tyres to be equipped with a tyre label. This label informs consumers about fuel efficiency, wet grip and the external rolling noise of car tyres. In this context, the Flemish government launched the information campaign *'Let op het label'* in the second half of 2012.

population (%)	2003	2004	2005	2006	2007	2008	2009	2010
(total number of) people potentially experiencing serious nuisance	13.6	13.5	13.5	13.4	13.4	13.5	13.5	13.5
(95 % CI)	(12.1-16.5)	(12.1-16.4)	(12.0-16.4)	(12.0-16.3)	(12.0-16.3)	(12.0-16.3)	(12.0-16.4)	(12.0-16.4)

Registered light nuisance complaints

DPSIR



Industry includes the energy sector. The annual data include only complaints submitted by the municipal environment services that register complaints using ECRAMS.

Source: LNE

Environmental complaint registration and monitoring system (ECRAMS)

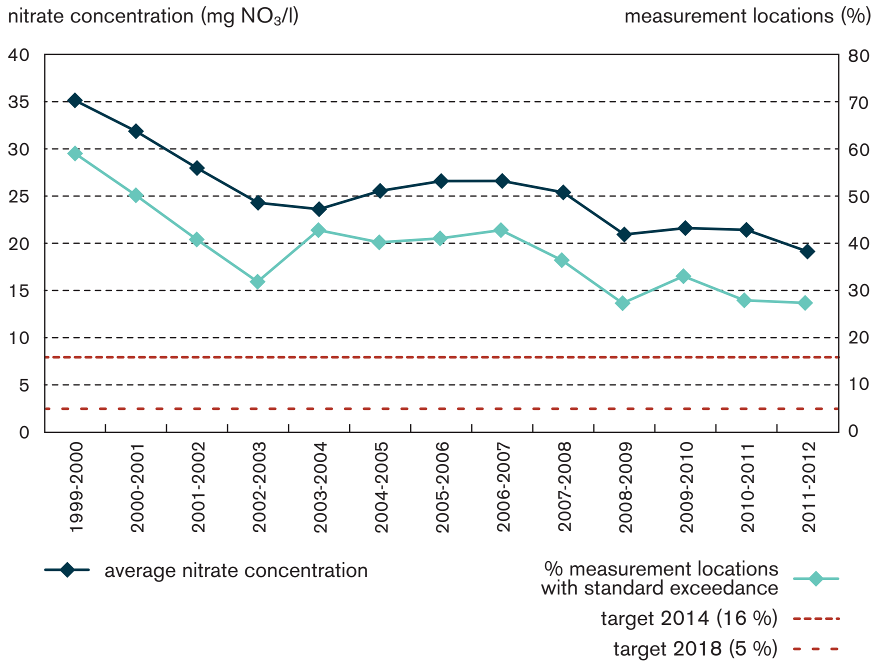
Since 2006, various municipal environmental services in Flanders have been registering reports of environmental nuisance in an environmental complaint registration and monitoring system (ECRAMS). ECRAMS was developed as part of the collaboration agreement. This voluntary agreement between municipalities and the Flemish Government will expire in 2013. It is unclear whether it will be renewed and if so, under what terms.

Light nuisance mainly by industry and trade & services

Nuisance complaints reveal a different picture from other nuisance indicators. The barrier to filing a complaint is higher than when reporting a nuisance in a survey. Complaints are, as it were, the tip of the iceberg. The main sources of light nuisance complaints are industry and trade & services. The differences between years can be the result of a variation in the number of reporting municipalities rather than differences in actual light nuisance. To obtain a general overview of the light nuisance in Flanders, the complaints made by people to other services, such as the environment inspectors and police, must also be included. These databases are, however, not yet completely linked.

Nitrate in surface water in agricultural areas

DPSIR



Source: VMM

Still a long way to go

Excessive nitrate concentration in the surface water threatens the drinking water supply and can lead to excessive algae growth in the surface water. The Manure Action Plan (MAP) surface water monitoring network is located in smaller watercourses where agriculture is the determining factor in water contamination. The results are presented per winter year (July-June).

The average nitrate concentration and the percentage of measurement locations with standard exceedance follow quite parallel trend. Between 2003-2004 and 2007-2008, little changed. In the winter year 2011-2012, the nitrate concentration exceeded the standard at 28 % of the measurement points in agricultural areas. The standard specifies 50 mg nitrate per litre as the maximum per measurement point. The situation must improve significantly if the target of the standard being exceeded by 16 % at the most in 2014 as specified in the MINA plan 4 (2011-2015) is to be achieved. The ambition is to decrease that percentage to less than 5 % before 2018.

Improvement at 29 % of the measurement points

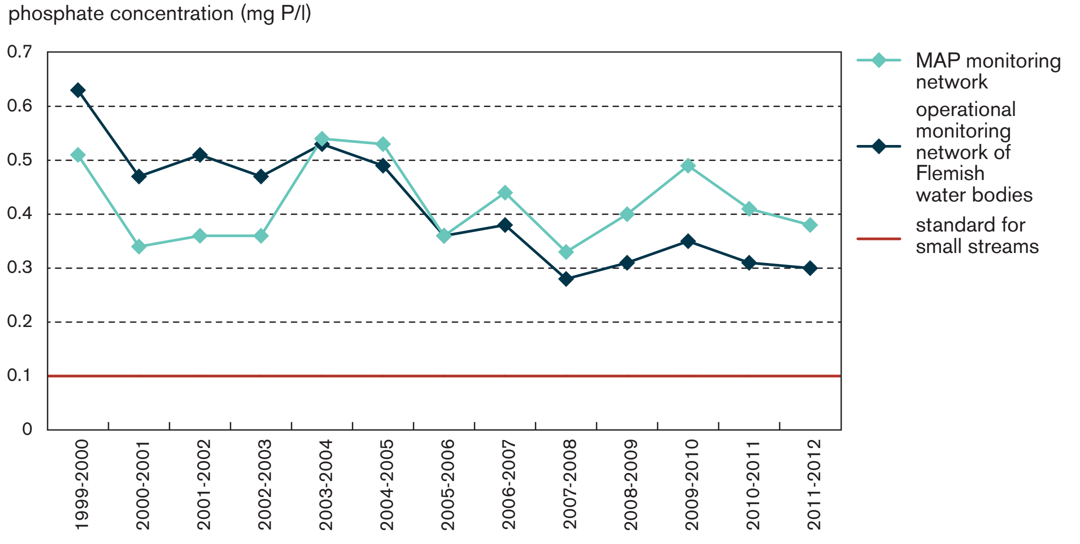
A statistical trend analysis per measurement location shows that, at approximately 68 % of the locations, the nitrate concentration does not show any significant trend in the period 2000-2011. 29 % of the measurement locations show a significant downward trend and nearly 3 % a significant upward trend. This analysis thus shows that the improved situation by no means applies to all measurement points.

Farmers can reduce the nitrate losses further by using less manure and applying it better, but also, for example, by sowing green cover crop in winter and creating buffer strips alongside watercourses. To this end, farmers are invited to participate in so-called water quality groups to exchange knowledge and practical experiences.

	99-00	01-02	03-04	05-06	07-08	08-09	09-10	10-11	11-12
average nitrate concentration (mg NO_3/l)	35.1	28.0	23.6	26.6	25.4	20.9	21.6	21.4	19.1
% measurement locations with standard exceedance	59	41	43	41	37	28	33	28	28

☹ Phosphate in surface water in agricultural areas

DPSIR



Source: VMM

Monitoring in surface water

Too much phosphate in surface water can lead to excessive algae growth and thus adversely affect the quality of the surface water. This phosphate mainly comes from discharges of household waste water and losses from agricultural land. The quality of the surface water in agricultural areas is monitored in the MAP monitoring network. The evolution of the annual average concentrations in the MAP monitoring network is compared with that of the operational monitoring network of Flemish water bodies. These are freshwater rivers with a basin larger than 50 km² and waters that form the transition to the sea. The environmental quality standards for phosphate in surface water have been specified per watercourse type. Here, all MAP measurement locations are assessed against the standard for small streams. This standard is 0.1 mg P/l for the annual average phosphate concentrations.

A great challenge

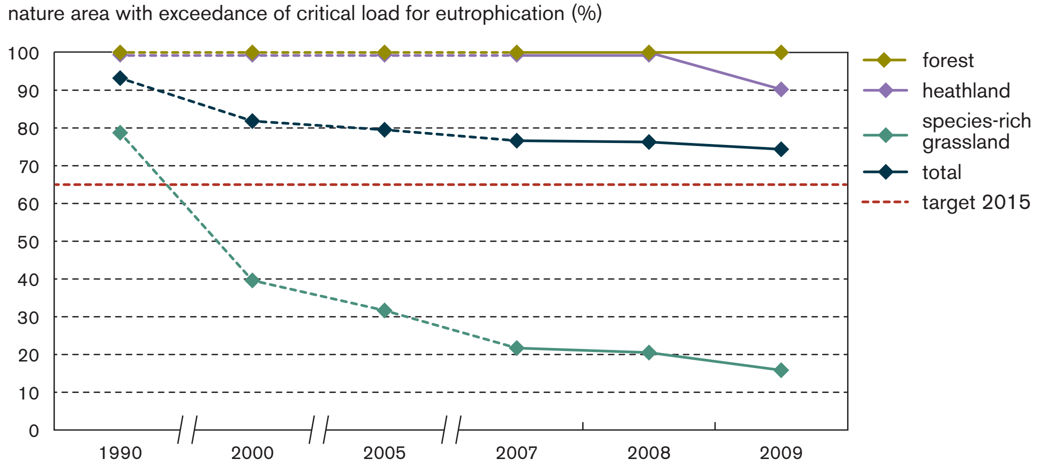
When considering the whole period 1999-2012, the average phosphate concentration in the MAP monitoring network shows little or no improvement. This contrasts with the concentrations in the operational monitoring network of Flemish water bodies. That improvement is due mainly to the development of the public water treatment, but also to the decrease in discharges by companies. The fact that no or hardly any improvement of the phosphate concentrations is noticeable in the MAP monitoring network is also confirmed by a statistical trend analysis per measurement location over the period 2000-2011. No statistically significant trend could be demonstrated at nearly 84 % of the measurement locations. Significantly downward and significantly upward trends were observed at nearly 9 % and 8 % of the locations respectively.

Farmers can reduce the phosphate losses further by using less manure and applying it better, but also, for example, by sowing green cover crops and creating buffer strips alongside watercourses.

average phosphate concentration (mg P/l)	**99-00**	**01-02**	**03-04**	**05-06**	**07-08**	**08-09**	**09-10**	**10-11**	**11-12**
MAP monitoring network	0.51	0.36	0.54	0.36	0.33	0.40	0.49	0.41	0.38
operational monitoring network of Flemish water bodies	0.63	0.51	0.53	0.36	0.28	0.31	0.35	0.31	0.30

☹ Nature area with exceedance of the critical load for eutrophication

DPSIR



results for all years calculated with VLOPS deposition model, which was modified in 2012

Source: VMM

Exceeding critical load leads to damage to vegetation

Eutrophication causes damage to natural vegetation. Nitrofilous plants are favoured and biodiversity is affected. Nitrate leaching can occur. For each type of vegetation, 'critical loads' for eutrophication are determined as the damage threshold for atmospheric nitrogen deposition. If these deposition limits are exceeded, this leads in the long term to harmful effects on the vegetation. By 2015, only 65 % of the surface nature in Flanders may still exceed the limits according to the target in the MINA plan 4 (2011-2015).

In 2009, on 74 % of the Flemish nature area (forest, heathland and species-rich grassland) the critical load for eutrophication was exceeded. For forest, the figure is 100 %. For heathland and species-rich grassland, it is 90 % and 16 % respectively. In 2004, 47 % of the nature in the EU-25 was exposed to nitrogen deposition levels higher than the critical load.

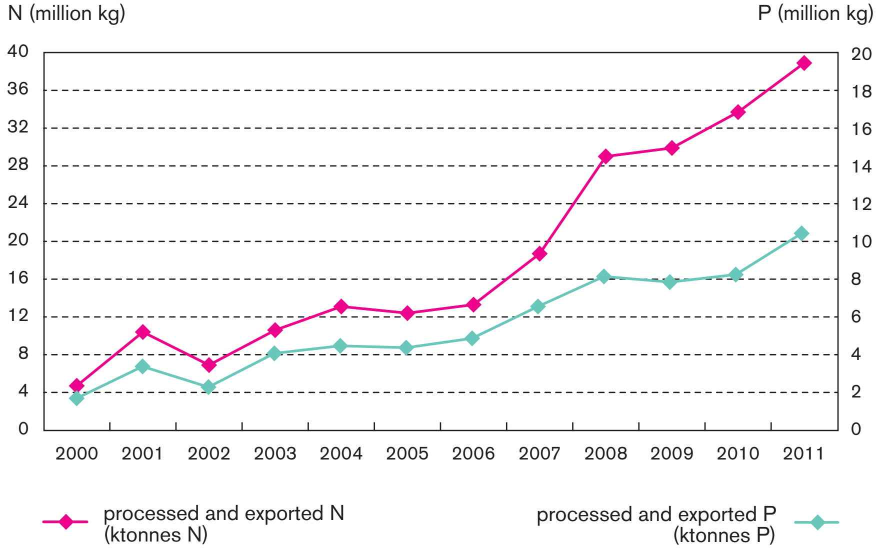
Eutrophication a greater threat to biodiversity than acidification

The long-term objective is that there should be no nature area where the critical load is exceeded. The nitrogen oxide and ammonia emissions reduction in 2009 achieved a small improvement. In addition, the conversion from coniferous forest to broadleaf forest reduced the sensitivity to acidification. Moreover, the long-term effect of the critical load being exceeded leads to an accumulation of nitrogen in the soil, the effects of which are not yet understood very well. This implies that eutrophication is a much greater threat to the conservation of biodiversity than acidification. The current deposition values pose a barrier to achieving the conservation objectives for Natura 2000 areas. Further emission reductions under international agreements are necessary. For Flanders this means that both NO_x and NH_3 emissions must be reduced further.

nature area with exceedance of critical load for eutrophication (%)	**1990**	**2000**	**2005**	**2007**	**2008**	**2009**
forest	100	100	100	100	100	100
heathland	100	100	100	100	100	90
species-rich grassland	79	40	32	22	21	16
total	*93*	*82*	*80*	*77*	*76*	*74*

☺ Manure processing and export

DPSIR



Source: VLM

Manure processing eases the surplus

Manure processing with the final product being exported with no shift towards emissions into the water and/or air not only contributes to reducing the pressure of fertilisers, but also to a reduction in the ammonia emissions. Manure processing is one of the measures for tackling the manure surplus in Flanders. Manure can also be exported unprocessed and in this context is referred to as manure export.

Since 1996, manure processing and export in Flanders has grown to 39 million kg of nitrogen (N) and 10.5 million kg of phosphorus (P) in 2011, including 8.5 million kg of N from other organic materials used in the processing. Proportionately, more phosphorus is processed and exported than nitrogen because more chicken manure is processed and exported than pig manure. Chicken manure is richer in phosphorus. In comparison with the actual animal manure production, approximately 19 % of the nitrogen content was processed in 2011. Manure processing consequently makes a real contribution to reducing the manure surplus. This does not, however, mean that the water quality objectives are being achieved.

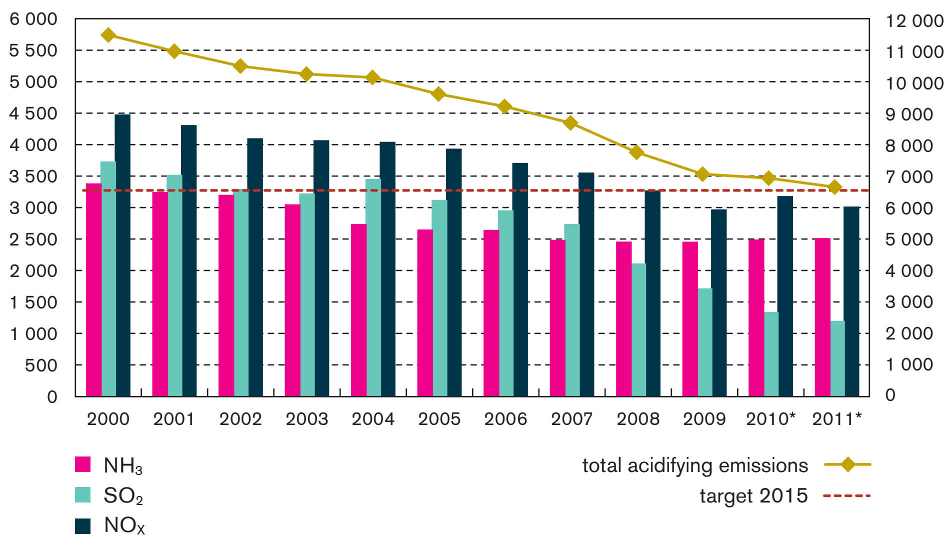
Manure processing continues to be necessary

Since 1 January 2007, the whole of Flanders has been designated as a sensitive area so that a general maximum of 170 kg N/ha from animal manure can be applied on agricultural land, with regional variations. Since then, increasing the number of livestock is allowed only if, among other things, additional animal manure is processed. In 2011, the fertilisation standards were differentiated even further. This limits the manure spreading area in Flanders. Manure processing, therefore, remains one of the preferred routes for limiting the amount of manure so that the quality targets for surface water and groundwater can be reached.

(million kg)	2000	2005	2007	2008	2009	2010	2011
manure processing and export N	4.7	12	19	29	30	34	39
manure processing and export P	1.7	4.4	6.6	8.2	7.9	8.3	10.5
actual animal manure production N	181	157	154	155	156	160	159
actual animal manure production P	31.6	27.0	26.6	25.9	25.9	26.6	26.5

Potentially acidifying emission

DPSIR



* provisional figures, emissions for 2010 from road traffic are not comparable with 2000-2009 series because of model modifications; emissions for 2011 from road traffic assumed identical with those for 2010; NH_3 emissions for 2011 from cattle breeding and fertilisers have been kept constant with 2010

Because the different acidifying substances have a different acid-forming capacity, the total potentially acidifying emission is expressed in acid equivalents (Aeq): one acid equivalent corresponds to 32 g SO_2, 46 g NO_2 or 17 g NH_3.

Source: VMM

NO_x emissions remain too high, SO_2 emissions sharply reduced

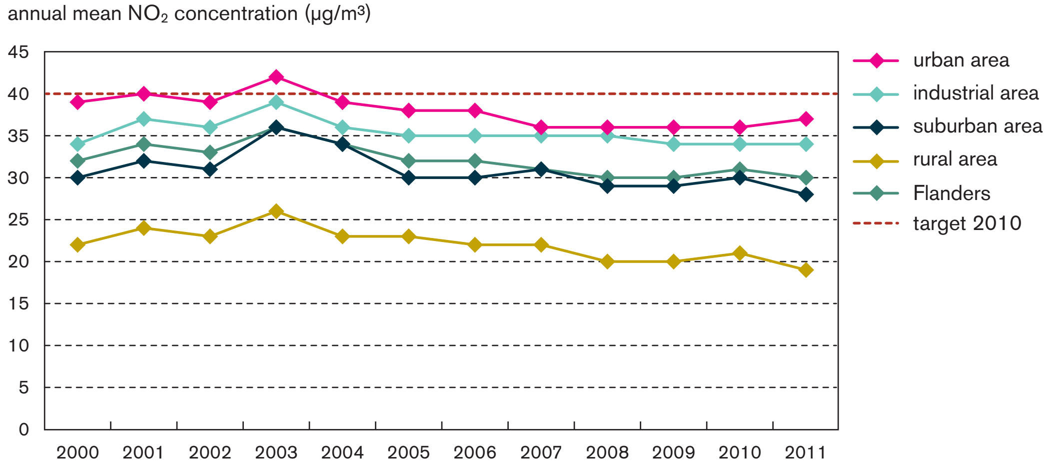
The total acidifying emissions include sulphur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3). The MINA plan 4 (2011-2015) includes targets to be achieved by 2015 for these pollutants. The targets for SO_2 and NH_3 were already reached in 2010 and 2005 respectively. For the NO_x emissions, however, a considerable effort remains to be made.

NO_x emissions have the greatest share in acidifying emissions. The transport sector accounts for almost half of the NO_x emissions, and diesel cars emit more NO_x than petrol cars. The still increasing dieselisation of the passenger car fleet (62 % diesel vehicles in 2011), therefore, adversely affects the NO_x emissions. The Flemish Air Quality Plan for NO_2, which was approved by the Flemish Government on 30 March 2012, aims to control the share of diesel cars. For the energy sector, the NO_x emissions in 2011 decreased by 24 % in comparison with 2010. This is due mainly to the decrease in power production and the resultant reduction in NO_x emissions from conventional thermal power plants. NH_3 emissions, the second biggest contributor to acidifying emissions, have shown a rather flat curve in recent years, and are to be attributed mainly to agriculture. SO_2 emissions dropped sharply in recent years, also as a result of the reduced emissions from oil refineries. This decrease continued at a more modest pace between 2010 and 2011. SO_2 emissions from inland navigation decreased drastically in 2011 following the reduction of the sulphur content of inland navigation diesel from 0.1 % to 0.001 %. For households and trade & services, both NO_x and SO_2 emissions decreased in comparison with 2010, due to the lower heating demand in 2011.

acidifying emissions (million Aeq)	**2000**	**2003**	**2006**	**2009**	**2010***	**2011***
NH_3	3 374	3 041	2 635	2 447	2 482	2 504
SO_2	3 722	3 214	2 946	1 706	1 330	1 188
NO_x	4 470	4 060	3 699	2 961	3 172	3 006
total	*11 566*	*10 315*	*9 279*	*7 113*	*6 984*	*6 699*

Annual mean NO_2 concentration in the air

DPSIR



This data series is not always based on the same measurement stations. The annual mean value applies for all measurement stations, except in the zones for which a postponement was granted.

Source: VMM

Annual mean NO_2 concentrations the highest at urban measurement stations

NO_2 plays a major role in acidification, in the formation of secondary particulate matter and as an ozone precursor in photochemical air pollution. NO_2 is an oxidising gas that can cause irritation of the airways. To protect public health, the European Air Quality Directive (2008/50/EC) specifies an annual limit for NO_2 of 40 µg/m³ and an hourly limit of 200 µg/m³ that may not be exceeded more than 18 times per calendar year.

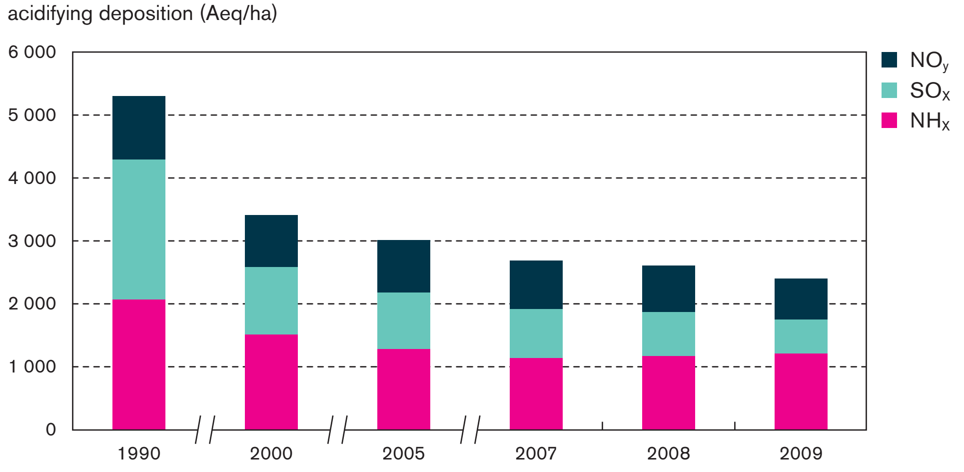
The values measured at all 36 measurement stations in Flanders were below the hourly limit in 2011. The annual mean concentrations varied between 13 µg/m³ at the rural measurement station in Houtem and 48 µg/m³ at the traffic-oriented measurement station in Borgerhout (Antwerp). An annual mean concentration of above 40 µg/m³ was measured at four measurement stations in the port of Antwerp and the Antwerp agglomeration. The Air Quality Plan for NO_2, which was approved by the Flemish Government on 30 March 2012, contains new measures aimed at achieving the annual limit for NO_2 as rapidly as possible. The plan is part of the request submitted to the European Commission for extension of the time for compliance with the standard. The European Commission granted an extension until 2015 for attaining the annual limit in the two Antwerp zones, until then a value of 60 µg/m³ applies only in these two zones.

Averaged over all measurement stations, annual mean NO_2 concentrations decreased slightly after 2003. The average concentrations were on average the highest at the urban measurement stations and the lowest at the rural stations. There is in fact a direct relationship between locations with intense road traffic and higher NO_2 concentrations. To reach the European standard for NO_2 concentrations everywhere and permanently, while at the same time reducing acidification and pollution from ozone and particulate matter, further reductions in NO_x (NO_2 and NO) emissions are needed.

annual mean NO_2 concentration (µg/m³)	**2000**	**2003**	**2006**	**2009**	**2010**	**2011**
urban area	39	42	38	36	36	37
industrial area	34	39	35	34	34	34
suburban area	30	36	30	29	30	28
rural area	22	26	22	20	21	19
Flanders	*32*	*36*	*32*	*30*	*31*	*30*

Potentially acidifying deposition

DPSIR



model calculations made using the VLOPS model.12

Source: VMM

Acidifying deposition continues to decrease

Too much acidifying deposition reduces the soil quality, damages vegetation and affects the biodiversity. The acidifying deposition in Flanders more than halved between 1990 and 2009. This continuous positive development is analogous to the decrease in the acidifying emissions in Flanders and the surrounding regions. In recent years, mainly the SO_x deposition decreased further and followed the downward trend in the SO_2 emissions. The decrease in NH_x and NO_y deposition was less pronounced. NH_x deposition even increased slightly (3 %) between 2008 and 2009 and in 2009 it made the largest contribution to the acidifying deposition (50 %), followed by NO_y (27 %) and SO_x (23 %).

The average acidifying deposition in Flanders was 2 401 Aeq/ha in 2009. VLAREM II specifies target values for total acidifying deposition, which vary from 1 400 to 2 400 Aeq/(ha.yr) depending on the vegetation and soil type. At various locations in Flanders, the acidifying deposition is still too high for various vegetation types. This is also indicated by the fact that the critical load for acidification is exceeded.

Imports from outside Flanders and the agriculture sector are the biggest contributors

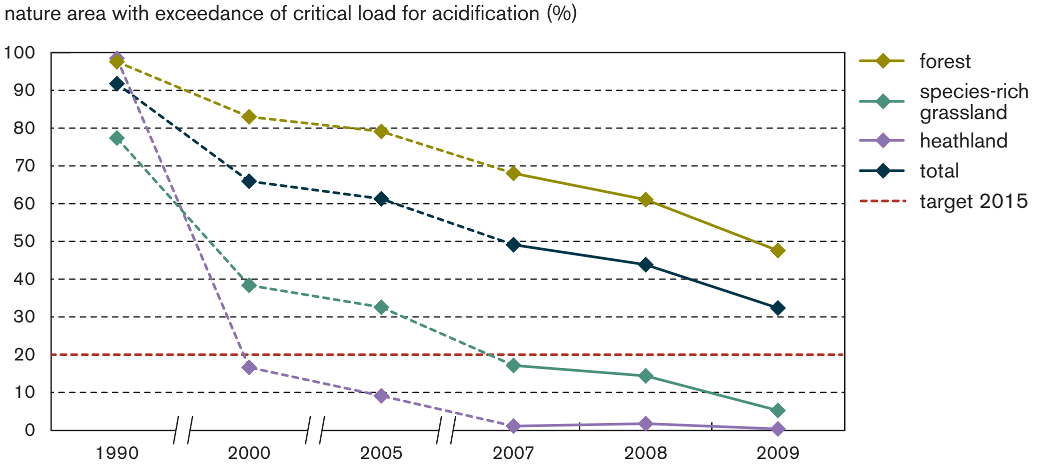
In 2009, 44 % of the acidifying deposition in Flanders was imported. SO_x and NO_y deposition, in particular, originates to a great extent from outside Flanders (53 % and 65 % respectively). 29 % of NH_x deposition is imported from outside Flanders. The other way around, Flemish acidifying emissions cause acidifying deposition abroad. For this reason, discussions on measures for emissions reduction are conducted in an international context.

Within Flanders, the main sources are agriculture (35 %), followed by transport (8 %) and industry (4 %). Agriculture contributes mainly to NH_x deposition, transport to NO_y deposition and industry to SO_x deposition. Deposition values vary considerably across Flanders. The highest deposition values are found in the Antwerp agglomeration and in agriculture-intensive areas; such as the centre of West Flanders and the north of the province of Antwerp.

acidifying deposition (Aeq/ha)	1990	2000	2005	2007	2008	2009
NH_x	2 070	1 510	1 280	1 140	1 170	1 210
SO_x	2 220	1 072	898	772	694	538
NO_y	1 010	827	831	774	746	653
total	*5 300*	*3 409*	*3 009*	*2 686*	*2 610*	*2 401*

Nature area with exceedance of the critical load for acidification

DPSIR



Source: VMM

Decreasing pressure on ecosystems, but further efforts still needed

Acidification causes damage to vegetation. The biodiversity is affected. Forests suffer root damage. For each type of vegetation, 'critical loads' for acidification have been determined as the damage threshold for acidifying deposition. If these deposition limits are exceeded, this leads in the long term to harmful effects on the vegetation.

In 2009, the critical load for acidification was exceeded in 32 % of the total area of terrestrial ecosystems (forest, heathland and species-rich grassland) in Flanders. This is a positive development since in 2008 critical loads were still being exceeded in 44 % of the total area. Forests remain the most sensitive, with the limits being exceeded in 48 % of the area in 2009. Between 2008 and 2009, the cases of critical loads being exceeded decreased more sharply than the acidifying deposition in these nature areas. Because the critical load is based on threshold values, even a minor decrease in deposition can, in some cases, lead to larger nature area achieving compliance with the critical load for acidification.

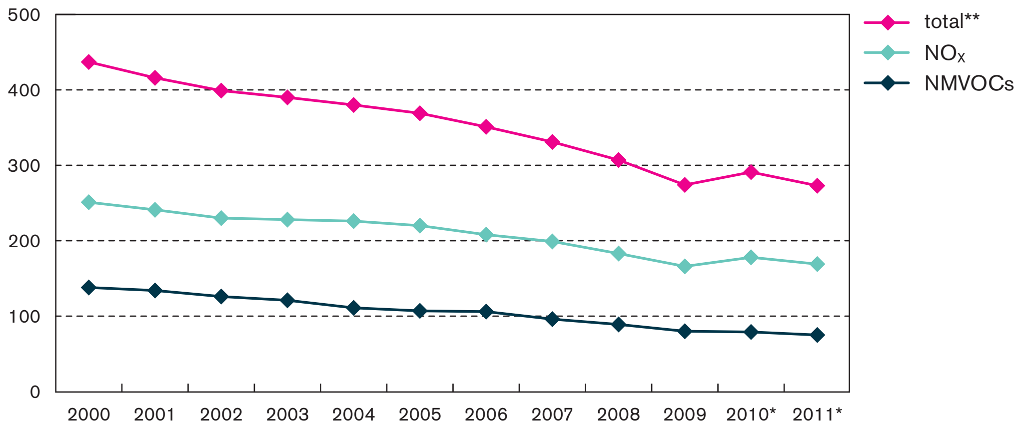
Efforts are still needed to meet the objective of the MINA plan 4 (2011-2015), notably to reduce the percentage of nature area where limits are being exceeded to 20 % by 2015. By comparison, the critical load was exceeded in the EU-25 in 2004 in 15 % of the nature area. The European long-term objective is to ensure that the critical loads for acidification are not exceeded in any ecosystem. Additional efforts continue to be needed to reduce the emissions of acidifying substances into the air.

Moreover, the decrease in the pressure on ecosystems in Flanders does not lead directly to a proportional recovery of the soil and biodiversity. This recovery is a very slow process, which depends, among other things, on the duration and the degree of the historic excess.

nature area with exceedance of critical load for acidification (%)	1990	2000	2005	2007	2008	2009
forest	97.6	83.0	79.1	68.0	61.1	47.6
species-rich grassland	77.4	38.4	32.6	17.1	14.4	5.2
heathland	98.5	16.6	9.1	1.1	1.7	0.3
total	*91.8*	*65.9*	*61.3*	*49.1*	*43.8*	*32.4*

Emission of ozone precursors into the air

DPSIR



* emissions from road traffic for 2010 are not comparable with 2000-2009 series due to model modifications; emissions from road traffic for 2011 assumed identical with those for 2010
** including CO and CH_4 contribution
Because the different ozone precursors have a different share in the tropospheric ozone formation, the photochemically relevant sum of the precursors is expressed in TOFP (tropospheric ozone-forming potential) units.

Source: VMM

NO_x emissions must decrease further

Ozone precursors, mainly NO_x (NO and NO_2), NMVOCs and to a lesser degree CO and CH_4, play a role in photochemical air pollution. Because of the complexity of the photochemical processes, there is no clear linear relationship between the emissions of ozone precursors and the resulting ozone formation.

The emission of ozone precursors decreased by 37 % between 2000 and 2011. The NMVOC emissions target for stationary sources, 64.0 ktonnes by 2015, as formulated in the MINA plan 4 (2011-2015), has already been attained since 2009. Further efforts are needed to reach the NMVOC emissions target for non-stationary sources (3.9 ktonnes) and especially the NO_x emissions target (110.4 ktonnes) by 2015.

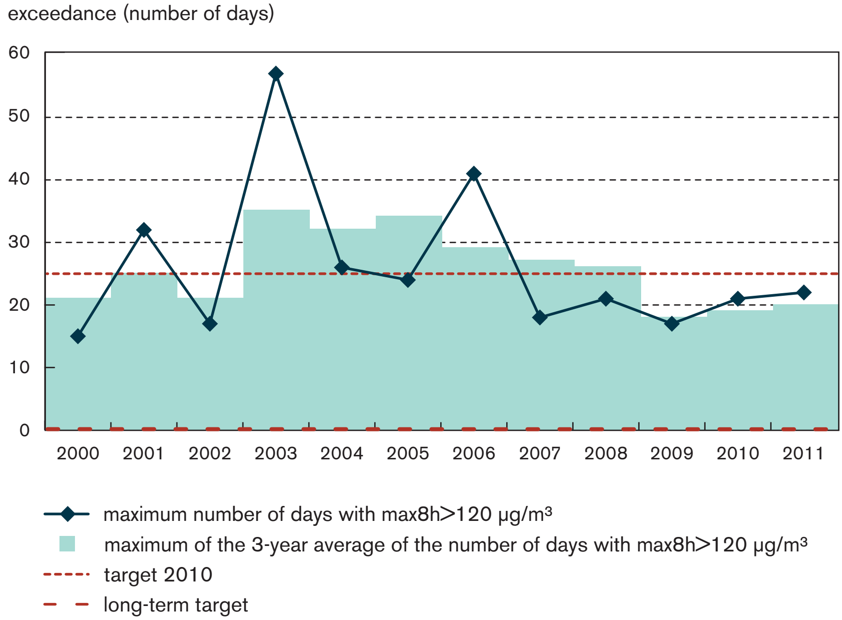
The transport sector accounts for almost half of the NO_x emissions, and diesel cars emit more NO_x than petrol cars. The still increasing dieselisation of the passenger car fleet (62.2 % in 2011) therefore adversely affects the NO_x emissions. The Flemish Air Quality Plan for NO_2, which was approved by the Flemish Government on 30 March 2012, aims to control the share of diesel cars. For the energy sector, the NO_x emissions in 2011 decreased by 24 % in comparison with 2010. This is mainly due to the decrease in power production and the resultant reduction in NO_x emissions from conventional thermal power plants. For households and trade & services, both NO_x and SO_2 emissions decreased in comparison with 2010, due to the lower heating demand in 2011.

Flanders has a VOC-sensitive ozone production regime, meaning that a limited decrease in the NO_x concentration initially leads to more ozone, because less NO is available for the ozone degradation. A sustainable reduction of the ozone concentration, therefore, requires a significant and global emission reduction of the precursors. Compared with Europe, the NO_x emissions in Flanders between 1990 and 2011 decreased slightly less fast (-43 % versus -49 % in Europe) and NMVOC emissions slightly faster (-63 % versus -57 % in Europe).

emissions (ktonnes TOFP units)	**2000**	**2007**	**2008**	**2009**	**2010***	**2011***
NO_x	251	199	183	166	178	169
NMVOCs	138	96	89	80	79	75
*total TOFP amount***	*437*	*331*	*307*	*274*	*291*	*273*

Exceedance indicator ($NET60_{ppb}$-max8h)

DPSIR



The annual maximum number of days on which the maximum 8-hour average exceeds 120 µg/m³ is determined by interpolating each year the number of exceedance days per 4x4 km grid cell over the whole of Flanders. The highest interpolated value in Flanders is then used. This time series has been recalculated using the RIO interpolation model, version 3.4, and can, therefore, differ slightly from previous reports.

Source: IRCEL, interregional air database

Target 2010 remains feasible thanks to favourable ozone year 2011

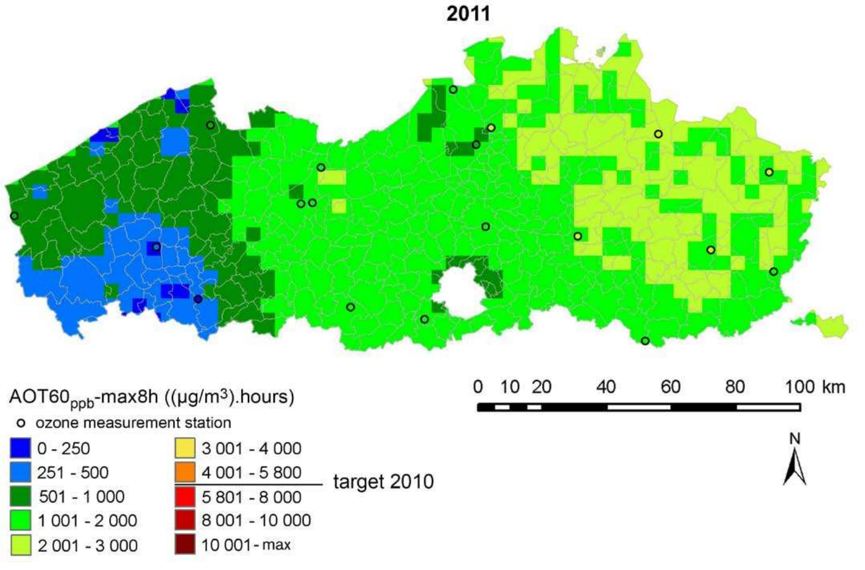
Because of its highly oxidising power, ozone can have an acute effect on health, such as respiratory problems, (temporary) lung function reduction or inflammatory reactions in the lungs. The European Air Quality Directive (2008/50/EC) sets targets for ozone concentrations for the protection of public health. As the long-term target, the maximum 8-hour average ozone concentration in the ambient air must not exceed 120 µg/m³ on any one day. The target for 2010 is a maximum of 25 exceedance days per calendar year, averaged over the years 2010, 2011 and 2012 ($NET60_{ppb}$-max8h). The MINA plan 4 (2011-2015) adopts these targets for 2015.

The number of exceedance days fluctuates from year to year and, in particular, follows the annual variation in sunshine and temperature. The quality of the summer has a major impact. 2011 was a favourable ozone year with a maximum of 22 exceedance days. Because the last few years were meteorologically favourable, the sliding 3-year average number of exceedance days reached a value of 20 days in 2011. The European target will probably be met, as the summer of 2012 was meteorologically favourable. An unfavourable summer, such as in 2003, in the coming years could imply that the European target is exceeded after 2010. Moreover, the European long-term target was not reached anywhere in Flanders. To reach the targets throughout Europe on a lasting basis, all of the European countries must implement sustainable measures to further reduce emissions of ozone precursors. The further reduction of NO_x emissions, in particular, requires additional efforts.

	2000	2007	2008	2009	2010	2011
maximum number of days with max8h>120 µg/m³	15	18	21	17	21	22
maximum of the 3-year average of the number of days with max8h>120 µg/m³	21	27	26	18	19	20

☹ Annual excess indicator (AOT60$_{ppb}$-max8h)

DPSIR



The geographical distribution is calculated by interpolation (RIO model) of the measurements from all ozone measurement locations in the telemetric monitoring network of the three federal regions. Only the VMM ozone measurement stations in Flanders are shown on the map.

Source: IRCEL, interregional air database

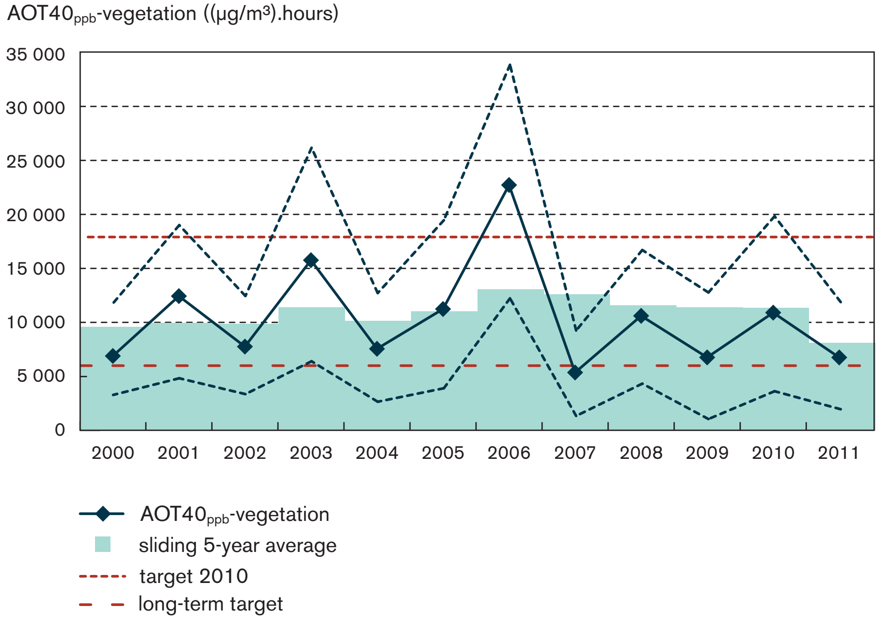
Only limited ozone effect on health in 2011

The annual excess indicator gives an indication of the effect of the excess ozone on health. This indicator also takes into account the magnitude and duration of the exceedance with respect to an ozone threshold of 120 µg/m³ and is, therefore, supplementary to the exceedance indicator. In the EU model calculations that were used as basis for both the European National Emission Ceilings and the Ozone Directives, a maximum annual excess of 5 800 (µg/m³).hours was proposed as the target for 2010. This target was not adopted in the European Air Quality Directive (2008/50/EC). The indicator is, however, monitored under the MINA plan 4 (2011-2015). No target has been set for 2015, but the aim is to ensure a favourable development in the period 2010-2015.

The annual excess fluctuates and mainly follows the annual variation in sunshine and temperature. 2011 was a favourable year in terms of ozone excess for human health, with an average value across Flanders of 1 439 (µg/m³).hours. The highest ozone excess was recorded in Limburg and the lowest in West Flanders, where a minimum of 120 (µg/m³).hours was reached. The higher excess in the northeast of Flanders has to do with the higher temperatures and the lack of atmospheric dilution processes such as e.g. a land or sea breeze at the coast. The target of 5 800 (µg/m³).hours was respected everywhere in Flanders. According to the European long-term target, the maximum 8-hour average ozone concentration is not to exceed the threshold value of 120 µg/m³ on any one single day. This long-term target was not met anywhere in Flanders. If a sustainable solution to the ozone issue is to be found, the emissions of ozone precursors, NMVOCs and especially NO_x will need to be reduced further, both in Europe and worldwide.

Seasonal excess for vegetation (AOT40$_{ppb}$-vegetation)

DPSIR



The points on the solid line show the average value for each year, weighted using the vegetation fraction, in Flanders. The dotted lines indicate the lowest and the highest annual values. The calculation method has been optimised, so these results can differ slightly from previous reports.

Source: IRCEL, interregional air database

Limited excess for vegetation in 2011

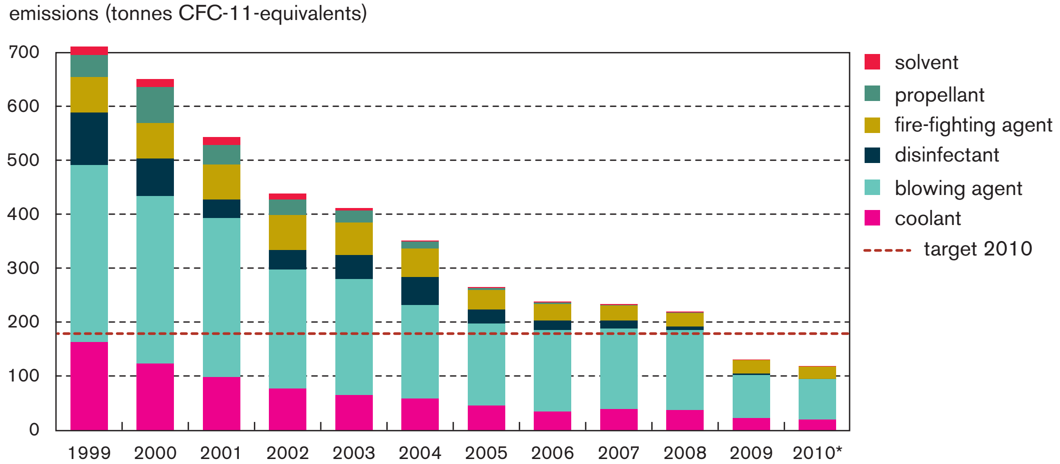
Natural ecosystems, arable crops and semi-natural vegetation can suffer damage from exposure to ozone. This leads to a reduction in yield and loss of quality in crops. For the protection of vegetation, a status indicator 'AOT40$_{ppb}$' was defined in the European Air Quality Directive (2008/50/EC), the seasonal excess. This indicator shows the excess above 80 µg/m³ of all hourly ozone concentration values between 8 am and 8 pm (Central European Time) during the months of May, June and July. The European target for 2010 is 18 000 (µg/m³).hours and the long-term target is 6 000 (µg/m³).hours. The indicator is monitored under the MINA plan 4 (2011-2015). No target has been set for 2015, but the aim is to ensure a favourable development in the period 2010-2015.

Averaged for Flanders, the target for 2010 was not exceeded at any time except in the meteorologically unfavourable year 2006. As a result, the 5-year average of the seasonal excess for vegetation (except forests) also remains well below the target for 2010. The long-term target, by contrast, was exceeded in 2011 on 66 % of Flemish land with vegetation. To reach the long-term target in varying meteorological conditions, the emissions of ozone precursors, NMVOCs and especially NO_x, must decrease further in Europe and also worldwide.

(µg/m³).hours	2000	2007	2008	2009	2010	2011
AOT40$_{ppb}$-vegetation	6 904	5 363	10 648	6 772	10 946	6 765
5-year average of AOT40$_{ppb}$-vegetation	9 564	12 583	11 544	11 384	11 316	8 099

☺ Emission of ozone-depleting substances

DPSIR



* provisional figures

Source: VITO based on Econotec (2012)

Emissions continue to decrease

Between 1999 and 2010, the total emissions of ozone-depleting substances decreased by 83.4 %. Between 2008 and 2009, the emissions decreased significantly following a correction to the lifetime of the most recent generation refrigerators using CFC-11-eq as blowing agent. In 2010, almost 64 % of the emissions came from blowing agents that are mainly released by incorrect disposal, collection and processing of insulation material during the demolition of houses. It is technically difficult to remove the insulation material cleanly from a wall and to capture the gas released during processing, distil it and remove it for destruction. Emissions from blowing agents will, therefore, continue for some years. In 2010, fire-fighting agents still accounted for 20 % of the emissions. Coolants used in air-conditioning installations, refrigerators and freezers were responsible for 16 % of the emissions.

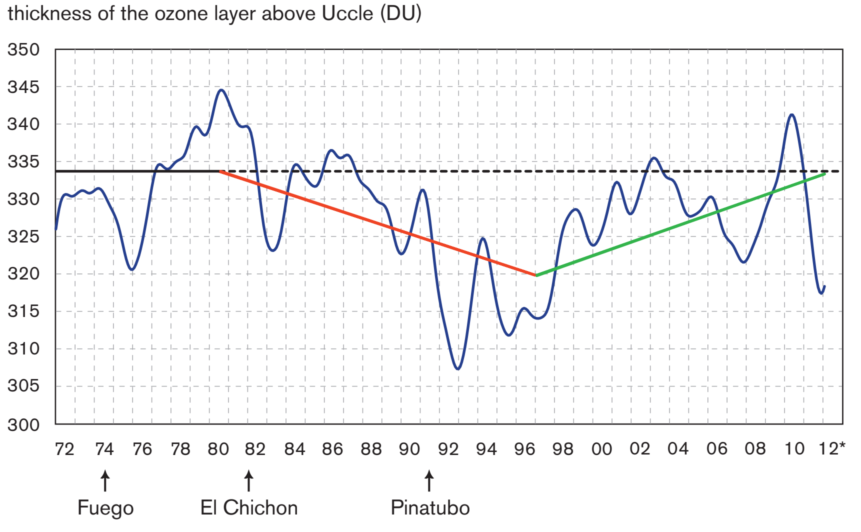
Target 2010 reached

The MINA plan 3+ (2008-2010) aimed to reduce the emissions by 2010 by at least 74.5 % with respect to the emissions in 1999. In concrete terms, the emissions were to be reduced to 181.2 tonnes CFC-11-eq by 2010. The target was achieved. Already in 2009 and 2010, the emissions of ozone-depleting substances were 28 % and 35 % below the target. The MINA plan 4 (2011-2015) does not specify a new target. Especially European policy will now determine the further reduction of these emissions and is very ambitious in its approach. European Regulation (EC) 1005/2009 stipulates the phasing-out schemes and prohibitions regarding the production, placing on the market and use of ozone-depleting substances. The goal of the Montreal Protocol is to limit and ultimately completely stop the use of ozone-depleting substances.

emissions (tonnes CFC-11-eq)	coolant	blowing agent	disinfectant	fire-fighting agent	propellant	solvent	*total*
1999	162.6	328.0	98.2	65.5	40.9	15.5	*710.7*
2008	36.6	148.7	6.2	25.2	0.9	1.7	*219.3*
2009	21.9	79.5	3.4	24.3	0.5	0.4	*129.9*
2010*	18.7	75.3	0.0	23.4	0.2	0.4	*118.0*

Thickness of the ozone layer above Uccle

DPSIR



* provisional figures

The arrows indicate the dates of volcanic eruptions (from left to right in Guatemala, in Mexico and in the Philippines) that ejected dust into the stratosphere. Depending on the location and time of the eruption, this had consequences for the thickness of the ozone layer in the longer term.

Source: KMI

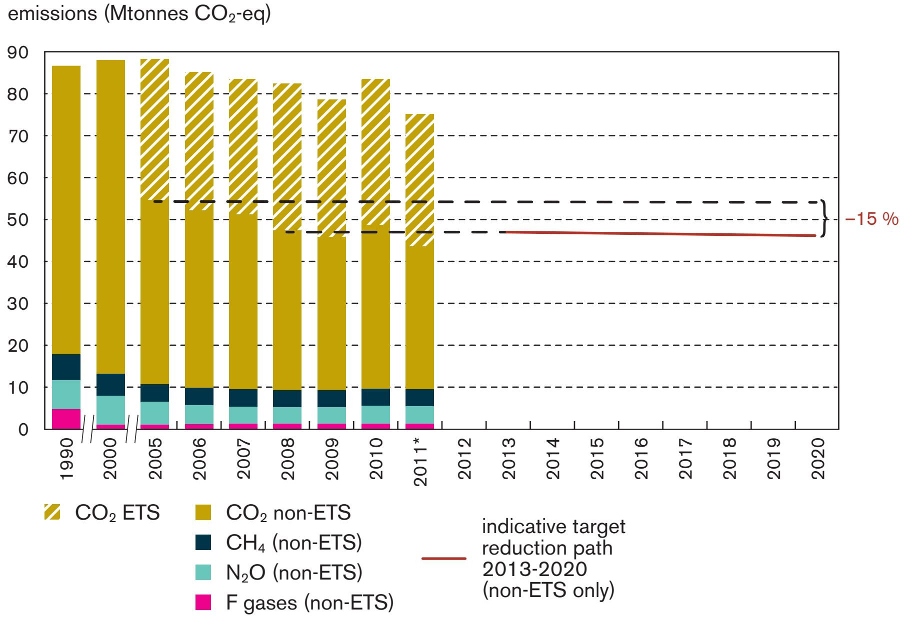
Signs of recovery of the ozone layer, certainty only after several decades

The advancing annual average of the thickness of the ozone layer above Uccle (blue line) can be split into two periods. Between 1980 and 1997, the thickness of the ozone layer decreased by 0.26 % per annum (red line). During the period 1997-2011, the thickness increased by an average 0.28 % per annum (green line). Satellite observations point in the direction of a recovery. However, in view of the large uncertainties and large annual fluctuations, it is still too early to interpret this as a definitive recovery.

The thickness of the ozone layer is influenced in a complex manner by human activities and natural phenomena. The production of ozone-depleting substances by humans is decreasing thanks to the measures taken in the Montreal Protocol. The effect on the ozone layer will, however, only be observable in the long-term. Furthermore, scientific research has shown that there are also various interactions with climate change. Among other things, a temperature increase in the troposphere is accompanied by a temperature drop in the stratosphere, which would increase the efficiency of the ozone-depleting substances. As a result, the recovery of the ozone layer (even with decreasing chlorine and bromine concentrations) could be slowed down further. Other natural phenomena, such as volcano eruptions and changes in the general circulation in the stratosphere, can also affect the condition of the ozone layer.

Total emission of greenhouse gases

PACT 2020 DPSIR



* provisional figures

Source: MIRA based on EIL (VMM), VITO and LNE

Further decrease in greenhouse gas emissions in 2011

As a result of a clear decrease with respect to 2010, greenhouse gas emissions in 2011 resumed the downward trend initiated in 2005.

Until 2010, the bulk of emission reductions were the result of important measures relating to PFHs and SF_6 (installation of a fluoride recuperation unit in one chemicals company), N_2O (commissioning of catalytic converters in the chemicals industry; decrease in livestock) and CH_4 (landfill gas recycling and restrictions on land filling; decrease in livestock). However, in 2011, the CO_2 emissions (for 83 % caused by the use of fossil fuels) too fell for the first time below the 1990 level. Apart from recovery of the economy, 2010 was characterised by a very cold winter. The winter months in 2011, by contrast, were the mildest from the whole time series. As a result, the heating demand was one-third lower than in the previous year. In addition, the effects of the prolonged crisis play a role, as do the implementation of energy-saving measures and the switch to more renewable energy sources.

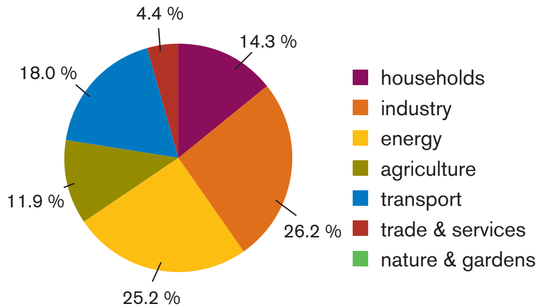
From 2013, European Member States will only be set targets for activities that are not covered by the European Emissions Trading System (ETS), the so-called non-ETS fraction. The target decreases each year following a linear path. For Belgium, this path runs between 2013 and 2020, starting from the average non-ETS emissions in the period 2008-2010 until the reduction target of -15 % in 2020 compared to 2005. The target for Belgium has not yet been converted into specific targets for each region.

emissions (Mtonnes CO_2-eq)		**1990**	**2000**	**2005**	**2009**	**2010**	**2011***
ETS	CO_2	.	.	33.6	32.7	34.8	31.6
non-ETS	CO_2	68.8	74.8	44.0	36.6	39.1	34.1
	CH_4	6.1	5.3	4.2	4.0	4.1	4.0
	N_2O	6.9	6.9	5.4	4.0	4.3	4.3
	F gases	4.8	1.0	1.1	1.2	1.2	1.2
total		*86.6*	*88.0*	*88.3*	*78.6*	*83.5*	*75.2*

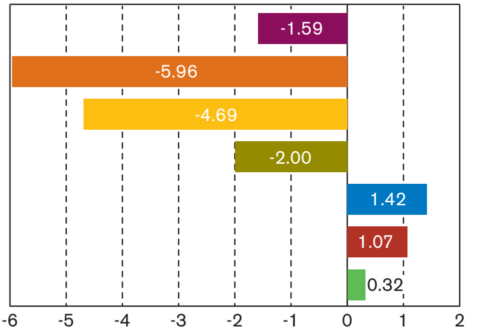
PACT 2020

DPSIR

Emission of greenhouse gases per sector



a) share in 2011 (%)



b) difference 2011* - 1990 (Mtonnes CO_2-eq)

* provisional figures
emissions from road traffic for 2010 not comparable with 2000-2009 series due to model modifications; emissions from road traffic for 2011 assumed identical with those for 2010
Emissions and sinks in nature & gardens are not included in the calculation of the shares.

Source: MIRA based on EIL (VMM)

Industry and energy (production) remain responsible for half of the greenhouse gas emissions

With a 3.7 % decrease in 2011, industry continued on the emissions reduction path initiated in 2005. This decrease may be the result of improvements in energy efficiency initiated by the European Emissions Trading System and the energy covenants with the Flemish Government, but also of the relocation of industrial activities to other countries. Together with the energy sector, industry still represents slightly over half of the greenhouse gas emissions. The energy sector recorded a remarkable 16 % decrease in emissions in 2011. This decrease was mainly the result of a decrease in power production in CHPs and in conventional thermal power plants (coal and gas) in combination with increased use of CO_2-neutral biomass.

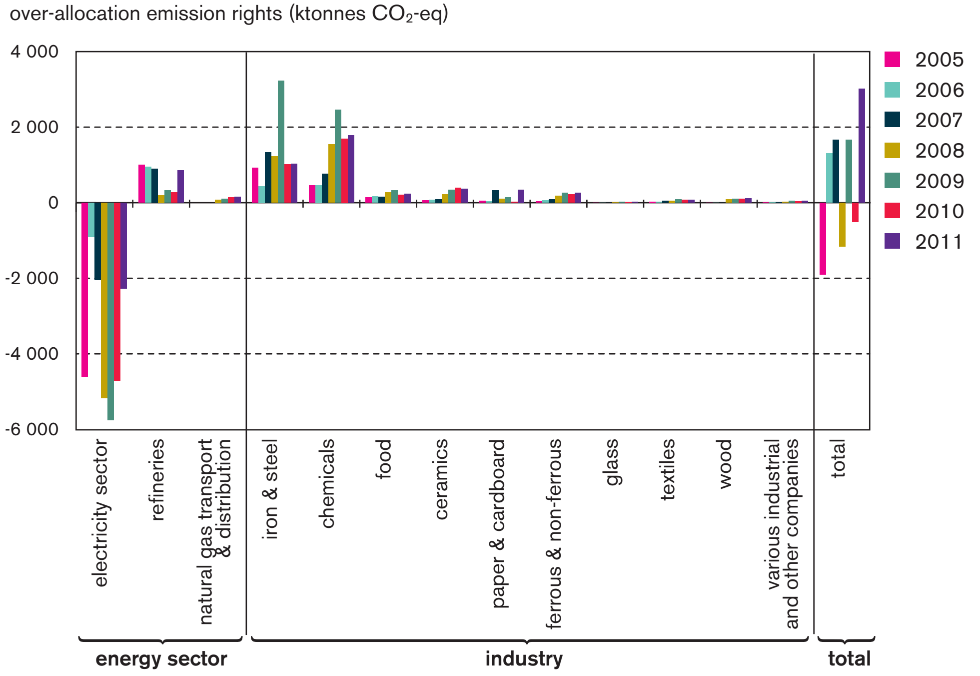
Emissions from households and trade & services mainly originated from building heating. Especially for households, the extremely mild winter months in 2011 resulted in a reduced share in the total emissions. Just as 2011, 2007 also had a very mild winter. But, whereas the emissions from households and trade & services were respectively 11 % and 7 % lower in 2011 than in 2007, the difference in degree-days was only 2.5 %. The deployment of energy-saving measures (e.g. insulation) and the switch to renewable energy sources (e.g. solar boilers and heat pumps) have resulted in additional emission reductions.

After a significant decrease in the period 1990-2008, the share of agriculture, as well as the absolute emissions by this sector, has again increased in recent years. Unlike most of the other sectors, the greenhouse gas emissions in the transport sector increased between 1990 and 2011. This also led to an increased share of the transport sector in the Flemish greenhouse gas emissions from 14 % in 1990 to 18 % in 2011.

greenhouse gas emissions (Mtonnes CO_2-eq)		**1990**	**2000**	**2005**	**2009**	**2010***	**2011***
households		12.39	12.91	13.50	12.88	13.82	10.80
industry	non-ETS	25.74	24.69	8.85	3.59	3.05	2.44
	ETS	.	.	15.08	14.50	17.49	17.35
energy	non-ETS	23.72	23.76	5.93	4.22	5.42	4.79
	ETS	.	.	18.51	18.20	17.29	14.24
agriculture		10.96	9.97	9.19	8.74	9.01	8.96
transport		12.19	13.40	13.54	12.76	13.60	13.61
trade & services		2.26	3.70	4.02	4.00	4.14	3.33
nature & gardens		-0.66	-0.43	-0.36	-0.32	-0.33	-0.34

Emissions trading

PACT 2020 DPSIR



Positive numbers indicate that more free emission rights were allocated than necessary. If the number of freely acquired emission rights was not sufficient to compensate for all verified emissions, the number is negative.

Source: VITO for MIRA based on Department LNE

European emissions trading regulates approximately 40 % of the Flemish greenhouse gas emissions

Since 2005, the major part of the CO_2 emissions in the industry and energy sector have been regulated via a European Emissions Trading system (ETS). Following an expansion of the scope, the ETS share in Flanders' total greenhouse gas emissions rose from on average 38 % in the first trading period (2005-2007) to 42 % in the second period.

The bulk of ETS installations are to be found in the industry and energy sector. The share of the greenhouse gas emissions that fall under the ETS is the greatest in the energy sector: up to 98 % in 2011. In the industry sector, the ETS share was 65 % in 2011.

Slight over-allocation of emission rights in Flanders

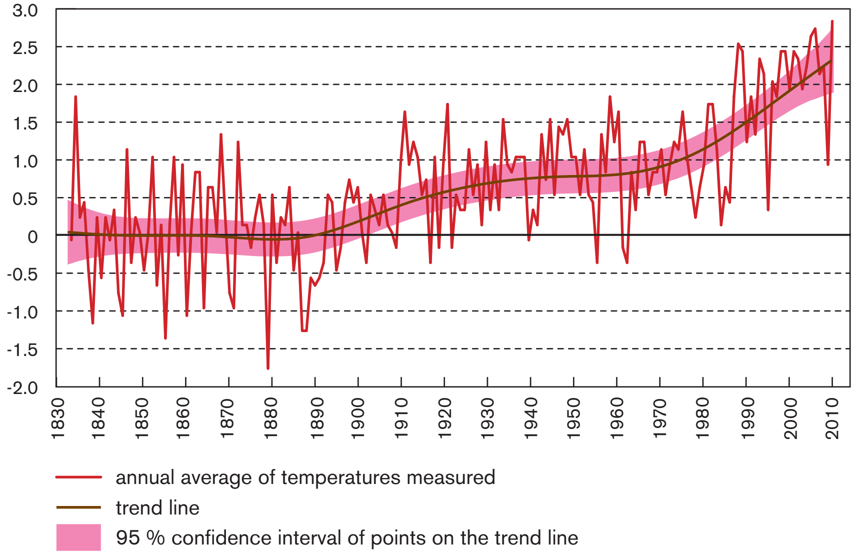
The electricity producers were allocated relatively few free emission rights. The reason for this is that coal-fired plants and conventional gas and diesel plants were allocated little or no free rights as an incentive to adopt emission reduction measures. Energy-intensive companies from the other subsectors could sign a covenant with the Flemish Government. When these companies could demonstrate that they belong to the 10 % best of class in terms of specific energy use, they received free emission rights. And, by doing better than the 10 % objective, several companies were allocated more emission rights than they actually needed. This led to an over-allocation in nearly all of the other industrial subsectors. Moreover, the economic crisis limited the activities and associated emissions in a number of subsectors, but this had no impact on the number of allocated free emission rights.

To this date, on average 1.8 % of the total number of free emission rights were over-allocated. This over-allocation is not just typical of Flanders. Too many free emission rights were allocated in the whole ETS, which had a major negative impact on the price of the emission rights.

☹ Temperature

DPSIR

deviation with respect to the average annual temperature during the period 1850-1899 (°C)



Because (certainly within Europe) the average annual temperatures in the pre-industrial period 1750-1799 were very similar to those in the period 1850-1899 and in this last period measurements for a lot more locations are available, 1850-1899 is used as the reference period for assessment against the 2 °C target.

Source: MIRA based on KMI data

Belgium now 2.3 °C warmer than in the pre-industrial period

To keep the impact of climate change within limits, the annual average global temperature may increase by a maximum of 2 °C with respect to the pre-industrial period. As in many other places in the world, the measurements in Belgium (Uccle) have indicated a significant upward trend since the end of the 19th century. The increase almost stops halfway through the 20th century but since then the temperature has started to increase even quicker. In recent years, the temperature shows a constant increase of 0.4 °C per decade. The trend line indicates that in Belgium it is now on average 2.3 °C warmer than in the pre-industrial period. Moreover, the temperature rise appears to be significant in all four seasons and is the greatest in spring.

With an annual average temperature of 11.6 °C, 2011 was the absolute record year since the measurements began in 1833. 2007 and 2006 complete the top 3 with 11.5 °C and 11.4 °C respectively. The 17 warmest years since 1833 are all in the period 1989-2011, whereas the 20 coldest years occurred before 1895.

Provisional results indicate that 2012, with an annual average temperature of 10.6 °C, just falls within the top 20 of warmest years.

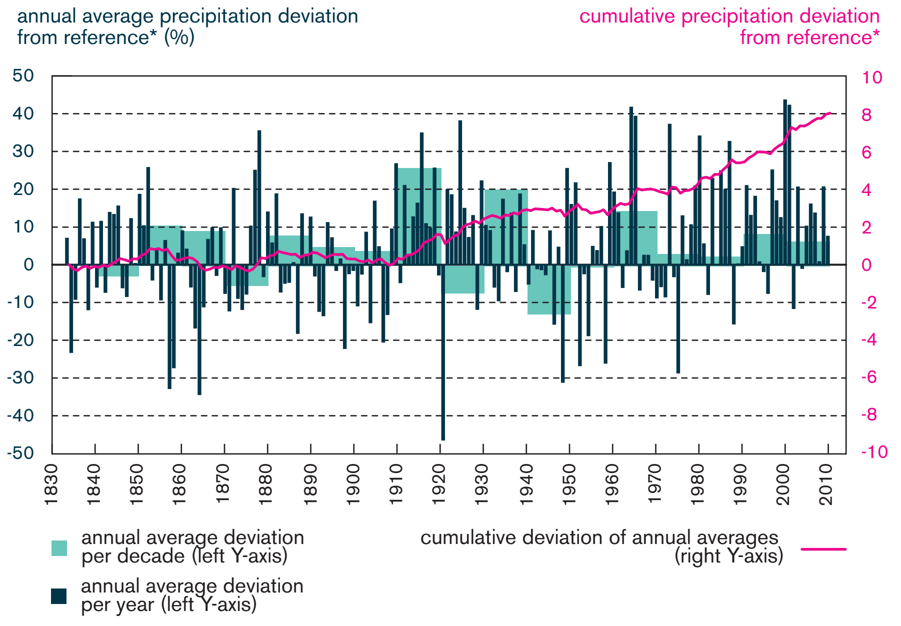
More days with extremely high temperatures

The number of extremely warm days in a year is also increasing: every decade there are three more summer days and every two decades there is one more heat day.

During the 20th century, we had on average one heat wave every two years, but since the 1990s we have had one heat wave per year. Heat waves can lead to significantly higher excess death rates. In the summer of 2010, for example, a 20 % rise in the mortality rate was recorded during two heat waves. The victims are mainly older persons, people with cardiovascular diseases or respiratory problems, and children under 4 years old.

Precipitation

DPSIR



* annual average precipitation over the period 1850-1899, namely 758 mm

Source: MIRA based on KMI data

Increasing precipitation in Belgium

There are clearly increasingly more wet than dry years in our country. The trend towards wetter years is illustrated in the figure, especially by the line that indicates the cumulated deviation for the measurement point in Uccle. In the 19th century, this line kept fluctuating around the zero point: wetter and drier years offset each other. However, since the beginning of the 20th century, we can see a clear rise, which becomes even more pronounced from the 1970s. For the first time since the beginning of the measurements, we also see five consecutive decades with an annual average precipitation that exceeds that of the reference period. Our country is experiencing a slow but significant increase in the average annual precipitation: +0.5 mm/year.

Provisional results indicate that 2012 was also a very wet year with a total precipitation of 977 mm in Uccle. 2012 falls just outside the top 10 of wettest years since the beginning of the measurements in 1833.

Wetter winters

When considering the whole measurement series, only the winter shows a significant increase in precipitation. The amount of precipitation in the other seasons changes little, if at all, even if the summer precipitation has increased since the 1970s. The number of precipitation days increases in winter and in spring. There is less snowfall. This is, of course, closely related to the rise in temperature.

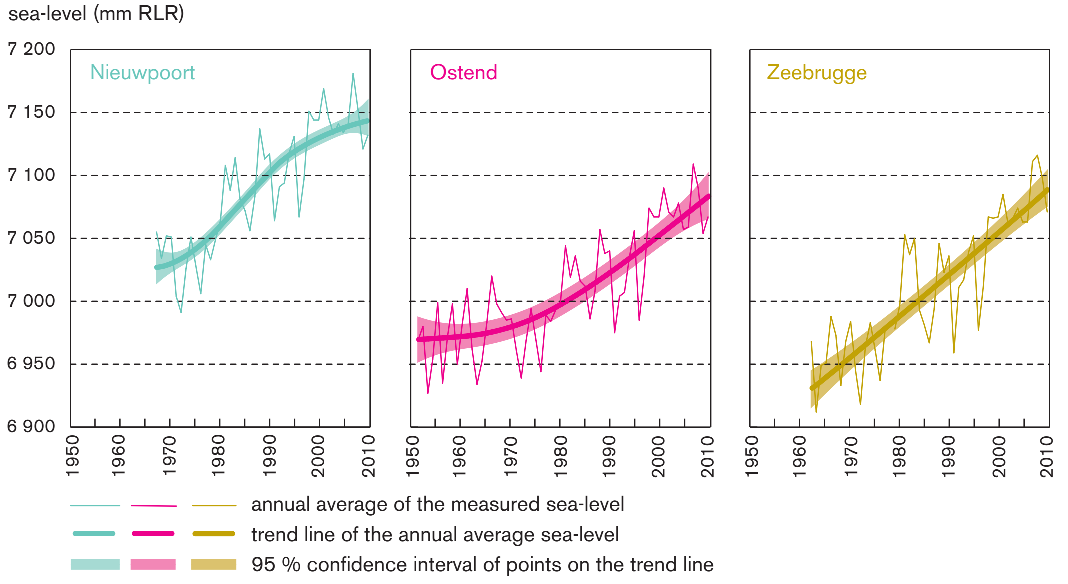
Doubling of the number of days with heavy precipitation

In 2011, science was able to first show that human activities contribute to the observed intensification of extreme periods of precipitation in the northern hemisphere.

Over the last decades, the measurement series of the number of days with heavy precipitation (at least 20 mm/day) in Uccle also shows a clearly upward trend: over six decades, the average number has risen from three to six per year.

☹ Sea-level

DPSIR



The sea level is expressed in mm RLR (Revised Local Reference). The data of a local reference (for the Belgian coast this is the Second General Water Level (TAW - Tweede Algemene Waterpassing) are converted to the international reference level.

Source: MIRA based on PSMSL and Agency for Maritime and Coastal Services

Global rise in sea-level is accelerating

Overall, the global average sea-level has risen by some 120 m since the end of the last ice age, some 20 000 years ago. In the 20th century, the average sea level on Earth rose annually by 1.7 mm. And, since the 1950s, a significant acceleration in the rising of the global sea level seems to be in progress. In the meantime the annual rise in the sea-level is already 3.4 mm per year.

Belgian coast is following the global trend

A statistical analysis of the values measured at the Belgian coast shows a clear, significant increase in the annual average sea-level for the three measurement locations, during 1970s, 1980s and 1990s. The increase also continues after 2000, but is significant only for Ostend and Zeebrugge. Compared with 1970, the annual average sea-level in 2010 was already 103 mm higher in Ostend, 115 mm higher in Nieuwpoort and 133 mm higher in Zeebrugge.

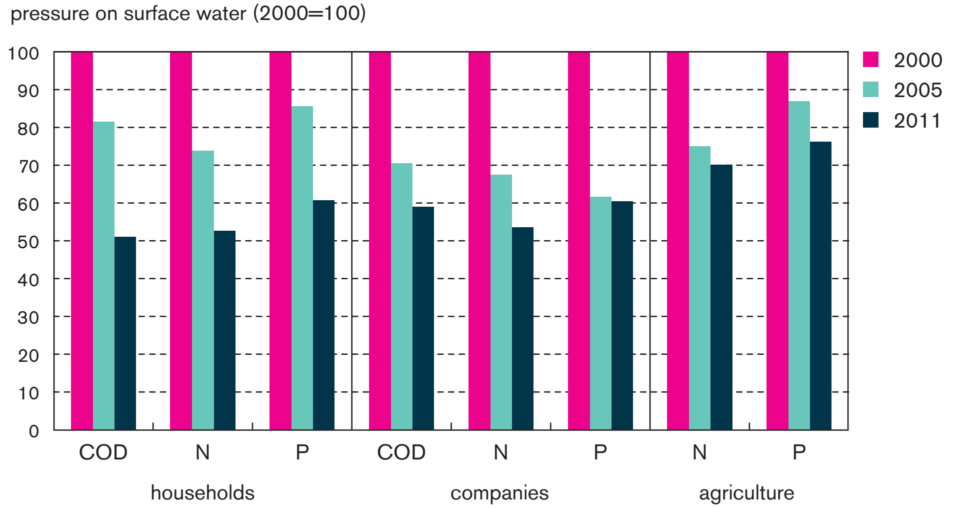
Furthermore, the rise is higher at high tide than at low tide, thereby increasing the tidal amplitude.

Vulnerable to floods

In Europe, Belgium appears, after the Netherlands, to be the most vulnerable to floods caused by the rising sea-level: in Flanders, 15 % of the surface area is located less than five metres above the average sea level. Moreover, the Belgian coast appears to be the most built-up in Europe: in 2000, more than 30 % of the 10 km coastal strip was built-up, and even almost 50 % of the strip up to 1 km from the coast. In West Flanders, 33 % of the population lives in low-lying polder areas vulnerable to floods caused by the sea.

Pressure on the surface water from oxygen-binding substances and nutrients

DPSIR



Source: VMM

Pressure on surface water from households continues to decrease

The pollutant load of a domestic origin that the Flemish surface waters have to deal with has decreased further in the period 2000-2011 due to the systematic expansion and improvement of the public waste water treatment network. However, households are still responsible for a major part of the pollutant load on the surface water from nitrogen (N, 30 % in 2011) and phosphorus (P, 42 % in 2011).

Favourable trend in pressure on surface water from companies is not continuing

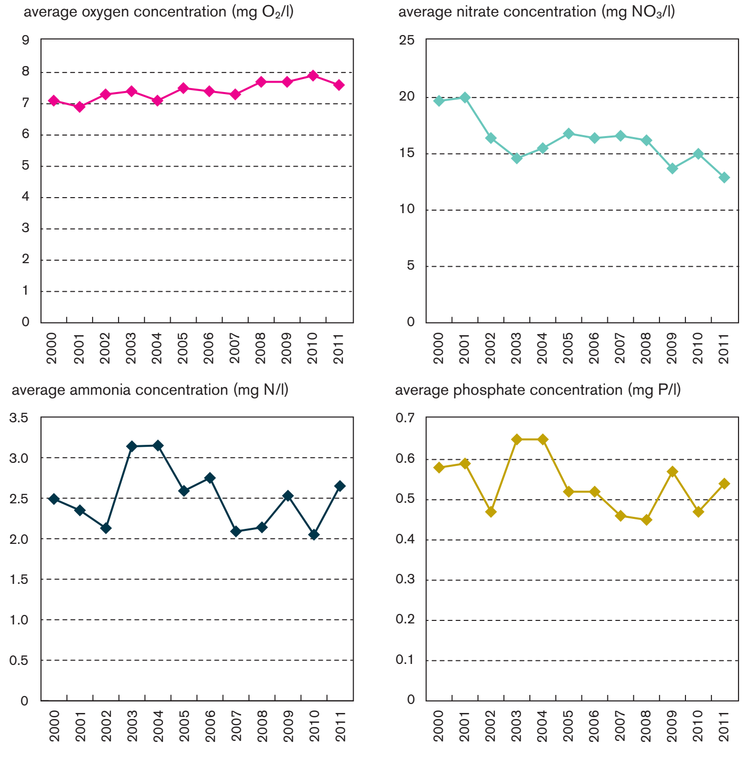
Companies achieved a sharp decrease in the 2000-2005 period; in 2006 and 2007 there was no clear trend. In 2008 and 2009, there was again a clear decrease. The financial-economic crisis probably played a significant role in this decrease. Since then, there has been no further reduction. The small proportion of companies in the load on the surface water with nitrogen (9 %) and phosphorus (15 %) is remarkable.

Losses of nitrogen and phosphorus from agriculture decreased to a lesser extent

The modelled nitrogen and phosphorus losses from agriculture in 2011 are at a lower level than at the start of the 2000s. The decrease is less pronounced than for households and companies. With respectively 61 % and 44 %, agriculture is, via fertilisation, responsible for the largest share of the total nitrogen and phoshorus load that ends up in the surface water.

Oxygen and nutrients in surface water

DPSIR



Source: VMM

No clear picture

Sufficient dissolved oxygen (O_2) in the water is an important prerequisite for a diversified ecosystem. The ammonia concentration (NH_4) is a good indicator for water contamination from untreated or insufficiently treated discharges. Too much nitrate (NO_3) and/or phosphate (PO_4) in the surface water can lead to excessive algae growth.

Taken over the whole 2000-2011 period, the average oxygen and nitrate concentrations show signs of a gradual improvement. These positive changes are attributable to the decrease in the pollutant load to the surface water. Weather conditions, and precipitation in particular, also play a major role and often cause fluctuations in e.g. nitrate concentrations. The phosphate concentrations also showed an improvement, which seems, however, to have stopped since 2008. The ammonia concentrations do not show any clear trend.

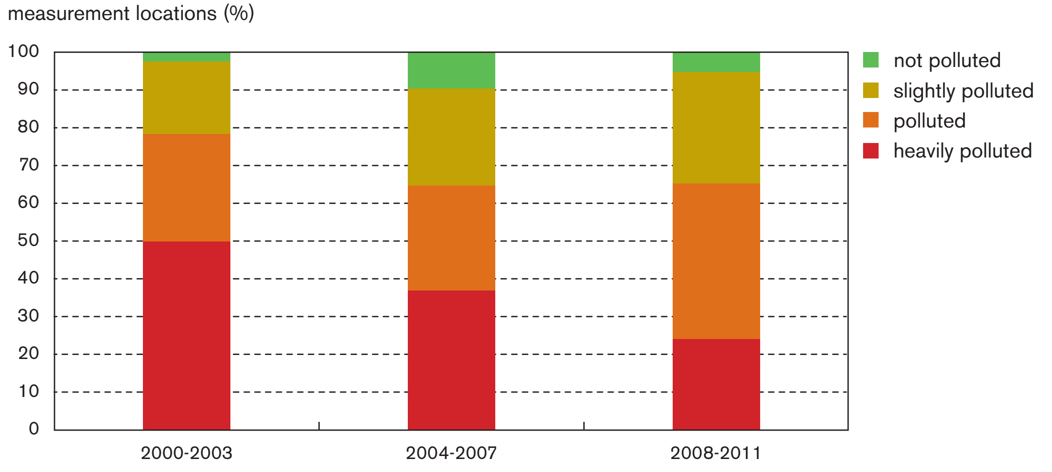
The results of a statistical analysis per measurement location are similar for the various substances. In the period 2000-2011, more than half of the measurement locations showed no statistically significant trend, about 30 % a significant improvement and some 10 % became significant worse. The gradual improvement of the average concentrations is the net result of this. The situation, therefore, is not improving everywhere and to the same extent.

The MINA plan 4 (2011-2015) proposes, among other things, as plan targets for 2015 that 79 % of the surface water bodies must meet the standard for oxygen and 27 % for total nitrogen. The percentage of Flemish water bodies, i.e. the larger watercourses, that met the standards in 2011 was 61 % for oxygen saturation and 30 % for total nitrogen. Only 20 % of the Flemish water bodies met the standard for phosphate (not included as a target in MINA plan 4).

To improve water quality further, the public water treatment system must be expanded further and improved. In addition, a further reduction in the losses from agriculture is especially needed.

☹ Watercourse sediment quality

DPSIR



Source: VMM

Watercourse sediment quality is improving

Pollution of the surface water is not limited to the water column itself. A number of substances have a tendency to bind to the particulate matter. If this suspended matter settles, it will form a water bottom or sediment layer together with the pollutants bound to it.

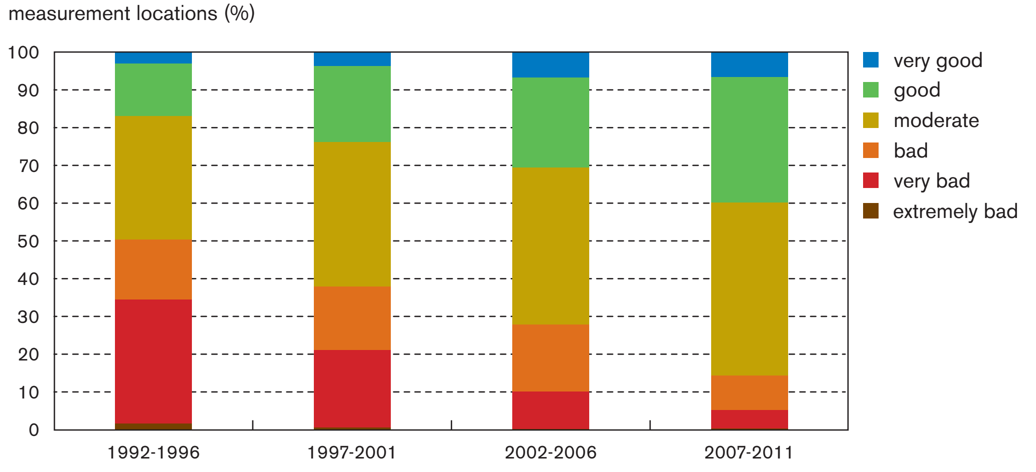
In the period 2008-2011, 25 % of the measurement locations investigated were heavily polluted, 70 % slightly polluted to polluted and only 5 % not polluted. From the evaluation against the standards, it appears that a few substances exceed the standards in more than 40 % of the measurement locations. These substances include a number of PCBs, a degradation product of DDT, and the heavy metals zinc and copper.

A comparison of the quality of the 241 watercourse sediments that were sampled in the periods 2000-2003, 2004-2007 as well as in 2008-2011, has revealed a positive trend (figure). The sharp decrease in the percentage of heavily polluted watercourse sediments (from 50 % to 24 %) and the increase in the percentage of slightly polluted watercourse sediments (from 19 % to 29 %) illustrate this improvement. The percentage of unpolluted watercourse sediments, however, shows no clear trend. The decrease in the percentage of heavily polluted sediments resulted mainly in an increase in the percentage of polluted sediments (from 29 % to 41 %).

For a number of watercourses, the improvement can be attributed to recently completed dredging and clearing works. Further research did however reveal that not all remedial measures result in an improved sediment quality, notably when the historic contamination has penetrated deep into the sediment. Therefore, it is not always advisable to clear deeper, as this could reveal other problems. A proper preliminary investigation should, therefore, always be carried out before proceeding with any effective remedial action regarding the watercourse sediment. Other factors that could have a positive effect on the sediment quality include reduced discharges of toxic substances, so that the newly formed watercourse sediment is less contaminated, and changes in the physico-chemical quality of the water column. Higher oxygen concentrations can, for example, lead to the subsequent release of toxic substances from the watercourse sediment into the water column.

Biological quality

DPSIR



Source: VMM

Quality improving but long way to go yet

For the evaluation of the biological water quality, use is first of all made of the Belgian Biotic Index (BBI), an index that is based on the presence or absence of aquatic macro-invertebrates (invertebrates that can perceived with the naked eye). In addition to macro-invertebrates, other biological quality elements are monitored. Macrophytes include all plants under water, on the water surface or along the banks that are visible to the naked eye. Algae belong to the group of phytoplankton and are, in principle, single-celled, although in many species the cells are clustered together into colonies or filaments. The chlorophyll-a content in the surface water is determined as a measure for the biomass of phytoplankton. The term phytobenthos refers to the microscopic algae that live on the bottom, on the banks or on aquatic plants.

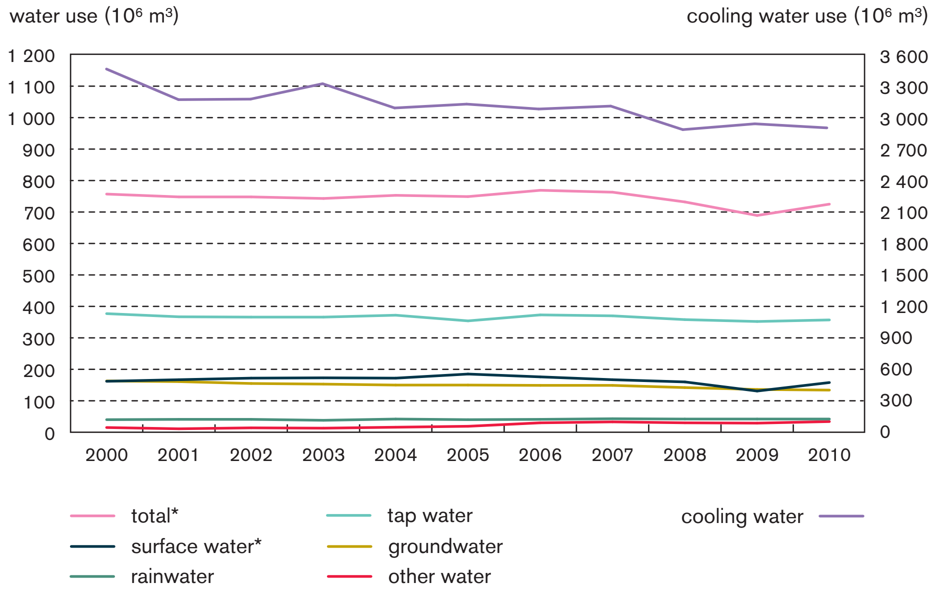
During the 2011 measurement campaign, the BBI was determined at 361 measurement locations. Of these, almost 34 % achieved a good or very good biological quality. Both the European and the Flemish legislation stipulate that a good ecological condition or good ecological potential is to be achieved everywhere, in principle by 2015. For macro-invertebrates, the distance to that target is determined using another index, namely the MMIF (Multimetric Macro-Invertebrate Index Flanders). Over the period 2007-2011, only 19 % of the water bodies scored good or higher, 29 % scored moderate, 33 % poor and 18 % bad. Also for the other biological quality elements, there is still a long way to go. For the macrophytes, only 6 % of the water bodies sampled in the period 2007-2011 belonged to the category good or higher. For phytobenthos, this was 7 %. For phytoplankton, 38 % of the water bodies met the standard for chlorophyll-a.

In the course of the last two decades, the biological quality (BBI) of the Flemish surface waters has improved slowly but surely (figure). The percentage of measurement locations with extremely or very bad quality decreased significantly and the percentage with a moderate or good quality increased significantly. The positive developments are the result of the expansion and improvement of the public waste water treatment system and the efforts made by companies and agriculture.

Considerable efforts are still needed in order to reach the final objective. Not only to further reduce the pollutant loads that find their way into the surface water, but certainly also to restore the watercourses to a more natural state (e.g. remeandering, nature-friendly banks, etc.).

Water use

DPSIR



* excluding cooling water. The ground and surface water that is used to produce tap water is not included in these figures.

Source: VMM

Water use decreasing, but ...

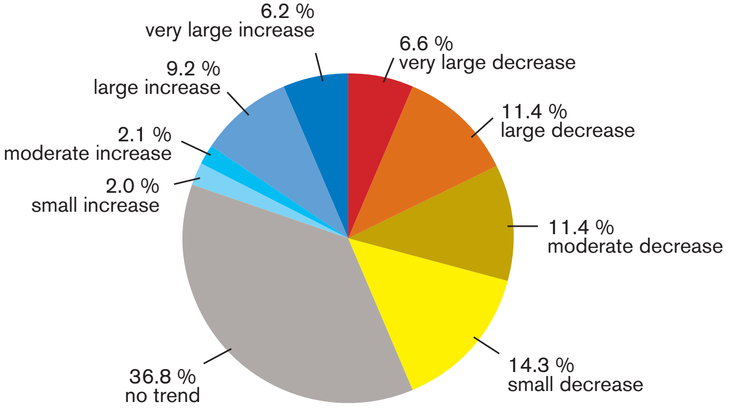
Total water use (excl. cooling water) over the period 2000-2006 showed little or no change. In the period 2006-2009 there was a clear decrease, which was not continued in 2010. The use of surface water (excl. cooling water) exhibits a very similar trend. In the period 2000-2010 the use of both tap water and groundwater decreased by 5 % and 18 % respectively. The government policy therefore appears to be successful. Through measures such as permits, levies and awareness campaigns, the government seeks to limit the total water use and especially the use of tap water and groundwater. Furthermore, the price of tap water has increased. The use of cooling water has also decreased, even though it stagnated somewhat in recent years.

Households mainly use tap water. In the period 2000-2010 the use of tap water fell from 110 l to 99 l per person per day. The total water use by industry remained more or less constant in the period 2000-2006, but decreased in the period 2006-2009 by slightly more than 20 %. Perhaps the financial-economic crisis also played a role in this. In 2010, it increased again. The energy sector is by far the largest user of cooling water. This use gradually decreased and in 2010 was almost 20 % lower than in 2000. This decrease was mainly caused by the shift from coal to gas-fired power plants, which have a higher energetic efficiency. Moreover, gas-fired power plants often use air cooling or hybrid systems (air + water). Total water use by agriculture showed no signs of any explicit trend and is estimated at almost 68 million m³ for 2010. Agriculture mainly uses ground water (55 million m³). The water use by agriculture is, however, only an approximation.

share 2010 (%)	**tap water**	**surface water***	**groundwater**	**other water**	***total****	**cooling water**
households	63.3	0.0	14.9	0.0	*37.4*	0.0
industry	22.3	76.7	40.6	90.2	*40.6*	21.3
energy	3.7	21.8	0.0	6.3	*7.1*	78.6
agriculture	1.8	0.5	41.0	1.7	*9.4*	0.0
trade & services	8.8	1.0	3.5	1.8	*5.5*	0.0

Groundwater level

DPSIR



The statistically significant trends are divided into classes: 0-0.05 m/year = small decrease/increase, 0.05-0.1 m/year = moderate decrease/increase, 0.1-0.5 m/year = large decrease/increase, >0.5 m/year = very large decrease/increase

Source: VMM

More falling than rising groundwater levels

Falling groundwater levels can cause problems for companies and drinking water companies, which then have to pump deeper or switch to other sources. A drop in ground water levels can also have a detrimental effect on the groundwater quality. A drop in the shallow groundwater levels can have negative effects on nature and agriculture.

Almost 37 % of the 747 analysed measurement series shows no statistically significant trend over the period 2000-2011, almost 44 % shows a decrease and almost 20 % an increase. There are some remarkable differences between the results from the phreatic and non-phreatic measurement wells. The phreatic measurement wells relatively more often show no statistically significant trend. This is because phreatic measurement wells respond more quickly to changing weather conditions. Of the phreatic measurement wells, only 6 % show a significant increase (as compared to 31 % of the non-phreatic measurement wells). Replenishment of the groundwater tables takes place mainly in winter and also depends on the amount of water that evaporates throughout the year. In the period 2000-2011, the amount of winter precipitation showed a decrease, whereas the annual average temperature showed no distinct trend.

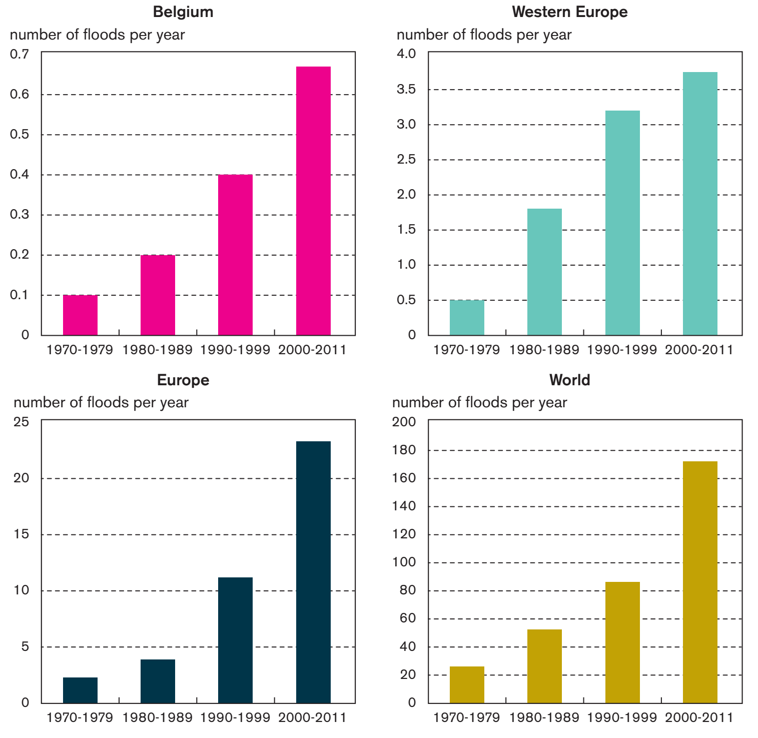
For the non-phreatic water layers, it is much more difficult to establish a direct link with changing weather conditions in general terms. On the one hand, the time interval between the moment of the precipitation and the actual replenishment of the deep groundwater layer can be very long and vary widely from layer to layer. On the other hand, it appears that the amount of winter precipitation has increased during the past century, as has the annual average temperature and, therefore, the evaporation. Both factors thus work against each other. Moreover, a changing land use could also have an impact in the long term.

The high percentage of decreasing measurement series in the non-phreatic groundwater levels illustrates that in many places too much groundwater is still being pumped up. The rising trends are probably the result of local measures.

Because the trends often differ greatly according to the layer and the area, a tailored approach by means of a differentiated policy of groundwater levies and permits is needed.

☹ Number of floods per decade

DPSIR



Source: The OFDA/CRED International Disaster Database - www.emdat.be - Université Catholique de Louvain - Brussels - Belgium

Number of registered floods increased

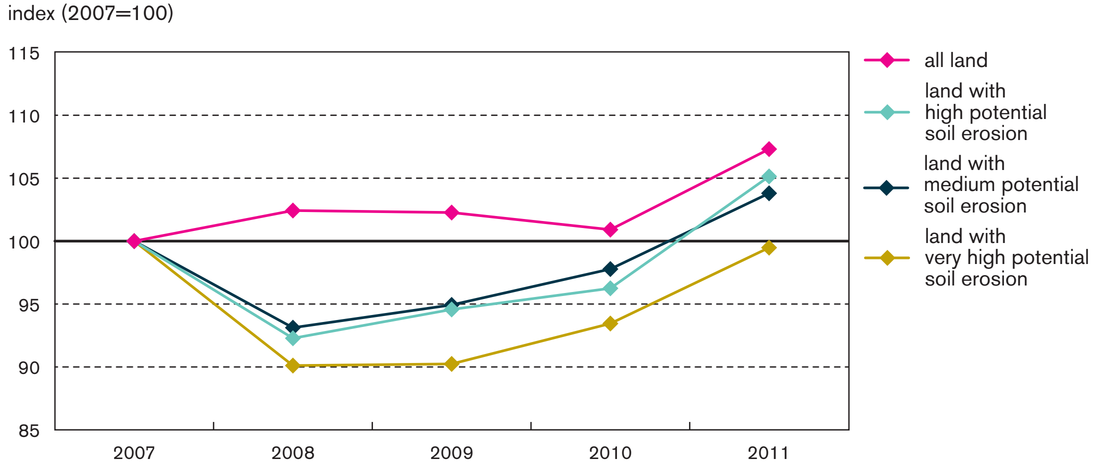
The Centre for Research on the Epidemiology of Disasters maintains a database with information on disasters worldwide. For a disaster to be entered into the database at least one of the following criteria must be fulfilled:

- ten or more people reported killed;
- hundred or more people reported affected;
- declaration of a state of emergency;
- call for international assistance.

Since 1970, the number of recorded floods per decade has increased markedly in Belgium, (Western) Europe and throughout the world. According to the report 'Mapping the impacts of natural hazards and technological accidents in Europe' (EEA, 2010), floods in Europe in the period 1998-2009 resulted in 1 126 deaths, affected more than 3 million people and resulted in economic damage in the amount of approx. 52 billion euros. Together with storms, floods are the natural disasters that cause the greatest amount of economic damage. The economic damage from floods has increased in the last decades. This increase is due to the increase in population and prosperity, but possibly also to better data collection. Although there is solid evidence for anthropogenic climate change in Europe, there is still no final proof that climate change is the reason for a trend in floodings on a continental scale. What has been demonstrated is that the anthropogenic increase in greenhouse gases has contributed to the intensification of heavy precipitation in the northern hemisphere in the second half of the 20th century.

☹ Area of erosion-sensitive crops

DPSIR



Source: LNE, ALBON

Increasing area of erosion-sensitive crops

Erosion-sensitive crops are crops with a crop erosion sensitivity factor (C factor) bigger than 0.25. This means that the soil cover by the crop during the most erosion-sensitive period of the year is insufficient to prevent erosion, as for example in the case of potatoes and maize. The area of erosion-sensitive crops is increasing in almost all classes of potential soil erosion or soil erosion sensitivity. The soil erosion sensitivity is determined, among other things, by the soil texture, the slope and the shape and location of the land.

The increase in the area of erosion-sensitive crops, averaged over the classes with very high, high or medium potential soil erosion, was on average 3 % in the period 2007-2011. Only in the class with very high potential soil erosion has the area remained stable. There, farmers who wish to receive direct income support under the European Common Agricultural Policy, are required to apply one specific measure to control erosion. On land with high, medium and low potential soil erosion, farmers are also recommended but not required, to take erosion mitigation measures. The average crop erosion sensitivity decreases with increasing potential soil erosion. However, even on land with high soil erosion, the share of erosion-sensitive crops in 2011 was 39 % against 15 % on land with very high soil erosion.

The MINA plan 4 (2011-2015) specifies that, in 2015, 50 % of the area of agricultural land with very high or high soil erosion sensitivity must have a permanent cover of agricultural crops or natural vegetation. This share was 48.7 % in 2012 and has been stable since 2008.

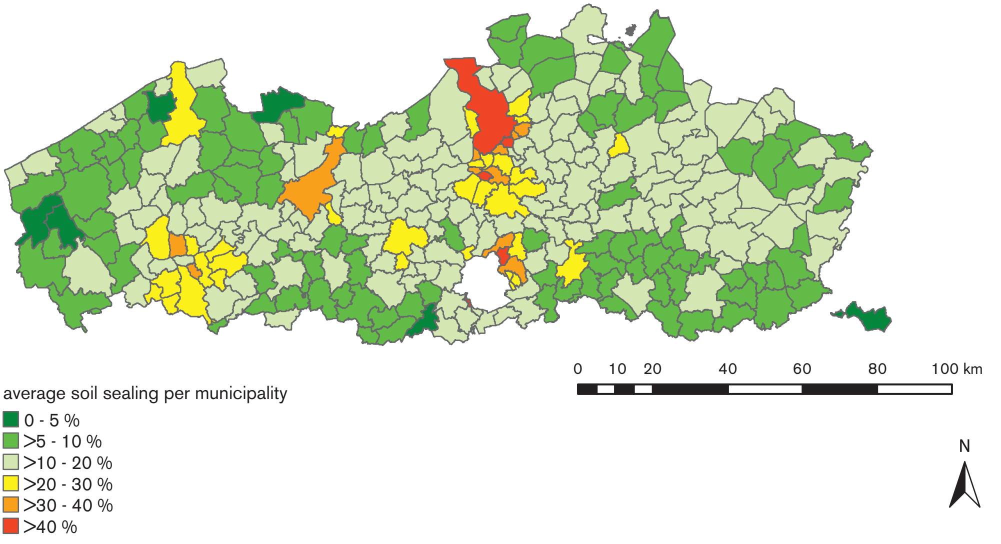
In 2011, 11 % of the most useful erosion control measures were implemented in the field to eliminate the major erosion obstacles. The MINA plan 4 proposes a value of 14 % as target for 2014.

There is also a major societal cost attached to the erosion issue in terms of dredging and clearing works. The question arises as to whether the optimisation and intensification of voluntary instruments is enough to effectively tackle the erosion problem.

☹ Soil sealing

DPSIR

2007-2009



Source: MIRA based on KU Leuven and NGI

Soil sealing leads to negative environmental effects

To a great extent, the soil in Flanders is sealed by the application of an artificial impermeable cover. By sealed soil we mean, for example, buildings and roads. Water can no longer seep through and runs off via the paved surface. Sealing entails a loss of ecosystem functions, such as the storage of carbon and water storage in the soil, and adversely affects the (soil) biodiversity. Increased average temperatures and the increase in heat waves due to climate change, combined with increased soil sealing can amplify the heat island effect in cities.

A large part of Flanders sealed

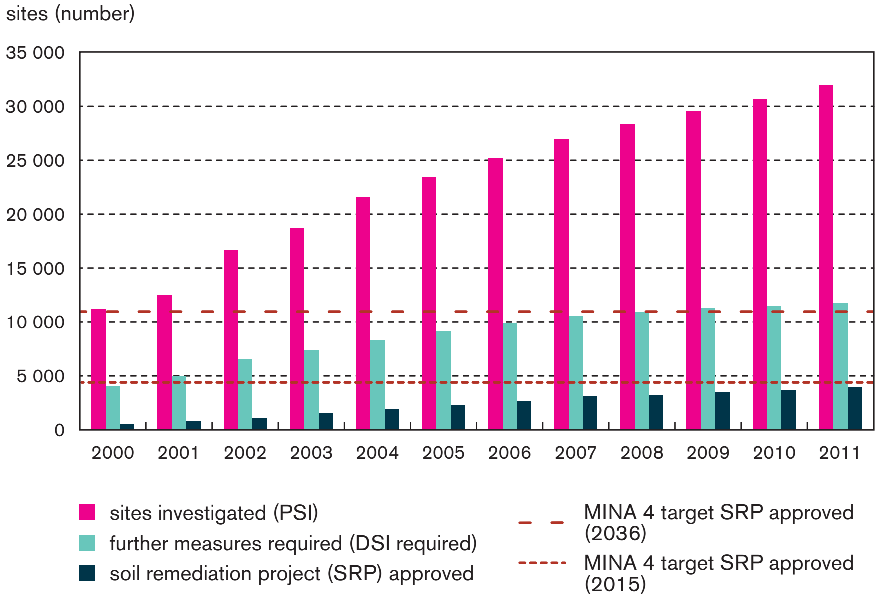
In the 2007-2009 period, 175 967 ha or 12.9 % of the soil in Flanders was sealed. Next to Malta, at 7.4 % Belgium had the greatest extent of soil sealing in Europe in 2006. In Europe, on average 1.8 % of the soil is sealed. 38 European countries are included in this analysis.

There are still a few areas in Flanders that contain municipalities where the percentage of sealing is less than 10 %, especially in the Westhoek, South Limburg, South East Flanders and Meetjesland. 10 % of the surface in most municipalities located in the Flemish Diamond (Ghent, Antwerp, Leuven and Brussels) is sealed. 20 % or more of the surface in the city regons of Bruges, Roeselare, Kortrijk, Ghent, Aalst, Antwerp, Mechelen and Leuven is sealed.

The increasing urbanisation is responsible for the continued soil sealing. Careful urban planning is, therefore, needed to avoid all soil sealing where it is not needed: parts of public spaces, car parks, brownfield lands. In implementation of the MINA plan 4 (2011-2015), the preparation of the White Paper for the new Flemish spatial planning policy will include a study of potential measures to be taken for the purpose of avoiding or offsetting new soil sealing.

☺ Number of contaminated sites by remediation phase

DPSIR



Source: OVAM

More than a third of Flemish soil at risk investigated

The soil in Flanders is contaminated through a variety of human influences with environmentally hazardous substances, such as heavy metals, organic materials and pesticides. In Flanders, 85 000 soil areas are estimated to be at risk, i.e. ground where activities are or will be carried out that can possibly cause soil pollution. At the end of 2011, OVAM had processed preliminary soil investigations (PSIs) of 32 000 (36 %) of these areas of ground. For 11 761 of the areas investigated, a descriptive soil survey (DSS) must be carried out. A DSS investigates the extent and the risks of soil pollution and determines the need for remediation.

Remediation of grounds investigated

If it appears from a descriptive soil survey (DSS) that remediation is needed, work is started on drawing up a soil remediation project (SRP). A SRP had to be drawn up for 5 016 sites. The total number of sites in Flanders for which a soil remediation project is necessary (SRP required) is estimated at 11 750. This corresponds to 15 % of the 85 000 sites that are at risk.

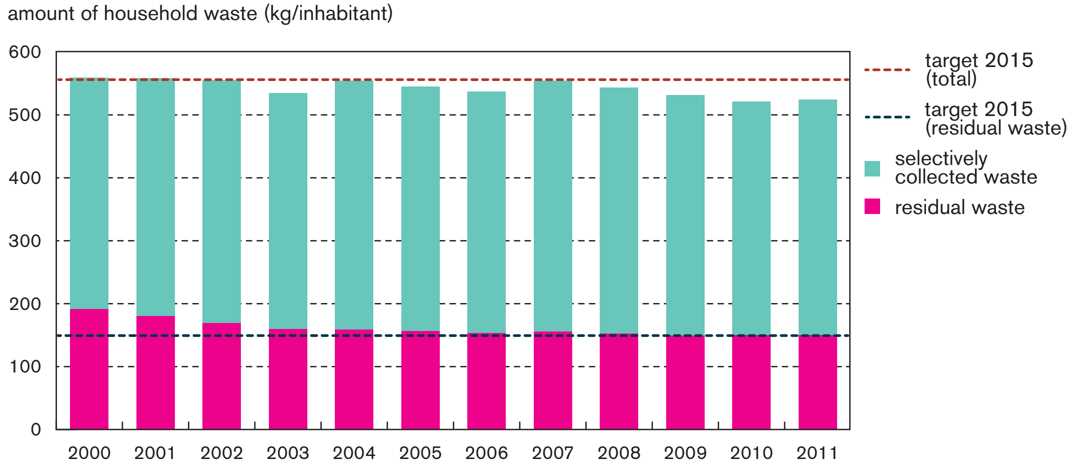
On the basis of an approved soil remediation project (SRP approved) the soil remediation work (SRW) is started. By 2015, 40 % of the soil remediation projects (SRP approved) should have been started (MINA plan 4, 2011-2015). All SRPs should have been started by 2036. In 2011, 36 % of the estimated SRPs were approved.

For the soil remediation activities for which OVAM issued an approval certificate in 2011, the cost price was estimated at approximately 134 million euros. The total amount estimated for the period 1997-2011 is approximately 1.452 billion euros.

The extent of the currently known sites that have been or are to be cleaned up can be estimated on the basis of the surface area for which a remediation project proved necessary (SRP required). That surface area was 112 km² or 0.8 % of the surface area of Flanders in 2011 and is the equivalent of 5 016 sites. The total surface area of the sites to be cleaned up is higher, but is not known yet.

☺ Amount of household waste

DPSIR



Source: OVAM

Decrease in amount of household waste has stopped

Between 2008 and 2010, the total amount of household waste per inhabitant decreased annually by 2 %. This was mainly attributable to a decrease in the amount of selectively collected waste. It was, however, unclear whether this was a structural trend as the decrease could not be explained by a systematic decrease in specific waste streams. This is now confirmed: in 2011, the amount of household waste per inhabitant increased by 0.6 % as a result of the increase in selectively collected waste. The greatest increase was recorded for construction and demolition waste (+1.4 kg/inhabitant) and vegetable, fruit and garden waste (+1.4 kg/inhabitant). Also, the amount of discarded electrical and electronic equipment increased considerably (+1.2 kg/inhabitant), but this was the result of the better registration of this waste stream. Flanders is still one of the leaders in Europe. In 2010, 448 kg of household waste were collected per inhabitant in Flanders, excluding construction and demolition waste. This is a great deal less than the EU-27 average of 502 kg per inhabitant.

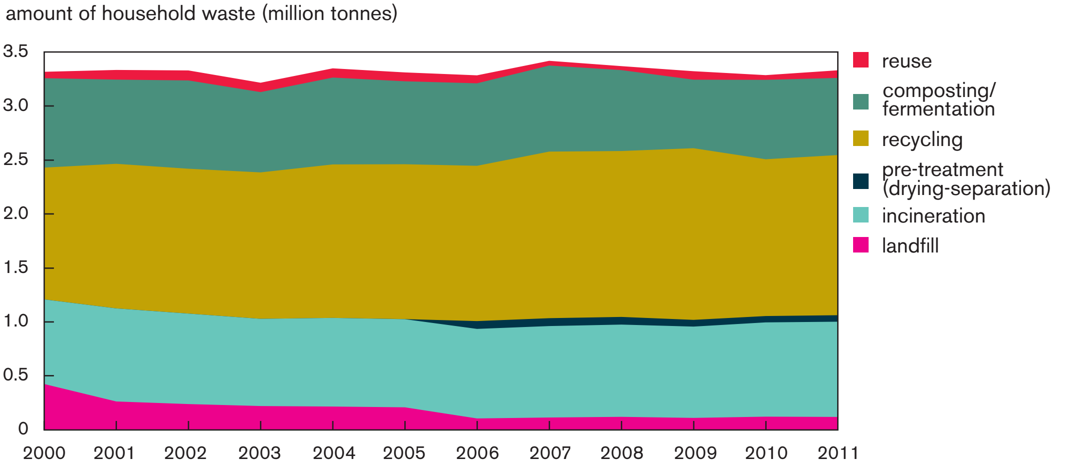
Amount of residual waste from households stagnates

Whilst between 2003 and 2009 the amount of residual waste from households still decreased slightly, by 1 to 3 kg per year, since then it has stagnated at slightly less than 150 kg per inhabitant. The MINA plan 4 (2011-2015) apparently assumes that a further reduction is difficult to achieve: the target of maximum 150 kg household residual waste per inhabitant from the MINA-plan 3+ (2008-2010) is maintained. According to the Implementation Plan for Environmentally Sound Management of Household Waste, the target for residual waste is actually ambitious because increasingly more complex products with a shorter life are being consumed. Yet a status quo of the residual waste does not seem to be in line with the Sustainable Materials Policy, which prioritises prevention, reuse and closing of the material loops.

amount of household waste (kg/inhabitant)	**2000**	**2008**	**2009**	**2010**	**2011**	**target 2015**
residual waste	191	153	149	150	150	150
selectively collected waste	368	390	382	372	375	.
total	*560*	*543*	*531*	*521*	*524*	*560*

☺ Processing of household waste

DPSIR



total amount of household waste, consisting of selectively collected waste and residual waste (household refuse bag and container, bulk waste and waste from municipalities); in 2000 excluding small hazardous waste

Source: OVAM

More than two-thirds of household waste goes to materials recovery

In 2011, 70 % of the household waste went to one form or another of materials recovery: 45 % to recycling, 21 % to composting or fermentation, 2 % to pre-treatment (drying-separation) and 2 % to reuse.

27 % of the household waste collected in 2011 was incinerated. The major part of this was residual waste. 1 % was selectively collected waste, mainly contaminated wood waste. Less than 4 % of the household waste was sent to landfill. 82 % of this was selectively collected waste, mainly construction and demolition waste containing asbestos or for which, due to the composition or level of contamination, no recycling option was available. The other part was residual waste, mainly non-combustible bulk waste.

... but this share is stagnating

With 70 % of the household waste going to materials recovery, Flanders scores very well within Europe: the EU-27 average for 2010 was 40 %. This share has remained rather stable since 2004. There is, nevertheless, still room for improvement. An analysis of the composition of the door-to-door collected bulk waste in 2011 revealed, for example, that 37 % of that waste should have been collected selectively according to the Implementation Plan for Environmentally Sound Management of Household Waste. This fraction could, therefore, have been suitable for materials recovery. From 1 July 2013, the collection of bulk waste will have to be paid for in all municipalities. Private individuals are thus encouraged to take reusable items to a reuse centre. An analysis of the composition of the Flemish household refuse bag and container is also planned for 2013.

amount of household waste (ktonnes)	**2000**	**2008**	**2009**	**2010**	**2011**
reuse	59	37	78	43	71
composting/fermentation/recycling	2 050	2 288	2 227	2 190	2 200
pre-treatment (drying-separation)	0	71	62	59	60
incineration	784	855	846	874	883
landfill	423	119	109	120	118
total	*3 317*	*3 370*	*3 323*	*3 286*	*3 331*

☺ Amount of industrial waste

DPSIR

primary industrial waste includes the waste produced by companies, including companies from the trade & services sector, with the exception of waste processing companies; all figures calculated by extrapolation from reported data

Source: OVAM

Amount of primary industrial waste, excluding construction and demolition waste, sludge and contaminated soil, one-fifth less than in 2004

In 2010, companies produced 17.3 million tonnes of primary waste. This is more than five times the amount of household waste collected. The largest streams were construction and demolition waste (22 %), sludge (13 %) and contaminated soil (11 %). Between 2004 and 2010, the amount of primary industrial waste excluding construction and demolition waste, sludge and contaminated soil, decreased by one-fifth. This trend is more or less similar to that for non-selectively collected industrial waste and paper and cardboard waste (excl. packaging material). With shares of respectively 11 % and 10 %, these streams represent the second and fourth largest fraction of the primary industrial waste, excluding construction and demolition waste, sludge and contaminated soil. Between 2005 and 2008, both streams decreased by approximately one-third, but this trend was not continued in 2009 and 2010. Waste of vegetable or animal origin, at 15 % the largest fraction of the primary industrial waste, excluding construction and demolition waste, sludge and contaminated soil, remained virtually stable over the period 2005-2010.

MINA plan 4 targets in line with Sustainable Materials Policy?

According to the MINA plan 4 (2011-2015), both the amount of primary industrial waste, excluding construction and demolition waste, sludge and contaminated soil, and the amount of non-selectively collected industrial waste should decrease by 2015 with respect to the period 2005-2007. Both targets were already reached before the start of the plan period. The question therefore arises as to whether the targets for industrial waste in the MINA plan 4 are ambitious enough to support the Sustainable Materials Policy, which focuses on the prevention, reuse and closing of the material loops.

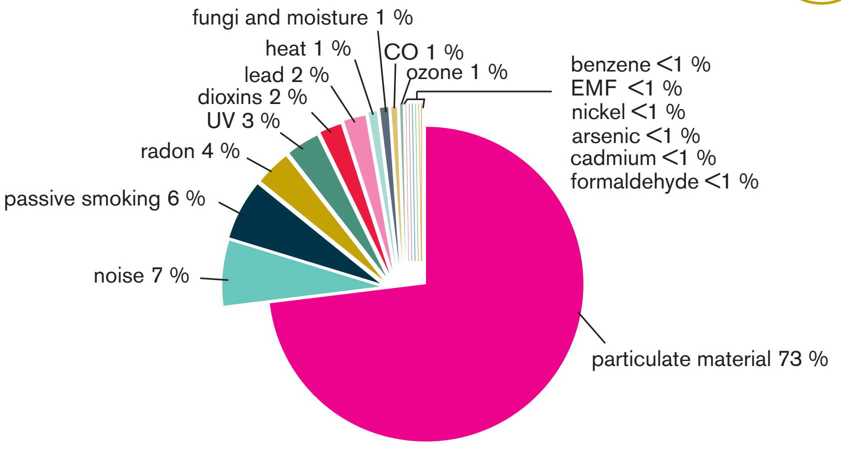
amount of primary industrial waste (million tonnes)	2007	2008	2009	2010	target 2015
primary industrial waste, excluding construction and demolition waste, sludge and contaminated soil	10.6	9.8	9.2	9.4	11.0
of which not selectively collected	1.1	1.0	1.1	1.0	1.3
construction and demolition waste, sludge and contaminated soil	8.3	7.6	7.4	7.9	.
total	*18.9*	*17.4*	*16.6*	*17.3*	.

Indicator Report
2012

3
Consequences
for people, nature and economy

The effects of environmental pollutants on health (DALYs)

PACT 2020 DPSIR



based on the calculated years of disability adjusted life years (DALYs) as a result of the set of pollutants shown
The uncertainty differs per pollutant and per health effect; calculation based on the most recent exposure data.

Source: VITO (2012)

Disability adjusted life years (DALYs) as a measure of health effects

The effects of various environmental pollutants on health are difficult to compare with one another. By reducing them to a common denominator such as disability adjusted life years (DALYs), comparison is nevertheless possible. The number of DALYs reflects the number of years of healthy life that a population loses due to death or disease, taking into account the seriousness and duration of the disease. The combining of the various data, each with its own uncertainty, means that the result contains a fairly large amount of uncertainty. The uncertainty in the dose-response relationship appears to be the largest contributor to this.

Particulate matter, noise and passive smoking have the most serious health effects

The burden of disease due to various environmental pollutants together amounts to 108 863 DALYs annually for the Flemish population. This total is around 8 % of the total burden of disease in Flanders. Calculated for each inhabitant of Flanders, that is five disability adjusted life days per year or a bit more than a disability adjusted life year lost throughout life due to a lifelong exposure to current levels of exposure to the calculated set of environmental factors. What is important here is that these are average values. For sensitive persons (e.g. asthma patients), the real impact will be greater.

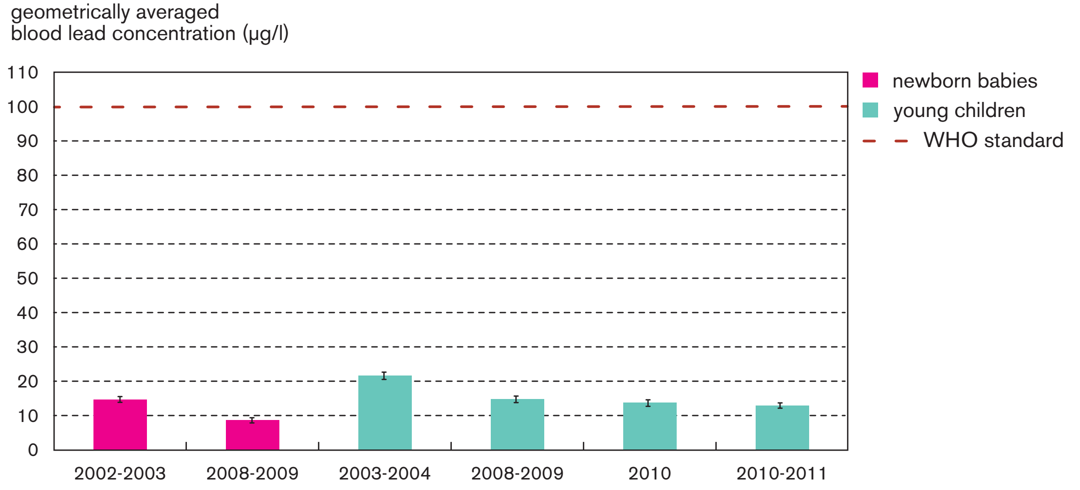
Particulate matter (see figure) is the most important pollutant for the burden of disease and is responsible for about three-quarters of all DALYs. Noise and atmospheric tobacco smoke are the second and third most important environmental factors in the calculation of the burden of disease.

Indoor air quality

People spend some 80 % of their time indoors. The indoor air quality therefore has a major effect on health. Key pollutants indoors are passive smoking, radon, fungi and moisture, volatile organic substances, combustion products, etc. The disability adjusted life years of indoor air pollutants (passive smoking, radon, fungi and moisture) amount to 11 200 DALYs for Flanders. This averages about six disability adjusted life weeks over a complete lifetime given lifelong exposure to current levels of exposure. The Flemish Government has proposed guidelines and intervention figures for different physical and biological factors and chemical substances in the indoor environment (Decision of the Flemish Government of 11 June 2004 on measures to combat the health risks from pollution of the indoor environment - BS 19 October 2004).

Total exposure to lead

DPSIR



The measurements of newborns from 2002-2003 and young people from 2003-2004 use a comparable study design, as do the measurements from 2008-2009 in young people and newborns. A different study design was created for measurements between these groups and for other measurements. This should be taken into account when interpreting the graph. The error bars indicate the 95 % confidence interval.

Source: Flemish Centre of Expertise on Environment & Health (2002-2011)

Lead exposure

Targets were formulated at the ministerial conference on environment and health in Parma (2010). The WHO-specified related indicators for the Member States to follow up, blood lead concentrations in children. Lead exposure causes health effects (e.g. impaired kidney function, cancer, etc.) depending on the concentration and duration of the exposure and individual susceptibility. In developed countries, drinking water is an important source due to older lead drinking water pipes. From 2013 the standard for lead in drinking water will be 10 µg/l. In 2009, this standard was still exceeded in 3.3 % of measurements in Flanders. In 2011, TOVO (Toezicht Volksgezondheid – Flemish Public Health Monitoring Department) and VMM initiated an action plan lead directed at water companies and citizens. There are areas in Flanders with lead contamination in the environment. In addition to addressing the lead contamination issue, measures have been formulated to reduce individual exposure.

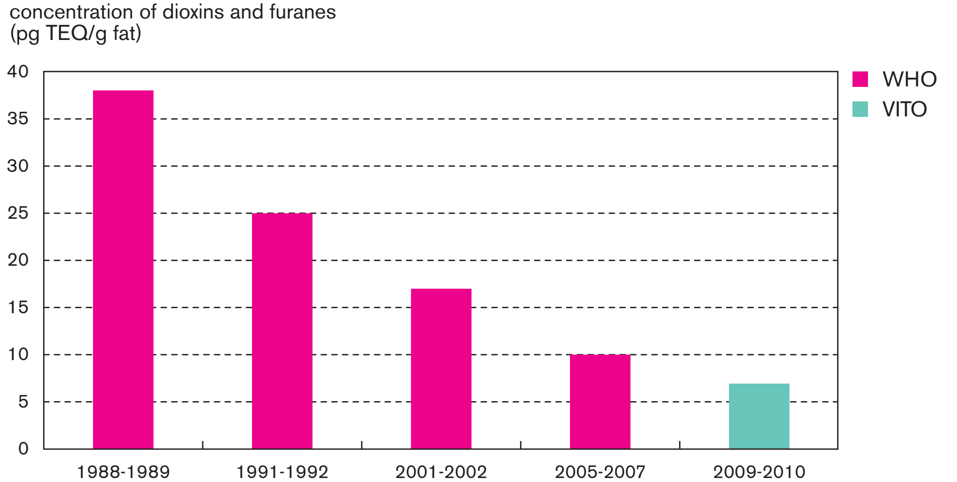
Blood lead concentrations in Flanders

The total exposure of an individual can be determined by measuring the pollutant or a metabolite of that pollutant in blood, urine, etc. In Flanders, blood lead concentrations in children were determined in human biomonitoring programmes by the Flemish Centre of Expertise on Environment & Health, and in some known hotspots (e.g. Hoboken, Genk South, etc.) The WHO regards values lower than 100 µg/l in blood as not harmful to health. However scientists suspect lower concentrations affect the intelligence of children. There have been calls for this standard to be lowered.

The figure shows the blood lead concentrations of young people and newborns from the biomonitoring programmes in Flanders. The average values are all below the WHO standard. The measured values for 2008-2009 are low compared to values from the international scientific literature. Measured values from Genk-South hotspots (2010) are lower than those from the reference biomonitoring from 2008-2009. Measured values from the Menen hotspot area for 2010-2011 are lower than values from the reference biomonitoring from 2008-2009. In follow-up studies with newborns being contacted again at 7-8 years of age and asked about health effects, it appeared that lead exposure at birth was related to domestic animal allergies and behavioural parameters (hyperactivity, behaviour problems, etc.). Blood lead exposure was again included in the human biomonitoring programme from the new Flemish Centre of Expertise on Environment & Health.

☺ Total exposure to persistent substances

DPSIR



The measurements from 2009-2010 have a different study design from other recorded measurements. This should be taken into account when interpreting the figure.
detailed description of study design in Colles et al. (2008) and Colles et al. (2011)

Source: WHO, VITO

Persistent organic pollutants (POPs)

Persistent substances such as PCBs, dioxins and DDT accumulate in the environment and because these substances are also fat-soluble, occur in humans and animals. Many POPs cause health effects. PCBs especially are related to a lower birth weight and disrupt thyroid function and cognitive development. In addition, they are endocrine disruptive and affect the immune system. Dioxins are carcinogenic, endocrine-disruptive and affect the immune system. The health effects depend on the amount and duration of the exposure and on individual susceptibility.

A number of targets were formulated at the ministerial conference on environment and health in Parma (2010), as well as the objective 'to prevent illness linked to the chemical, physical and biological environment'. The WHO specified related indicators so the Member States could monitor the various objectives. One of the indicators is the concentration of dioxins and PCBs in breast milk.

Decrease of PCBs, dioxins and furanes in breast milk

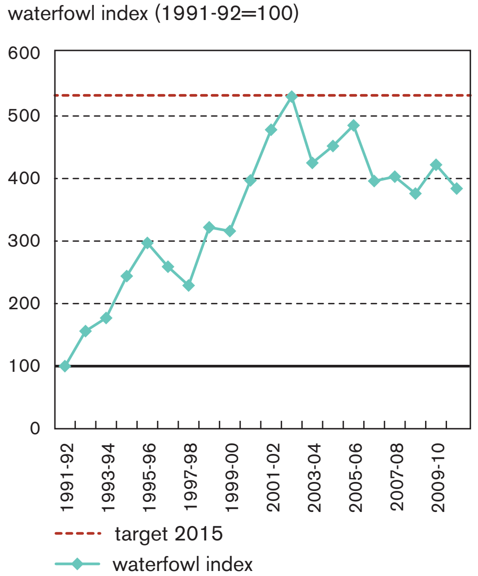
Since the 1980s, the WHO has at regular intervals specified various POPs in breast milk for different countries, including Belgium. The last occasion was in 2007. Because of its high fat content, breast milk is the ideal matrix for determining these substances. In Flanders, the phase plan calls for additional research into increased concentrations of POPs in people in rural areas. POPs were also found in breast milk during 2009-2010.

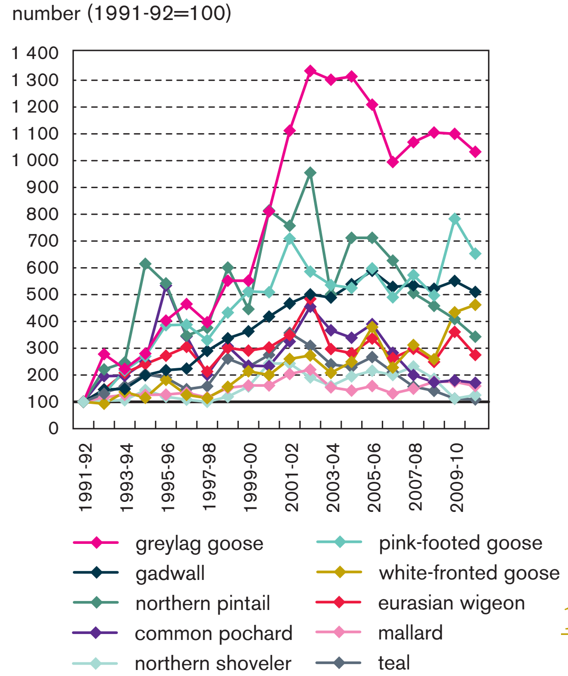
The concentrations of dioxins and furanes (see figure) have shown a clear downward trend since the late 1980s. This is also the case for dioxin-like PCBs and marker-PCBs (see table). The figures for dioxins and furanes in 2009-2010 match the European average. The marker-PCBs for the same period in Belgium are lower than the values for Italy and Germany. The dioxin-like PCBs for 2009-2010 are comparable with the results for Germany.

	1988-1989	1991-1992	2001-2002	2005-2007	2009-2010
total 6 marker-PCBs (ng/g fat)	584	282	191	80	70
total dioxin-like PCBs (pg TEQ/g fat)	..	16.3	12.3	6.8	5.8
dioxins and furanes (pg TEQ/g fat)	38	25	17	10	6.9

Index of overwintering waterfowl

PACT 2020 DPSIR





Source: Natuurindicatoren 2012, INBO, www.biodiversityindicators.be

Increasing trend since 1991 but slight decrease since 2005

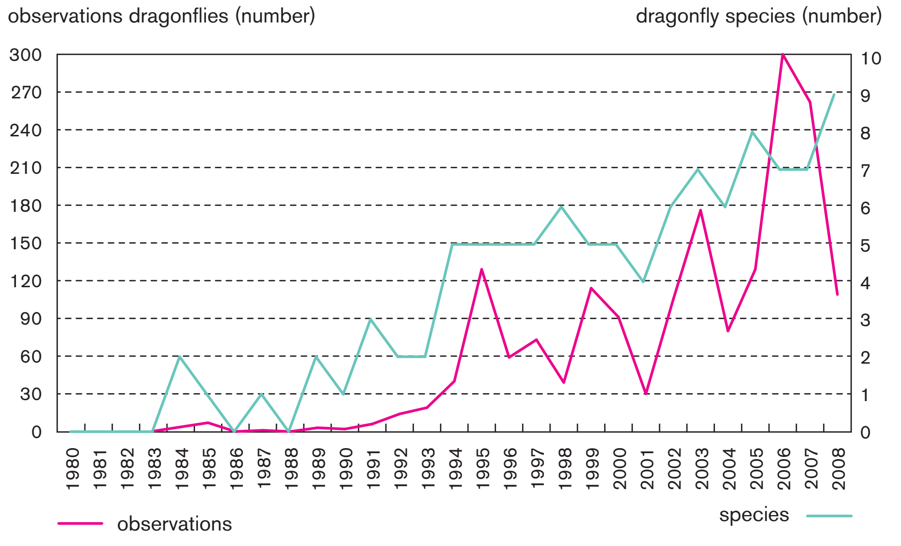
The index of overwintering waterfowl is based on the change in the number of the 10 most important species of geese and ducks in Flanders (determined on the basis of six mid-monthly counts per winter).

The number of waterfowl has increased by a factor of five between the winter of 1991-1992 and the winter of 2002-2003. Thereafter a slight decreasing trend established itself that is, however, not the same for all species (ranging from stable to a decrease). With an index figure of 384 in 2012, 78 % of the plan target for MINA plan 4 (2011-2015) has been achieved. This target is to improve the state of endangered and protected species groups by 10 % in 2015 compared to 2005-2006.

The trend for waterfowl in Flanders is a combined effect of the developments at Northwest European level and of regional and local factors. In Northwest Europe nearly all species of geese and duck have increased during the past 20 to 30 years. This is a consequence, on the one hand, of a better protection of species and wetlands, and on the other of an increased availability of food. After an increase lasting for years, a levelling out or reversal of this positive trend has been noticeable more recently for a large number of species. Furthermore, the trends in Flanders are at least partly determined by local changes in, amongst other things, water quality, human activities and nature management and development. These factors can have a large influence on the capacity of areas for waterfowl, mainly via changes in the food supply (as found recently along the Zeeschelde). Climate change may also play an increasing role in regional changes in numbers and distribution.

☹ Trends in Southern European dragonfly species

DPSIR



Source: Natuurindicatoren 2012, INBO, www.biodiversityindicators.be

Impact of climate change on nature

In Flanders, there is growing evidence of the current impact of climate change on nature. Some migratory birds are arriving earlier from the south. Some butterflies and dragonflies fly earlier in the season and their flight period also lasts longer.

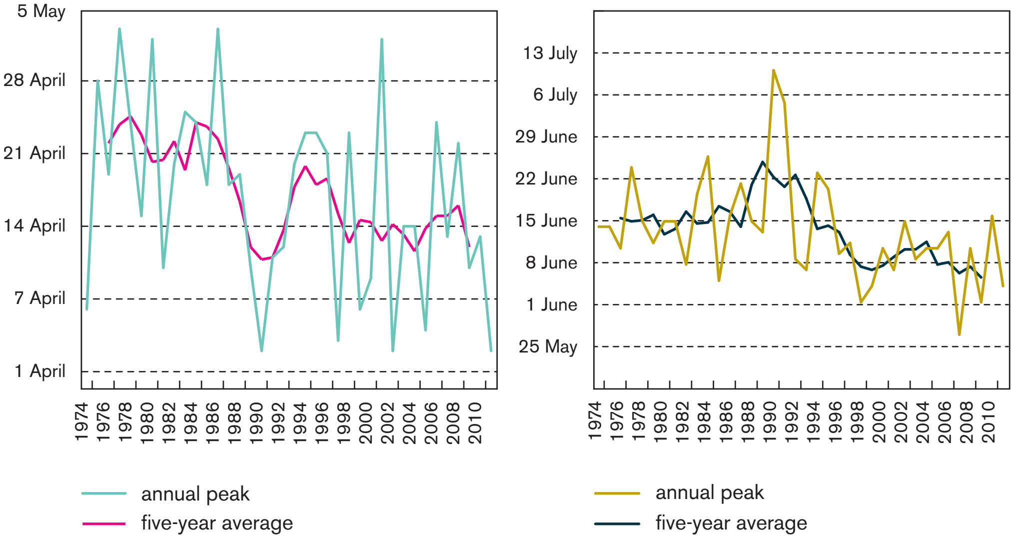
There are spatial as well as temporal shifts. Southern and South-eastern species extend to the North. This is also the case for different species of dragonflies. The main distribution area for these species is in Mediterranean Europe and even further away in Africa and Asia. No populations of these species came to Northwest Europe until 1990. The figure shows the evolution in the number of observations of nine species of dragonfly and the number of Southern dragonfly species since 1980.

Despite annual fluctuations, the graph shows how since the early 1990s the number of observations for all species is gradually increasing. The annual fluctuations are often due to weather conditions (persistent bad or good weather during the mid-May to end-August period), which translates directly into the number of observations. In 2006, the number of observations was the highest since records began. Some species, such as the fire dragonfly and the damselfly, which used to be just nomads here, have now established a number of populations in Flanders.

As well as this increase in species richness, whether temporary or permanent, there has been a decrease in other species in Flanders caused, for example, by the temporary drying up of meres, their breeding habitat. This can bring about changes in the species community, with less selective species increasing, and species with high demands in terms of the quality of their habitat decreasing and being likely to disappear from Flanders.

☹ Peak moment for pollen production in birch and grasses

DPSIR



Source: Natuurindicatoren 2012, INBO, www.biodiversityindicators.be

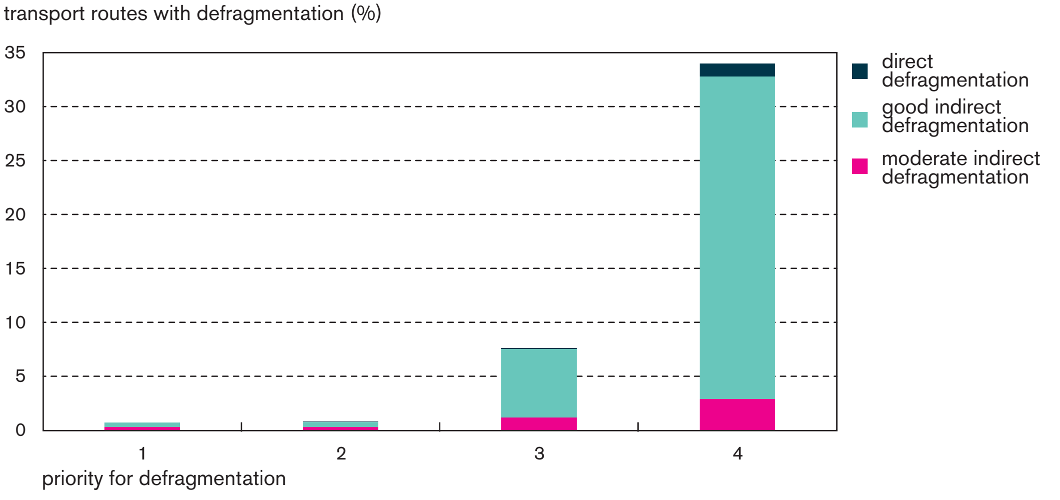
Impact of climate change on nature

This indicator considers the evolution of the peak moment for pollen production in birch and various kinds of grasses. Since 1974, the Scientific Institute for Public Health has measured the concentration of pollen from birch and different grasses in the air at Uccle. This is the day with the highest value (= peak moment) for pollen from birch and grasses plotted over time. The figure shows clearly that large annual fluctuations are occurring.

The trend for the five-year average for birch seems to indicate a clear advance occurring over the years. The peak for birch appears to fall during 1975-1985 at around 21 April, while it was more than a week earlier between 1995 and 2011. The peak has remained much the same over the past 10 years. The trend for the five-year average for grass species also seems to indicate a clear advance occurring over the years. The peak falls around 8 June during 1975-1985, while it was a week earlier between 1995 and 2011. The statistical trend shows that in the period 1974-2011 the annual peak for both birch and the grass species advances by one day every three years.

Defragmentation along Flemish transport routes

DPSIR



Source: Natuurindicatoren 2012, INBO, www.biodiversityindicators.be

Defragmentation still very limited

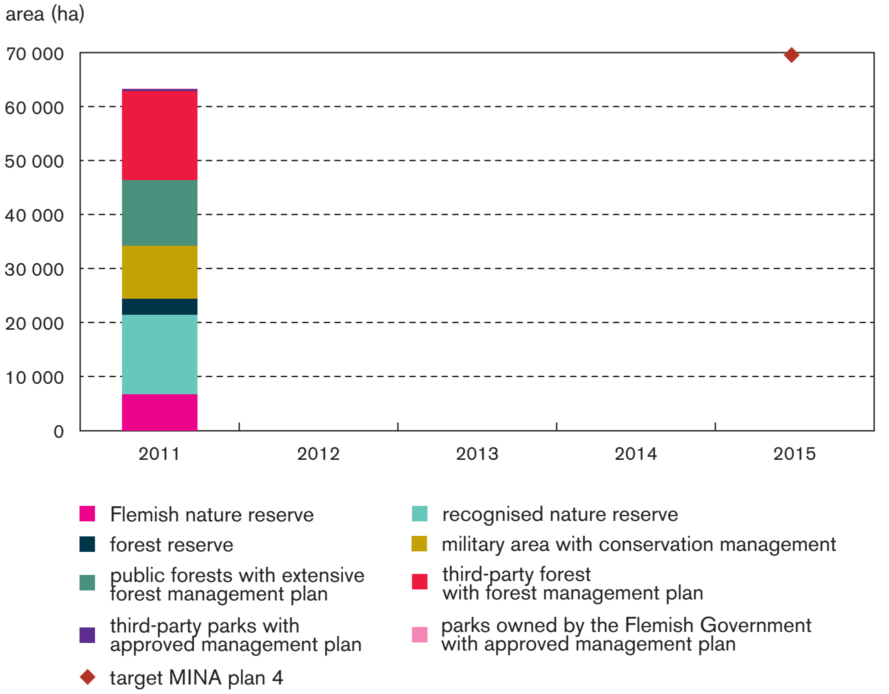
The many transport routes in Flanders are dividing the landscape into ever smaller fragments and causing all manner of problems for nature. The Flemish Agency Roads and Traffic has, as one of its five strategic objectives, the reduction in the damage to the environment and nature, even though mobility is increasing. Through its continuing attention to nature and the environment, the Agency is contributing to the achievement of the MINA plan of the Flemish Government. The avoidance of and reduction in fragmentation by the transport infrastructure plays a very important part. An exact target for the number of kilometres of defragmentation has not yet been defined.

The indicator for defragmentation along transport routes shows the quantity and quality of current defragmentation along Flemish motorways, main roads, secondary roads, connecting roads, railways and canals. The development of the indicator has also seen the adoption of a number of criteria, which reflect the overall quality of existing defragmentation projects: direct defragmentation (= zone for a fauna passage) and medium to good indirect defragmentation (= route with guide grid). This makes it possible to further improve the completed projects on the basis of evaluation.

The indicator shows that the number of kilometres of defragmentation along Flemish roads - places where work is being done on the fragmentation by creating fauna passages – is still very limited. Currently, some 3.6 % of 1 200 km of transport routes with low to very high priority for defragmentation have medium to good defragmentation for a particular group of animals. This is 34 % for the very high priority, 8 % for the high priority and 1 % each for the normal and lower priority transport routes.

Area with conservation management (plan period MINA-plan 4)

PACT 2020 DPSIR



Source: Natuurindicatoren 2012, INBO, www.biodiversityindicators.be

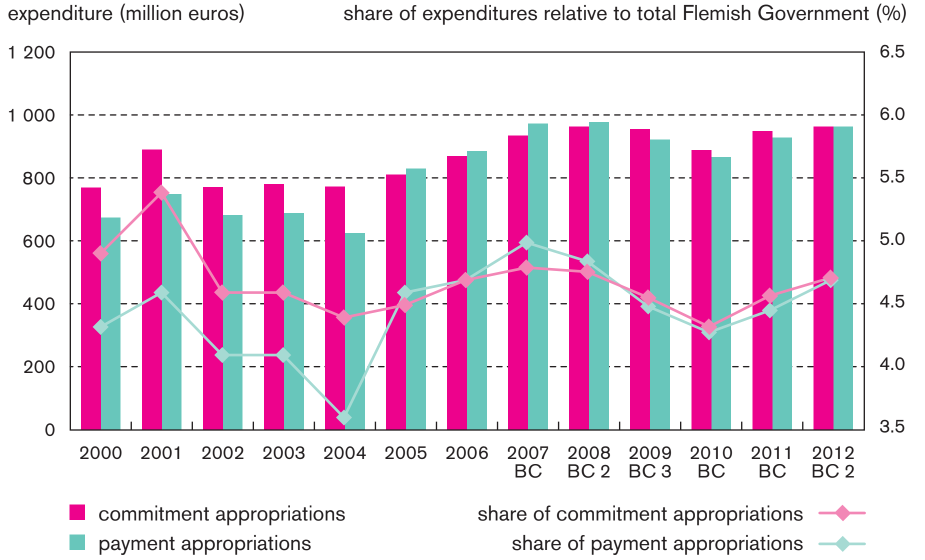
90 % of the plan target achieved

According to the definition in MINA plan 4 (2011-2015), this indicator includes Flemish nature and forest reserves, recognised nature and forest reserves, military areas with a nature protocol, public forests with a management plan approved in accordance with criteria for sustainable forest management, forest belonging to third-parties and having a management plan approved in accordance with criteria for sustainable forest management, and parks belonging to the Flemish Government or third-parties and having a management plan approved in accordance with the principles of harmonic park and green area management. Unlike the indicator in MINA plan 3/3+, this includes only the areas with an approved management plan. Nature areas not yet recognised as nature reserves, managed by non-governmental organisations, are not part of the indicator. At the start of the plan period (2011), the area with effective nature management was 63 329 ha or 90 % of the plan target.

With 26 % the forests owned by third-parties and having an approved management plan, form the largest percentage of this area. Recognised nature reserves also make up a large portion of the area (23 %). These are followed by public forests with a management plan approved in accordance with sustainable forest management criteria (19 %), military areas with a nature protocol (16 %) and Flemish nature reserves (11 %). The number of Flemish nature and forest reserves (5 %) and parks, both public and private domains, with a management plan approved in accordance with the principles of harmonious park and green area management (± 1 %) are limited.

Expenditure of the Flemish Environment Government

DPSIR



The amounts are expressed in constant prices with respect to 2000. Commitment appropriations indicate the room available for policymaking. Payment appropriations give the approval to actually make the payments.
BC = budget control

Source: Budget Unit, LNE Department

Resources for the environment again increasing

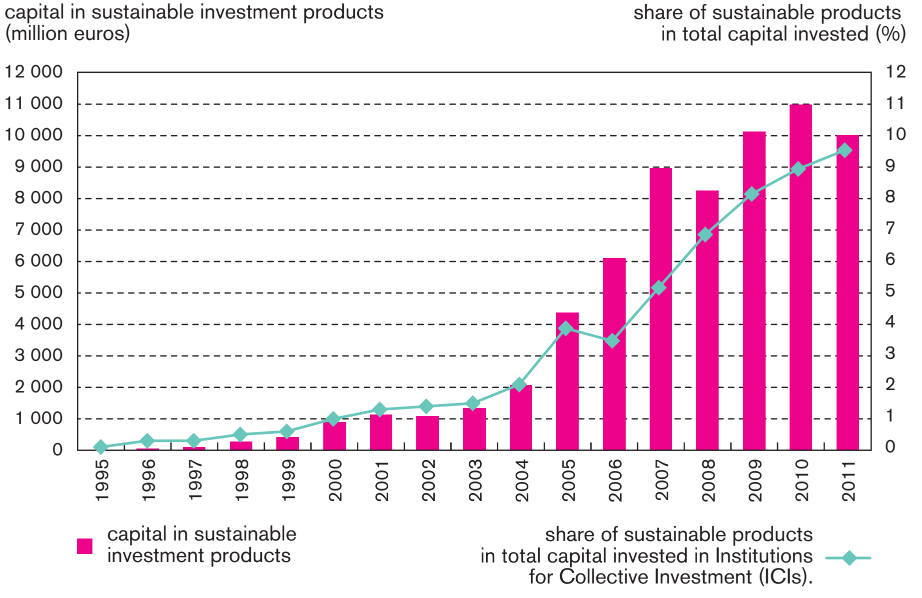
Between 2004 and 2008 the resources of the Flemish Environment Government continued to increase. In 2007 and 2008 the environmental expenditure reached a temporary peak. In 2007 and 2008, the resources amounted to 934 and 963 million euros in commitment appropriations and reached a share of 4.8 % of the total Flemish budget. This peak was, among other reasons, the result of the good total Flemish cash position. As a result, in 2007 the operational allowance for the drinking water companies and the whole historical amount of VAT outstanding of 100 million euros could be paid out. After this, due to the financial-economic crisis, the environment resources experienced a small reduction, which coincided with savings within the Flemish Government. In 2009, a very low level of inflation still masked the decrease in these resources in constant prices, but in 2010 the decrease was clearly visible. In 2011, expenditure increased again. This continued in 2012.

Water and watercourse sediments the largest expenditure item

In 2012, 56.1 % of the resources went to the theme ‘water and watercourse sediments’. This expenditure was used for various forms of public waste water treatment in municipalities as well as for the contribution for Aquafin. 10 % of the environmental expenditure went to the theme ‘biodiversity’. Nearly all the credits from the Agency of Nature and Forests were included in this. The resources were used, among other things, for the purchase and maintenance of nature reserves. The ‘soil remediation’ theme received 6.3 % of the expenditure. OVAM used these resources for the clean-up and restoration of areas contaminated as the result of industrial activities.

☺ Sustainable investment in Belgium

DPSIR



Source: Forum ETHIBEL, based on data from BEAMA and financial institutions

Share of sustainable investments is increasing

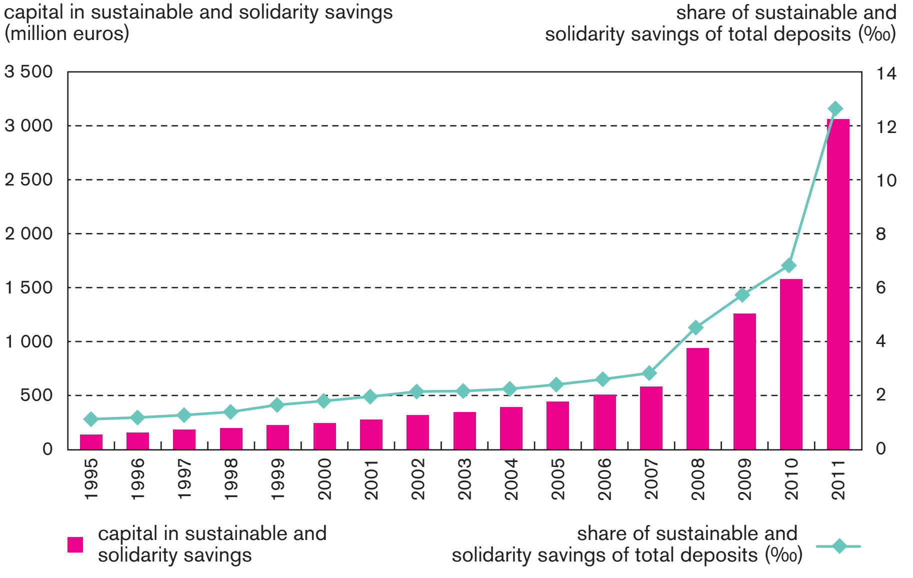
Markets and financial institutions have a major impact on economic and societal developments by steering capital flows. One of the ways in which they can contribute to sustainable development is by participating in or offering sustainable investment products. These investment products may have various financial characteristics, but their sustainable character is the binding factor.

Between 1995 and 2011, the managed capital in sustainable investment products in Belgium increased from 8.9 million euros to nearly 10 billion euros. In 2011 the sustainable investment market fell by 8.8 % compared to 2010. The total Belgian market for publicly traded Institutions for Collective Investment (ICIs) shrank further in the same year by 14.4 %. As a result, the share of sustainable investment products with respect to the total capital invested increased in ICIs from 9.0 % in 2010 to 9.6 % in 2011.

The major financial institutions now offer sustainable investment funds, so these are more or less easily accessible to the general public. A total of 359 sustainable investment vehicles were offered on the Belgian market in 2011. Of these, 318 were specifically for the Belgian market. This is an increase of 8 units compared to 2010.

Sustainable savings in Belgium

DPSIR



Source: Forum ETHIBEL, based on annual reports and data from the financial institutions concerned, from alternative financiers and from the National Bank of Belgium

Sustainable savings are recovering but still marginal

Sustainable savings in Belgium started in 1984. By sustainable saving is meant all savings products from financial institutions that are subject to extra financial criteria and strive for added value for society.

Between 1984 and 2011, sustainable saving in Belgium grew continuously. In 2011, the capital accrued in sustainable savings increased further by 118 % compared to 2010, to 3.06 billion euros. The total deposits in all savings accounts in Belgium increased in the same year by 4.5 %, but still amounted to 240 billion euros. The sharp increase in sustainable savings indicates a considerable growth potential for money invested in sustainable savings products. Nevertheless, after a quarter of a century, sustainable saving remains a marginal phenomenon with a market share of 1.27 % in 2011.

Sustainable saving versus sustainable investment

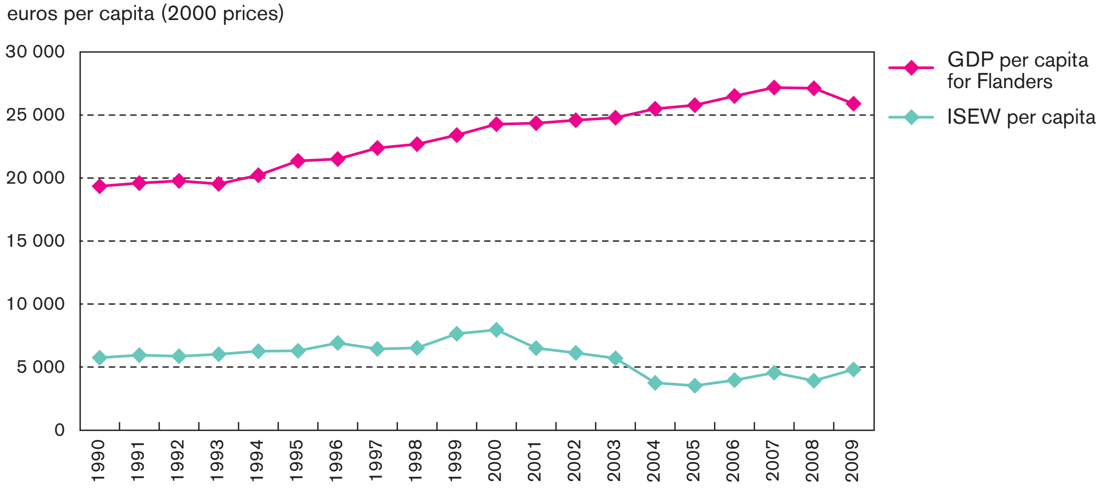
Sustainable savings products are by definition more accessible to the general public than sustainable investment products. This form of building up financial reserves has less risk and greater liquidity. Nevertheless, the market for sustainable saving is more limited in volume and growth rate than the market for sustainable investment.

In absolute terms, sustainable savings in 2011 reached only 30.1 % of the volume of sustainable investments: 3.06 billion euros as against 10.01 billion euros. This difference in success is because the sustainable savings products are not sufficiently known to the general public and are not fervently promoted by most financial institutions.

Index for Sustainable Economic Welfare for Flanders

PACT 2020

DPSIR



Source: University College Ghent

New welfare indicator for Flanders

The Index for Sustainable Economic Welfare (ISEW) is an alternative measure of welfare. The ISEW was developed in an effort to address the shortcomings of the gross domestic product (GDP). The ISEW provides a better picture of actual economic welfare and also reflects better with the perception of welfare by the population. Through the explicit assessment of benefits and costs, the ISEW represents the contribution made by the economy in a country or region to the well-being of the population.

The economic, social and environmental indicators which form part of the ISEW provide a broad basis of information for policy-makers. The ISEW can give them information on the broader effects of the applied policy and help to create a more effective policy that increases general welfare in a sustainable manner.

Prosperity has not increased in Flanders over the past 10 years

Between 1990 and 2009, the GDP per capita in Flanders grew by 33.8 %. Between 2008 and 2009, the GDP per capita shrank due to the financial-economic crisis.

The ISEW for Flanders showed a different trend. Between 1990 and 2009, the ISEW per capita fell by 16.3 %. Sustainable economic welfare in Flanders increased until 2000, then fell back sharply. Between 2000 and 2005 the ISEW per capita for Flanders fell by more than 50 %. It recovered somewhat between 2005 and 2009.

The sharp decline in the ISEW between 2000 and 2005 was caused by a worsening of the net international investment position of Belgium and an increase in income inequality in Flanders. Between 2006 and 2009, the improvement in the net international investment position of Belgium formed the basis for the recovery of the ISEW for Flanders.

Indicator Report
2012

4
Appendices

Core set of environmental data 2012

Table 1: Water use in m³ (Flanders, 2000-2010)

Table 2: Energy consumption in PJ (Flanders, 1990, 2000, 2005, 2008-2011)

Table 3: Land use in ha (Flanders, 1990, 2000-2011)

Table 4: Total emissions of ozone-depleting substances in tonnes CFC-11-eq. (Flanders, 1995, 2000-2010)

Table 5: Emissions of greenhouse gases in ktonnes CO_2-eq. (Flanders, 1990, 1995, 2000, 2005-2011)

Table 6: Emissions into the air (Flanders, 1990, 1995, 2000, 2005, 2008-2011)

Table 7: Waste production in tonnes (Flanders, 1992, 2000-2011 for household waste and 2004-2010 for industrial waste)

Table 8: Discharges of industrial waste water per sector (Flanders, 2000-2011)

Table 9: Pressure on surface water from households and diffuse discharges from agriculture (Flanders, 2000-2011)

More detailed environmental data are available via the 'dynamic core set' tool on the website www.environmentflanders.be. This interactive tool enables users to request various environmental data à la carte. The figures are available as totals for Flanders but also at sector, sub-sector and activity level. Additional subdivisions for various specifications are possible, if relevant (e.g. energetic and non-energetic CO_2 emissions), data for intermediate years are available, if applicable there is a choice of different units … It is also possible to directly generate relevant summations in the right units (e.g. total acidifying emissions in acid equivalents with a subdivision into NH_3, NO_x and SO_2 emissions). From the requested data, the user can quickly and easily generate a table or a graphic. Moreover, it is possible to download the data in Excel format and save the graphics directly as JPG or PNG files. In this way, we want to further improve the accessibility and usability of environmental data.

The figures in the Core set of environmental data 2012 have - where possible - been split into six sectors. This enables a coherent overview of the environmental pressure for each sector. The table below shows the demarcation of these sectors and the further classification into sub-sectors on the basis of the NACE-BEL 2008 nomenclature.

Designation of the sectors in the MIRA Indicator Report 2012

no.	sector	sub-sector	NACE-BEL 2008 code
1	households		
2	industry	chemical	20, 21
		metal (iron and steel, non-ferrous …)	24 to 30, 32.5, 33
		foodstuffs	10, 11, 12
		textiles	13, 14, 15
		paper	17, 18, 58.1
		waste & waste water	37 to 39°°°
		other industry	7, 8, 9.9, 16, 22, 23, 31 to 32.4, 32.9, 36, 41, 42, 43
3	energy	electricity & heat	35.1, 35.3
		petroleum refineries	19.2
		natural gas	35.2
		biofuels (refinery)	**
		other energy companies	5, 6, 9.1, 19.1
4	agriculture°°	arable farming and horticulture	1.1 to 1.3, 1.5, 1.60, 1.61, 1.63, 1.64
		livestock breeding	1.4, 1.5, 1.62
		hunting, forestry, fisheries & public green spaces	1.7, 2, 3
5	transport*		
6	trade & services	trade	45 to 49.5, 50, 51, 52, 95
		hotels & restaurants	55, 56
		offices & administration	53, 64 to 74, 77 to 84, 94
		education	85
		health care	75, 86, 87, 88
		other services	58.2, 59 to 63, 90 to 93, 96 to 99

* includes all transport flows and the associated emissions, but not the other activities (e.g. offices)
** no NACEs available yet
° 1.5 (mixed farming) belongs to both arable farming and horticulture plus livestock breeding
°° the agriculture sub-sectors can be split up even further
°°° since waste incineration is always done with energy recovery, emissions (into the air) from the activity are counted with the energy sector

Datasets in MIRA

MIRA uses and reports datasets coming from various (government) agencies. Data inventorying is a complex exercise and is based on legally required information collection, such as annual environmental reports, collective emissions inventories, measurements made by the government, such as the sampling of industrial waste water, scientific studies, surveys of companies and individuals, statistical information (e.g. traffic and agricultural surveys, use of hazardous products (that are damaging to the environment)), emission models in combination with internationally accepted emissions factors, etc.

An inventory is always a complete and correct as possible estimation of the data at a certain moment. However, this does not mean that there are no uncertainties in the figures. It is not possible at present to assign a concrete error margin to the various datasets. For the greenhouse gas emissions only, at Belgian level, a general error margin of 8.1 % has been determined for 2010 (the uncertainty for the other years is of the same order of magnitude). An inventory is also always a snapshot. For this reason it is useful/necessary each time to state the time of consultation of the database.

Data administrators also make ongoing efforts to improve their data inventory. They use the latest scientific findings and international agreements concerning methods to fully and consistently compile validated time series. The consequence of this is that the datasets can differ from those in earlier reports.

In 2012, for example, the emission factors for various pollutants from building heating were fine-tuned in collaboration with the other Belgian regions on the basis of new information. The method for determining the energy consumption by households was then adjusted. All this obviously has an impact of the estimation of emissions. A consistent time series is retained because the recalculations were carried out for all historic years.

In 2012, the methodology for estimating the energy consumption of collectively registered companies was also completely revised, resulting in different emissions for various pollutants. In addition, changes to the energy balance for the use of biomass at various industrial plants and a differentiation between process and incineration resulted again in different emissions for such things as particulate matter, heavy metals and NMVOCs. The recalculation was carried out for every year so that a consistent time series was maintained.

There is a new calculation method (MIMOSA 4.2) for transport, particularly road transport. The latest Core Set of environmental data was only recalculated using this method in 2010. Use was also made of a changed mobility module (for distribution of road types, vehicle types, size classes and Euro-standards). The 2000-2009 time series has not yet been changed to the new method and is still the result of calculations made using the earlier MIMOSA 4.1 model. Emissions figures are not available for 2011; the data of 2010 were used for 2011. This makes the emissions data from 2010 inconsistent with the figures for previous years, so they cannot really be compared.

Table 1: Water use in m³ (Flanders, 2000-2010)

sector	water type	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
households	other water	0	0	0	0	0	0	0	0	0	0	0
households	groundwater	20 000 000	20 000 000	20 000 000	20 000 000	20 000 000	20 000 000	20 000 000	20 000 000	20 000 000	20 000 000	20 000 000
households	cooling water	0	0	0	0	0	0	0	0	0	0	0
households	tap water	238 065 794	236 406 681	236 240 002	233 354 305	232 516 436	217 059 347	232 580 634	229 458 764	226 043 801	226 998 538	226 205 021
households	surface water excl. cooling water	0	0	0	0	0	0	0	0	0	0	0
households	rainwater	25 000 000	25 000 000	25 000 000	25 000 000	25 000 000	25 000 000	25 000 000	25 000 000	25 000 000	25 000 000	25 000 000
households	total (excl. cooling water)	283 065 794	281 406 681	281 240 002	278 354 305	277 516 436	262 059 347	277 580 634	274 458 764	271 043 801	271 998 538	271 205 021
households	total (incl. cooling water)	283 065 794	281 406 681	281 240 002	278 354 305	277 516 436	262 059 347	277 580 634	274 458 764	271 043 801	271 998 538	271 205 021
industry	other water	13 463 903	10 884 244	13 058 127	12 344 659	15 674 188	18 096 309	28 850 371	31 875 238	28 869 994	27 648 219	31 060 266
industry	groundwater	81 140 757	80 041 813	73 721 011	72 369 739	69 490 874	69 775 007	68 503 907	68 781 786	61 718 120	55 787 008	54 498 799
industry	cooling water	637 892 099	553 052 168	598 976 851	580 190 907	564 105 154	570 261 682	606 957 245	609 699 981	555 929 222	571 435 227	623 518 105
industry	tap water	87 242 076	84 348 919	81 575 734	81 711 984	84 419 340	86 584 365	88 433 097	86 253 601	80 434 244	73 558 848	79 574 851
industry	surface water excl. cooling water	125 524 438	130 475 602	137 615 071	137 790 108	137 721 478	148 243 690	139 331 007	129 086 395	125 536 003	93 523 692	121 032 950
industry	rainwater	6 888 108	8 246 208	8 249 457	6 318 926	9 032 480	7 322 964	8 328 664	9 957 711	8 627 394	8 979 606	8 313 798
industry	total (excl. cooling water)	314 259 281	313 996 786	314 219 400	310 535 416	316 338 361	330 022 336	333 447 046	325 954 731	305 185 756	259 497 374	294 480 664
industry	total (incl. cooling water)	952 151 380	867 048 954	913 196 251	890 726 323	880 443 514	900 284 018	940 404 291	935 654 712	861 114 977	830 932 600	917 998 768
energy	other water	638 852	89 388	178 774	126 284	155 128	274 806	113 797	105 929	159 760	146 005	2 185 879
energy	groundwater	300 093	276 776	155 822	173 719	170 314	164 609	156 998	135 700	137 503	96 234	17 198
energy	cooling water	2 849 406 012	2 640 207 891	2 599 432 971	2 766 135 799	2 549 607 577	2 580 235 378	2 496 729 861	2 521 440 177	2 349 194 878	2 389 687 486	2 297 620 289
energy	tap water	16 852 267	11 895 727	12 230 926	12 178 560	13 495 726	12 809 639	12 760 346	12 971 810	13 200 042	13 041 071	13 254 204
energy	surface water excl. cooling water	35 995 028	35 847 130	33 370 685	33 868 651	34 007 680	36 445 857	35 790 853	37 361 525	33 435 225	35 222 335	34 371 528
energy	rainwater	2 249 211	2 137 142	2 203 756	1 309 450	1 634 711	1 501 757	1 704 016	1 894 402	1 750 419	1 628 366	1 746 939
energy	total (excl. cooling water)	56 035 451	50 246 163	48 139 963	47 656 664	49 463 559	51 196 668	50 526 011	52 469 366	48 682 949	50 134 011	51 575 748
energy	total (incl. cooling water)	2 905 441 463	2 690 454 054	2 647 572 934	2 813 792 463	2 599 071 136	2 631 432 047	2 547 255 872	2 573 909 543	2 397 877 827	2 439 821 498	2 349 196 037
agriculture	other water	619 176	288 360	284 024	251 043	270 618	337 546	329 003	497 423	473 417	563 399	575 869
agriculture	groundwater	55 000 000	55 000 000	55 000 000	55 000 000	55 000 000	55 000 000	55 000 000	55 000 000	55 000 000	55 000 000	55 000 000
agriculture	cooling water	7 172	6 160	5 500	4 000	5 500	5 500	5 500	5 500	5 500	4 000	4 000
agriculture	tap water	7 344 871	7 007 557	7 933 895	8 089 607	8 527 231	7 002 571	7 467 384	7 260 666	6 377 816	6 418 823	6 492 661
agriculture	surface water excl. cooling water	394 271	371 192	456 687	613 256	338 548	448 747	560 416	418 058	500 696	561 116	768 911
agriculture	rainwater	5 000 000	5 000 000	5 000 000	5 000 000	5 000 000	5 000 000	5 000 000	5 000 000	5 000 000	5 000 000	5 000 000
agriculture	total (excl. cooling water)	68 358 318	67 667 109	68 674 605	68 953 906	69 136 398	67 788 864	68 356 803	68 176 146	67 351 930	67 543 337	67 837 441
agriculture	total (incl. cooling water)	68 365 490	67 673 269	68 680 105	68 957 906	69 141 898	67 794 364	68 362 303	68 181 646	67 357 430	67 547 337	67 841 441

trade & services	other water	223 057	222 440	208 433	191 089	320 210	412 800	337 550	393 113	474 365	633 368	618 805
trade & services	groundwater	6 367 517	6 131 434	5 841 856	5 577 246	5 837 965	5 413 637	5 069 903	4 927 880	4 936 191	4 725 240	4 636 035
trade & services	cooling water	909 345	877 864	1 041 104	705 386	736 556	776 123	585 618	1 098 998	1 168 330	1 216 243	1 390 858
trade & services	tap water	27 717 819	27 469 827	28 441 524	30 176 523	33 492 160	30 812 206	31 632 353	34 378 275	31 841 430	31 602 232	31 603 414
trade & services	surface water excl. cooling water	461 335	112 433	124 951	372 799	164 625	238 929	634 769	596 629	1 001 680	1 958 553	1 607 277
trade & services	rainwater	849 573	960 426	870 644	704 132	979 972	1 120 612	1 307 605	1 161 572	1 341 726	1 374 010	1 666 267
trade & services	total (excl. cooling water)	35 619 301	34 896 560	35 487 409	37 021 788	40 794 932	37 998 183	38 982 180	41 457 469	39 595 392	40 293 403	40 131 798
trade & services	total (incl. cooling water)	36 528 646	35 774 424	36 528 513	37 727 174	41 531 488	38 774 306	39 567 798	42 556 467	40 763 722	41 509 646	41 522 656
Flanders	other water	14 944 989	11 484 432	13 729 358	12 913 076	16 420 144	19 121 461	29 630 721	32 871 703	29 977 537	28 990 992	34 440 819
Flanders	groundwater	162 808 367	161 450 023	154 718 689	153 120 703	150 499 153	150 353 254	148 730 808	148 845 366	141 791 814	135 608 482	134 152 032
Flanders	cooling water	3 488 214 628	3 194 144 083	3 199 456 426	3 347 036 092	3 114 454 786	3 151 278 683	3 104 278 223	3 132 244 656	2 906 297 930	2 962 342 956	2 922 533 252
Flanders	tap water	377 222 827	367 128 711	366 422 081	365 510 979	372 450 893	354 268 128	372 873 814	370 323 115	357 897 333	351 619 511	357 130 151
Flanders	surface water excl. cooling water	162 375 072	166 806 357	171 567 393	172 644 814	172 232 331	185 377 223	176 317 045	167 462 606	160 473 603	131 265 696	157 780 665
Flanders	rainwater	39 986 891	41 343 776	41 323 857	38 332 507	41 647 163	39 945 333	41 340 285	43 013 685	41 719 540	41 981 982	41 727 004
Flanders	total (excl. cooling water)	757 338 146	748 213 299	747 761 379	742 522 080	753 249 685	749 065 399	768 892 674	762 516 476	731 859 826	689 466 663	725 230 671
Flanders	total (incl. cooling water)	4 245 552 773	3 942 357 383	3 947 217 806	4 089 558 171	3 867 704 472	3 900 344 082	3 873 170 897	3 894 761 132	3 638 157 757	3 651 809 619	3 647 763 923

database version November 2012
Remarks:
- other water = water coming from the product, ice, waste water from another company, (drinking) water that is traded between companies
- The figures for the consumption of groundwater and rainwater by households are based on Ecolas (2005) and are kept constant.
- The groundwater consumption by agriculture is a rough estimate (partly based on the ILVO study conducted by MIRA) and is kept constant.
- The rainwater consumption by agriculture is an estimate based on declarations and is kept constant.

Source: VMM

Table 2: Energy consumption in PJ (Flanders, 1990, 2000, 2005, 2008-2011)

		households	industry	energy	agriculture	transport	trade & services	Flanders** (gross domestic energy consumption = total excluding bunkers)	international bunkers
1990	coal, cokes, coal tar	8.5	100.1	127.1	2.2	0.0	0.0	238.1	0.0
	petroleum products	107.3	135.1	68.2	28.8	165.9	14.2	519.5	218.6
	gas	57.4	72.6	52.8	1.2	0.0	18.8	202.8	0.0
	other fuels	0.0	22.2	5.2	0.0	0.0	0.4	27.8	0.0
	renewable fuels	3.8	0.2	4.2	0.0	0.0	0.0	8.2	0.0
	electricity	27.9	70.7	-122.1	3.6	1.9	20.2	2.2	0.0
	heat	0.0	2.5	0.0	0.0	0.0	0.0	2.5	0.0
	nuclear heat	0.0	0.0	208.0	0.0	0.0	0.0	208.0	0.0
	total	204.9	403.4	343.5	35.8	167.7	53.8	1 209.1	218.6
2000	coal, cokes, coal tar	2.6	92.4	93.2	0.8	0.0	0.0	189.0	0.0
	petroleum products	103.6	247.6	68.8	22.9	181.2	21.9	646.0	273.3
	gas	83.1	122.0	122.6	5.2	0.0	32.5	365.3	0.0
	other fuels	0.0	80.3	5.5	0.0	0.0	0.9	86.8	0.0
	renewable fuels	4.4	1.0	3.7	0.0	0.0	0.1	9.2	0.0
	electricity	36.1	96.9	-150.8	3.8	2.8	31.1	20.0	0.0
	heat	0.0	22.0	-19.3	0.0	0.0	0.0	3.9	0.0
	nuclear heat	0.0	0.0	242.4	0.0	0.0	0.0	242.4	0.0
	total	229.9	662.3	366.1	32.7	184.0	86.5	1 562.6	273.3
2005	coal, cokes, coal tar	3.6	101.6	69.2	0.8	0.0	0.0	175.2	0.0
	petroleum products	108.0	275.7	80.4	22.2	182.8	15.9	684.9	371.4
	gas	87.0	120.1	154.8	6.6	0.0	44.1	412.6	0.0
	other fuels	0.0	76.4	7.1	0.0	0.0	1.5	85.0	0.0
	renewable fuels	3.8	5.1	11.2	0.0	0.0	0.3	20.4	0.0
	electricity	39.2	96.3	-161.9	3.2	2.8	43.2	22.8	0.0
	heat	0.0	20.5	-15.8	0.0	0.0	0.0	8.6	0.0
	nuclear heat	0.0	0.0	239.4	0.0	0.0	0.0	239.4	0.0
	total	241.6	695.7	384.6	32.8	185.5	104.9	1 648.9	371.4
2008	coal, cokes, coal tar	3.2	86.7	48.6	1.7	0.0	0.0	140.2	0.0
	petroleum products	96.4	272.2	77.3	14.6	185.3	10.3	656.1	455.5
	gas	90.5	121.5	167.5	6.7	0.0	47.1	433.4	0.0
	other fuels	0.0	77.4	13.3	0.0	0.0	1.5	92.2	0.0
	renewable fuels	3.8	6.3	19.6	1.2	2.2	0.4	33.5	0.0
	electricity	40.4	97.5	-153.8	1.5	2.9	45.5	34.0	0.0
	heat	0.0	21.7	-19.5	0.0	0.0	0.0	6.0	0.0
	nuclear heat	0.0	0.0	222.2	0.0	0.0	0.0	222.2	0.0
	total	234.3	683.4	375.3	25.7	190.4	104.8	1 617.6	455.5

2009	coal, cokes, coal tar	3.2	74.2	46.7	0.4	0.0	0.0	124.4	0.0
	petroleum products	97.2	230.1	69.1	14.6	171.3	12.8	595.0	340.6
	gas	91.3	107.8	187.0	9.3	0.0	46.4	441.8	0.0
	other fuels	0.0	77.0	10.8	0.0	0.0	1.6	89.3	0.0
	renewable fuels	3.8	6.0	24.1	2.6	5.2	0.5	42.2	0.0
	electricity	41.2	83.6	-164.8	0.9	2.8	46.4	10.0	0.0
	heat	0.0	21.1	-20.5	0.0	0.0	0.0	4.2	0.0
	nuclear heat	0.0	0.0	228.6	0.0	0.0	0.0	228.6	0.0
	total	236.5	599.8	380.9	27.7	179.3	107.7	1 535.5	340.6
2010	coal, cokes, coal tar	3.8	90.1	38.5	0.5	0.0	0.0	132.9	0.0
	petroleum products	98.5	267.4	75.2	14.4	179.2	12.4	647.3	317.0
	gas	104.9	126.9	193.6	13.0	0.0	49.1	487.5	0.0
	other fuels	0.0	82.6	11.3	0.0	0.0	1.6	95.5	0.0
	renewable fuels	4.6	8.0	26.4	3.3	7.6	0.6	50.5	0.0
	electricity	41.4	97.4	-165.4	-0.3	2.8	45.4	21.3	0.0
	heat	0.0	26.2	-22.8	0.0	0.0	0.0	7.3	0.0
	nuclear heat	0.0	0.0	234.6	0.0	0.0	0.0	234.6	0.0
	total	253.2	698.6	391.4	30.9	189.6	109.2	1 676.9	317.0
2011*	coal, cokes, coal tar	2.7	88.7	31.5	0.5	0.0	0.0	123.4	0.0
	petroleum products	77.2	273.5	68.3	14.4	178.6	8.9	621.0	373.5
	gas	81.0	117.2	163.3	13.1	0.0	39.9	414.5	0.0
	other fuels	0.0	83.1	10.5	0.0	0.0	1.1	94.7	0.0
	renewable fuels	3.3	8.3	28.1	2.8	7.0	0.6	50.2	0.0
	electricity	40.4	95.8	-153.4	-0.9	2.8	43.7	28.4	0.0
	heat	0.0	24.4	-22.8	0.0	0.0	0.0	6.3	0.0
	nuclear heat	0.0	0.0	243.8	0.0	0.0	0.0	243.8	0.0
	total	204.6	691.0	369.3	29.9	188.4	94.2	1 582.3	373.5

database version 27 November 2012
* provisional figures
** including the (very limited) energy consumption that cannot be attributed to one sector
Remarks:
- energy consumption by road traffic in 2010 is not comparable to the period 2000-2009 because of model changes; energy consumption by road traffic in 2011 is only an initial estimate;
- energy consumption by the energy sector itself is the sum of transformation losses, own consumption and losses occurring during transmission and distribution;
- 'petroleum products' = crude oil and intermediary products, refinery gas, LPG, petrol, kerosene, gas and diesel oil, lamp oil, heavy fuel oil, naphtha, petroleum cokes and other petroleum products;
- 'gas' = natural gas, mine gas, coking gas and blast-furnace gas;
- 'other fuels' = mainly residual fuels from the chemical industry (3/4 own fuel crackers) and non-renewable part of waste incineration;
- 'renewable fuels' = biomass;
- 'bunkers' = bunkers with fuels for international shipping and aviation.

Source: MIRA based on Flanders Energy Balance VITO

Table 3: Land use in ha (Flanders, 1990, 2000-2011)

sector	specification	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
households	apartments	2 702	4 234	4 424	4 560	4 744	4 943	5 143	5 479	5 901	6 195	6 508	6 780	7 103
households	houses, farmhouses including gardens	119 044	146 318	148 164	149 690	151 435	152 843	154 265	155 853	157 297	158 819	160 368	161 675	162 881
households	total	121 747	150 552	152 587	154 249	156 179	157 786	159 407	161 332	163 198	165 013	166 875	168 456	169 984
industry + energy	craft and industrial buildings	17 026	20 651	20 728	20 824	20 731	20 852	20 881	20 878	20 903	21 035	21 008	21 114	21 017
agriculture	temporary grass	38 080	61 899	57 262	48 756	48 207	48 528	52 968	53 414	52 683	53 169	53 692	54 758	55 009
agriculture	permanent grass	213 811	179 414	180 673	186 914	185 571	181 383	173 346	169 433	165 527	163 477	161 930	160 648	159 963
agriculture	feed crops excl. grass	100 811	120 062	134 164	120 231	120 578	116 174	116 630	115 061	116 555	125 820	127 045	123 576	127 278
agriculture	arable farming	208 811	219 736	203 153	220 222	219 266	229 994	229 637	229 567	231 124	228 562	224 653	224 993	218 751
agriculture	horticulture	38 498	47 825	50 614	50 734	51 899	50 145	48 969	50 102	49 427	49 023	49 534	49 837	49 155
agriculture	fallow and other agricultural land	3 885	7 940	9 289	9 029	9 413	7 545	8 135	7 630	6 817	3 648	3 307	3 323	652
agriculture	total	603 896	636 876	635 155	635 886	634 934	633 769	629 684	625 207	622 133	623 699	620 161	617 134	610 808
transport	roads	..	55 173	55 468	55 763	55 947	56 258	56 543	56 878	57 170	57 466	57 701	57 941	..
transport	railways	..	4 283	4 213	4 268	4 278	4 295	4 323	4 390	4 413	4 425	4 528	4 528	..
transport	waterways	..	..	..	..	..	..	..	..	10 338	10 338	10 338	10 338	10 338
transport	airports	..	..	..	..	..	..	..	..	1 808	1 808	1 808	1 808	1 808
transport	total	..	..	..	..	..	..	..	..	73 729	74 037	74 375	74 615	..
trade & services	warehouses	4 718	7 493	7 773	8 013	8 128	8 425	8 591	8 734	8 924	9 183	9 469	9 713	9 885
trade & services	office buildings	488	938	974	1 006	1 053	1 083	1 107	1 145	1 166	1 173	1 207	1 223	1 242
trade & services	commercial buildings	6 675	7 922	7 951	7 988	7 987	8 008	7 972	7 964	7 949	7 925	7 934	7 927	7 952
trade & services	public buildings	3 183	3 666	3 613	3 601	3 635	3 670	3 725	3 782	3 829	3 847	3 812	3 800	3 749
trade & services	utilities buildings	1 129	1 769	1 842	1 866	1 904	1 943	1 971	1 980	2 001	2 114	2 082	2 189	2 190
trade & services	social welfare and healthcare buildings	1 969	2 445	2 465	2 483	2 509	2 527	2 555	2 580	2 575	2 602	2 640	2 665	2 729
trade & services	buildings for education, research and culture	4 128	4 407	4 431	4 428	4 450	4 461	4 476	4 481	4 487	4 484	4 496	4 492	4 502
trade & services	religious buildings	921	925	919	927	932	925	919	916	902	902	893	883	874
trade & services	recreational and sport buildings	6 996	8 228	8 280	8 272	8 369	8 412	8 451	8 463	8 486	8 567	8 628	8 652	8 626
trade & services	recreation areas	4 222	4 603	4 588	4 606	4 567	4 568	4 545	4 521	4 502	4 504	4 518	4 546	4 518
trade & services	total	34 429	42 395	42 835	43 190	43 534	44 023	44 312	44 564	44 821	45 301	45 678	46 091	46 268

nature	grass land with nature management	..	..	..	..	..	..	7 988	..	..	..	..	..	..
nature	heathland	..	..	..	..	..	..	8 577	..	..	..	..	..	..
nature	marsh	..	..	..	..	..	..	15 728	..	..	..	..	..	..
nature	woodland	..	..	..	..	..	..	133 419	..	..	..	..	..	..
nature	park	..	..	..	..	..	..	10 077	..	..	..	..	..	..
nature	coastal dunes	..	..	..	..	..	..	2 162	..	..	..	..	..	..
nature	mud flats and tidal marsh	..	..	..	..	..	..	1 789	..	..	..	..	..	..
nature	total	..	..	..	..	..	..	179 740	..	..	..	..	..	..

database version 15 December 2011
Note: As different sources need to be used in order to get a good idea per sector, it is not possible to compare figures between the different sectors unambiguously. However, comparison with respect to the total area of Flanders (13 522 km² or 1 352 225 ha) is possible. Allowance must then be made for the fact that this table includes only approximately 82 % of the total area of Flanders.

Sources:
- for the Households, Industry + Energy, Trade & services sectors: Land Registry, 2010. These figures indicate the land use on 1 January of that year.
- for the Transport sector: MIRA (VMM) based on Antwerp Airport, Brussels Airport, Kortrijk/Wevelgem Airport, Ostend Airport, NV De Scheepvaart, Belgian Federal Public Service Mobility and Transport, Belgian Railways (NMBS), Flemish Waterway and Sea Canal Authority (W&Z).
- for the Agriculture sector: Agriculture survey/census 15 May, Belgian Federal Public Service Economy, Statistics Belgium (Statistics and Economic Information)
- for Nature: Van Esch L., Poelmans L., Engelen G. & Uljee I. (2011), Land usage map of Flanders and Brussels, study commissioned by the Flemish Environment Agency, MIRA, MIRA/2011/09, VITO, 2011\RMA\R\272, www.milieurapport.be

Table 4: Total emissions of ozone-depleting substances in tonnes CFC-11-eq (Flanders, 1995, 2000-2010)

sector	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
households	50.6	73.7	42.7	33.7	24.5	16.1	9.9	8.9	7.6	6.1	5.2	4.9
industry**	396.8	241.5	218.3	171.4	160.0	115.4	90.3	83.3	79.2	74.6	68.2	61.4
energy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
agriculture	129.7	59.9	23.9	22.2	22.6	26.1	8.5	0.0	0.0	0.0	0.0	0.0
transport	31.0	9.3	9.3	9.3	9.2	9.2	9.1	9.1	9.0	8.9	8.9	8.8
trade & services	401.2	266.1	248.9	201.4	194.6	184.2	147.4	136.4	137.6	129.6	47.7	42.9
Flanders (total)	1 009.3	650.5	543.1	437.9	411.0	351.1	265.2	237.7	233.4	219.3	129.9	118.0

database version 20 July 2012
* provisional figures
** including the Energy sector

Source: Econotec, VITO

Table 5: Emission of greenhouse gases in ktonnes CO_2-eq (Flanders, 1990, 1995, 2000, 2005-2011)

sector	substance	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011*
households	CO_2	11 800	13 066	12 454	13 097	12 503	11 815	12 411	12 499	13 422	10 425
households	CH_4	292	272	198	170	171	161	154	155	168	148
households	N_2O	199	202	190	196	195	194	196	197	201	195
households	HFCs	99	99	73	41	41	41	39	31	31	31
households	all gases combined	12 389	13 640	12 915	13 504	12 911	12 210	12 800	12 883	13 822	10 800
industry	CO_2	16 436	17 671	19 173	20 100	19 781	19 029	18 628	15 877	18 034	17 325
industry	CH_4	1 582	1 543	1 311	652	627	545	479	419	392	380
industry	N_2O	3 104	3 778	3 439	2 470	1 719	1 224	1 049	1 046	1 388	1 347
industry	HFCs	135	135	321	525	550	623	647	630	639	639
industry	PFCs	2 335	2 335	361	154	158	179	200	114	84	84
industry	SF_6	2 153	2 153	82	29	12	11	10	9	9	9
industry	all gases combined	25 745	27 615	24 687	23 929	22 848	21 611	21 012	18 095	20 545	19 784
energy	CO_2	22 963	22 384	23 273	24 056	23 077	23 413	22 262	22 014	22 288	18 649
energy	CH_4	591	310	280	267	267	268	253	260	291	261
energy	N_2O	158	159	192	113	102	100	92	136	119	117
energy	SF_6	12	12	12	7	7	7	6	7	7	7
energy	all gases combined	23 724	22 865	23 757	24 444	23 452	23 787	22 614	22 416	22 704	19 033
agriculture	CO_2	4 305	4 256	3 840	3 824	3 760	3 480	3 294	3 314	3 507	3 511
agriculture	CH_4	3 458	3 544	3 324	2 953	2 935	3 049	3 036	3 052	3 104	3 069
agriculture	N_2O	3 194	3 258	2 806	2 409	2 362	2 344	2 278	2 371	2 396	2 381
agriculture	all gases combined	10 957	11 058	9 971	9 186	9 056	8 873	8 608	8 736	9 007	8 961
transport	CO_2	11 998	13 361	13 128	13 256	13 267	13 361	13 456	12 437	13 282	13 293
transport	CH_4	72	59	32	18	15	13	10	8	9	9
transport	N_2O	108	159	186	142	139	140	142	130	111	112
transport	HFCs	8	8	54	125	140	161	172	186	194	194
transport	all gases combined	12 185	13 587	13 400	13 542	13 562	13 675	13 781	12 761	13 597	13 608
trade & services	CO_2	2 123	3 137	3 491	3 712	3 355	3 225	3 470	3 621	3 748	2 944
trade & services	CH_4	8	14	14	17	16	16	17	18	18	13
trade & services	N_2O	112	111	110	109	108	109	109	109	109	108
trade & services	HFCs	22	22	85	164	171	189	198	212	221	221
trade & services	SF_6	0	0	0	21	26	30	35	39	44	44
trade & services	all gases combined	2 264	3 284	3 700	4 024	3 677	3 569	3 828	3 998	4 140	3 330

nature & gardens	CO_2	-778	-581	-552	-480	-443	-394	-385	-438	-448	-459
nature & gardens	CH_4	119	119	119	119	119	119	119	119	119	119
nature & gardens	all gases combined	-659	-462	-433	-362	-325	-275	-266	-319	-329	-340
Flanders	CO_2	68 846	73 295	74 808	77 565	75 301	73 929	73 136	69 325	73 833	65 689
Flanders	CH_4	6 121	5 861	5 278	4 196	4 150	4 171	4 068	4 030	4 100	3 999
Flanders	N_2O	6 874	7 666	6 923	5 441	4 626	4 111	3 866	3 988	4 325	4 259
Flanders	HFCs	264	264	532	854	903	1 013	1 055	1 059	1 085	1 085
Flanders	PFCs	2 335	2 335	361	154	158	179	200	114	84	84
Flanders	SF_6	2 165	2 165	94	57	45	48	50	55	59	59
Flanders	all gases combined, energetic	66 731	70 380	71 692	72 865	70 891	69 280	68 645	65 841	70 105	62 430
Flanders	all gases combined, non-energetic	19 875	21 206	16 306	15 402	14 290	14 170	13 732	12 730	13 381	12 745
Flanders	all gases combined, total	86 606	91 587	87 998	88 267	85 181	83 450	82 376	78 571	83 486	75 176

database version 19 November 2012
* The figures for 2011 are provisional. The figures for 2010 have been used provisionally for 2011 for some data series for which no new data were available on 19 November 2012 (e.g. F gases and road transport emissions). As a result of a new, refined methodology, the figures for road transport in 2010 (and therefore in 2011) are not directly comparable with the figures from other years.
Remarks:
- This data refers to the group of 6 greenhouse gases that are included in the Kyoto Protocol: CO_2, CH_4, N_2O, HFCs, PFCs and SF_6;
- But figures are available from 1995 for HFCs, PFCs and SF_6. For the totals for 'all gases combined', the values of HFCs, PFCs and SF_6 for 1995 were adopted as constants for 1990.
- For the conversion from tonnages to CO_2 equivalents in this table the GWP values from the IPCC 'Second Assessment Report' of 1996 have been used, in accordance with the reporting requirements for the Climate Conference (UNFCCC): 1 for CO_2, 21 for CH_4, 310 for N_2O, 23 900 for SF_6, 140 to 11 700 for the various HFCs and 6 500 to 9 200 for the various PFCs.
- Emissions from waste incineration with generation of electricity are included in the Energy sector.
- A negative figure indicates a net uptake ('sink') instead of an emission.
- In accordance with the core set data relating to energy consumption and in line with the international reporting requirements (UNFCCC, NEC, EMEP, etc.), all greenhouse gas emissions from CHPs used in different sectors (often in cooperation with electricity companies) were assigned to the Energy sector.
- CO_2 emissions generated by the incineration of renewable fossil fuels (biomass, biogas) are not included in the table because of their CO_2-neutral nature: the same amount gets into the air as was previously captured from the air during the growth of the plant material.
- Dataset error margin: The data in this table are the result of scientific studies, surveys, compulsory reports, etc. Such datasets attempt to give as complete an estimate as possible. However, there are still uncertainties and there is a margin of error for these data. During a determination of the uncertainty conducted for the Belgian greenhouse gas inventory – which is largely based on the Flemish emissions data – for 2010 and for the 1990-2010 trend for all sectors and all gases combined, there appeared to be an 'overall uncertainty' for 2010 of 8.1 %, meaning that the total for all greenhouse gas emissions in 2010 could in reality be up to 8.1 % higher or lower than currently estimated. The uncertainty is largely governed by the estimate of N_2O emissions. For CO_2 and CH_4 emissions, the uncertainty is 2 % or less. For the trend (of all gases combined), the uncertainty is 2.9 %.

Source: MIRA based on EIL (VMM)

Table 6: Emissions into the air (Flanders, 1990, 1995, 2000, 2005, 2008-2011)

sector	year	As [kg]	benzene [kg]	Cd [kg]	CO [tonne]	CO [tonne TOFP]	Cr (total) [kg]	Cu [kg]	dioxins [mg TEQ]	Hg [kg]	NH_3 [tonne]	NH_3 [million Aeq]	Ni [kg]	NMVOCs [tonne, tonne TOFP]	NO_x [tonne]	NO_x [tonne TOFP]	NO_x [million Aeq]	PAHs [kg]	Pb [kg]	SO_x as SO_2 [tonne]	SO_x as SO_2 [million Aeq]	particulate matter (elemental carbon) [tonne]	particulate matter ($PM_{2.5}$) [tonne]	particulate matter (PM_{10}) [tonne]	particulate matter (total) [tonne]	toluene [kg]	Zn [kg]
households	1990				74 441	8 188			32 001		3 380	199		12 058	9 527	11 623	207	73 293		14 734	460						
households	1995		14 626		59 666	6 563			32 730		3 340	196		12 945	10 579	12 907	230	82 325		13 195	412	445	1 817	1 917	2 152		
households	2000	198	15 120	194	50 387	5 543	236	3 120	32 552	176	2 241	132	270	12 792	8 935	10 901	194	83 201	1 032	11 149	348	438	1 903	2 003	2 229		2 407
households	2005	210	15 190	204	52 129	5 734	255	3 202	31 522	189	1 667	98	292	13 131	8 722	10 640	190	72 825	1 161	12 241	383	436	1 922	2 044	2 317		2 610
households	2008	190	14 328	190	49 694	5 466	237	3 220	31 387	172	1 462	86	273	12 569	7 788	9 501	169	72 746	1 061	6 495	203	415	1 783	1 893	2 140		2 520
households	2009	190	13 669	190	49 672	5 464	238	3 242	31 376	172	1 493	88	275	11 865	7 660	9 345	167	72 585	1 060	6 477	202	411	1 779	1 889	2 134		2 541
households	2010	196	13 000	201	57 534	6 329	258	3 293	33 056	182	1 529	90	300	11 941	8 154	9 948	177	86 761	1 196	6 944	217	451	1 933	2 065	2 349		2 949
households	2011	153	13 000	156	43 874	4 826	197	3 192	30 251	140	1 565	92	230	11 274	6 219	7 587	135	64 411	891	5 267	165	363	1 603	1 697	1 913		2 203
industry	1990				204 857	22 534			202 315		1 770	104		95 052	29 446	35 924	640	194 366		81 340	2 542						
industry	1995		72 524		206 514	22 717			201 313		881	52		78 796	35 639	43 480	775	43 262		56 653	1 770	654	8 702	10 293	12 364	1 629 288	
industry	2000	2 380	51 713	1 076	222 967	24 526	2 446	5 602	10 248	983	821	48	7 043	61 714	33 384	40 728	726	31 363	54 424	41 168	1 286	422	3 857	4 548	6 202	1 535 363	47 432
industry	2005	1 341	52 870	1 104	225 361	24 790	1 122	4 295	11 286	863	714	42	6 726	50 371	29 949	36 538	651	12 245	44 299	32 020	1 001	427	3 634	4 457	6 033	895 248	26 044
industry	2008	1 180	70 611	801	189 705	20 868	1 261	1 989	9 229	591	850	50	5 092	43 851	25 909	31 609	563	17 919	20 539	27 289	853	494	3 360	4 022	5 531	715 034	19 532
industry	2009	1 083	62 108	822	133 715	14 709	1 035	1 739	6 698	498	558	33	3 208	35 133	22 172	27 049	482	11 271	13 792	17 442	545	407	2 722	3 288	4 658	492 056	9 055
industry	2010	898	64 067	1 056	175 446	19 299	1 351	1 887	6 933	474	661	39	4 066	34 707	25 386	30 971	552	12 419	16 032	17 155	536	439	3 143	3 783	5 241	514 477	18 502
industry	2011	929	73 880	1 082	146 640	16 130	966	2 331	8 625	461	860	51	3 067	31 943	24 107	29 410	524	13 894	18 487	16 587	518	460	3 440	4 127	5 684	576 455	20 192
energy	1990				15 581	1 714			254 018		39	2		18 390	58 261	71 079	1 267	386		116 355	3 636						
energy	1995		66 701		23 698	2 607			130 809		0	0		17 415	49 452	60 331	1 075	472		95 798	2 994	189	2 168	3 688	5 528	104 846	
energy	2000	436	46 596	332	8 331	916	1 200	1 130	12 402	639	1	0	15 031	13 974	40 324	49 195	877	1 209	1 947	54 940	1 717	147	1 704	2 731	3 926	76 134	3 434
energy	2005	470	29 382	325	8 386	922	1 202	1 804	3 912	375	3	0	11 540	9 989	33 794	41 228	735	768	1 828	45 857	1 433	84	938	1 665	2 744	76 172	3 114
energy	2008	185	13 412	312	5 795	637	1 032	830	4 870	417	4	0	7 847	7 025	18 290	22 313	398	706	1 475	27 668	865	28	399	656	838	60 694	1 191
energy	2009	172	9 790	307	5 979	658	859	956	4 755	317	2	0	3 309	6 876	18 150	22 143	395	678	1 721	25 861	808	29	329	559	743	44 822	1 006
energy	2010	196	9 390	302	5 069	558	427	1 060	4 800	331	4	0	1 880	6 850	16 126	19 674	351	1 170	1 330	13 882	434	18	250	405	533	33 741	1 047
energy	2011	139	9 498	293	5 397	594	378	773	4 755	445	6	0	1 149	5 694	12 310	15 018	268	1 410	1 433	12 198	381	11	179	273	353	33 252	1 134
agriculture	1990				5 797	638			451		86 196	5 070		2 071	22 602	27 574	491	925		28 719	897						
agriculture	1995		19 046		4 224	465			326		82 786	4 869		1 560	22 328	27 240	485	893		9 093	284	681	2 672	7 241	18 123		
agriculture	2000	24	19 009	16	4 021	442	152	294	253	17	52 822	3 107	2 548	1 594	19 138	23 348	416	765	1 428	6 149	192	713	2 538	7 067	18 020		442
agriculture	2005	23	18 692	16	4 134	455	152	276	249	16	41 522	2 442	2 548	1 540	17 267	21 066	375	719	1 328	6 056	189	655	2 323	6 687	17 519		450
agriculture	2008	22	18 690	18	8 152	897	83	231	343	23	38 560	2 268	831	1 997	16 466	20 088	358	9 942	1 250	3 473	109	605	2 021	6 409	17 463		627
agriculture	2009	17	17 394	18	8 775	965	63	213	286	14	38 866	2 286	687	1 942	17 396	21 223	378	11 729	1 102	2 463	77	622	2 044	6 466	17 605		439
agriculture	2010	18	17 388	21	10 013	1 101	59	210	250	16	39 326	2 313	530	2 106	18 189	22 190	395	9 509	1 092	2 268	71	606	2 008	6 501	17 792		496
agriculture	2011	18	17 384	20	10 303	1 133	59	210	257	15	39 467	2 321	529	2 135	18 086	22 065	393	11 041	1 092	2 241	70	611	2 168	6 697	18 085		505

transport	1990				328 195	36 101			759		89	5		61 660	132 587	161 756	2 882	25 666		10 235	320						
transport	1995		2 271 018		231 796	25 498			588		586	34		52 880	127 113	155 078	2 763	33 449		9 614	300	4 054	8 581	9 602	11 171	4 523 600	
transport	2000	4	1 125 480	50	117 080	12 879	533	34 443	272	2	1 479	87	638	28 963	100 752	122 918	2 190	68 001	2 656	3 428	107	3 073	6 027	7 115	8 845	2 244 600	14 104
transport	2005	4	556 673	51	60 288	6 632	549	35 493	142	2	996	59	687	14 813	87 770	107 079	1 908	91 448	2 474	1 751	55	2 241	4 308	5 408	7 072	1 080 830	14 553
transport	2008	5	333 509	53	38 363	4 220	563	36 295	104	3	759	45	700	7 891	78 704	96 019	1 711	103 476	2 373	1 519	47	1 778	3 551	4 686	6 404	603 960	14 997
transport	2009	4	294 502	50	32 315	3 555	539	34 938	88	2	680	40	657	6 754	68 012	82 975	1 479	105 124	2 281	1 339	42	1 577	3 168	4 229	5 851	535 900	14 432
transport	2010	4	266 036	55	35 621	3 918	1 326	29 540	108	3	675	40	288	6 650	75 287	91 850	1 637	99 541	3 622	1 447	45	1 598	3 283	4 445	6 143	485 140	18 312
transport	2011	4	265 976	55	35 718	3 929	1 326	29 546	108	3	675	40	285	6 658	75 339	91 914	1 638	99 517	3 622	1 114	35	1 596	3 278	4 440	6 145	485 140	18 316
trade & services	1990				1 384	152			212		0	0		10 589	2 157	2 632	47	370		1 876	59						
trade & services	1995		255 829		1 888	208			319		0	0		7 825	3 055	3 728	66	519		1 940	61	46	145	147	160	814 635	
trade & services	2000	40	32 127	46	2 174	239	59	85	379	59	0	0	228	5 251	3 076	3 753	67	3 309	127	2 264	71	48	166	175	190	113 073	509
trade & services	2005	30	12 577	43	2 191	241	55	73	254	32	0	0	171	2 206	3 099	3 781	67	4 608	109	1 556	49	35	116	123	137	41 466	656
trade & services	2008	20	8 279	36	2 146	236	56	64	218	24	0	0	300	1 701	2 841	3 466	62	6 951	94	829	26	28	93	107	127	31 577	696
trade & services	2009	24	8 972	40	2 187	241	60	69	250	27	0	0	336	2 074	2 792	3 406	61	8 138	106	1 005	31	28	97	111	132	25 681	692
trade & services	2010	23	8 931	40	2 362	260	59	69	260	27	0	0	277	2 107	2 749	3 354	60	9 618	104	868	27	27	94	106	126	25 537	740
trade & services	2011	17	8 438	31	1 991	219	45	56	213	21	0	0	203	2 227	2 230	2 721	48	9 808	78	609	19	21	71	81	98	25 935	602
nature & gardens	1990													14 557													
nature & gardens	1995													16 036													
nature & gardens	2000													13 874													
nature & gardens	2005													15 429													
nature & gardens	2008													14 346													
nature & gardens	2009													15 313													
nature & gardens	2010													14 537													
nature & gardens	2011													15 113													
Flanders (total)	1990				630 254	69 328			489 757		91 474	5 380		214 378	254 580	310 587	5 535	295 005		253 259	7 914						
Flanders (total)	1995		2 699 744		527 786	58 056			366 085		87 593	5 152		187 458	248 166	302 763	5 395	160 920		186 292	5 822	6 069	24 085	32 887	49 499	7 072 370	
Flanders (total)	2000	3 081	1 290 045	1 714	404 960	44 546	4 627	44 674	56 107	1 876	57 364	3 374	25 759	138 162	205 609	250 843	4 470	187 849	61 614	119 097	3 722	4 841	16 194	23 640	39 412	3 969 170	68 328
Flanders (total)	2005	2 079	685 383	1 743	352 489	38 774	3 336	45 143	47 365	1 476	44 902	2 641	21 964	107 479	180 601	220 333	3 926	182 614	51 199	99 480	3 109	3 878	13 239	20 385	35 821	2 093 716	47 428
Flanders (total)	2008	1 601	458 830	1 409	293 856	32 324	3 232	42 630	46 152	1 230	41 636	2 449	15 043	89 381	149 998	182 997	3 261	211 740	26 792	67 274	2 102	3 348	11 207	17 773	32 504	1 411 264	39 564
Flanders (total)	2009	1 491	406 434	1 427	232 644	25 591	2 794	41 157	43 453	1 031	41 599	2 447	8 472	79 957	136 181	166 141	2 961	209 526	20 062	54 586	1 706	3 075	10 139	16 542	31 122	1 098 458	28 165
Flanders (total)	2010	1 336	378 813	1 676	286 045	31 465	3 480	36 059	45 407	1 033	42 195	2 482	7 341	78 898	145 890	177 986	3 172	219 019	23 376	42 565	1 330	3 139	10 710	17 306	32 183	1 058 895	42 047
Flanders (total)	2011	1 260	388 175	1 637	243 923	26 832	2 972	36 107	44 209	1 086	42 574	2 504	5 464	75 043	138 292	168 716	3 006	200 080	25 603	38 016	1 188	3 062	10 739	17 314	32 278	1 120 782	42 951

database version 5 November 2012
Remarks:
- Emissions of acidifying substances were converted to Aeq (acid equivalents) using the following conversion factors: 0.03125 (SO_2); 0.02174 (NO_x as NO_2); 0.05882 (NH_3).
  In the process, grams are converted to Aeq: 1 tonne SO_2 equals 0.03125×10^6 Aeq or 31.25×10^3 Aeq.
- Emissions of ozone precursors were converted to TOFPs (tropospheric ozone forming potentials) using the following conversion factors: 1 (NMVOC); 1.22 (NO_x as NO_2); 0.014 (CH_4); 0.11 (CO).
  With these, tonnages are converted to TOFPs: 1 tonne NO_x equals a TOFP of 1.22 tonnes.
- For details of the emissions of ozone-depleting substances and greenhouse gases, please refer to tables 4 and 5 respectively.
- The figures for 2011 are provisional figures.

Source: VITO, VMM

Table 7a: Production of primary waste in tonnes (Flanders, 1992, 2000-2011 for household waste and 2004-2010 for industrial waste)

sector	year	separately collected waste	residual waste	total
households (household waste)	1992	539 887	1 912 283	2 452 170
households (household waste)	2000	2 192 472	1 138 385	3 330 857
households (household waste)	2001	2 256 434	1 076 895	3 333 328
households (household waste)	2002	2 315 598	1 014 359	3 329 957
households (household waste)	2003	2 255 232	960 585	3 215 817
households (household waste)	2004	2 389 643	959 632	3 349 275
households (household waste)	2005	2 359 800	951 670	3 311 471
households (household waste)	2006	2 345 951	938 505	3 284 456
households (household waste)	2007	2 461 340	957 748	3 419 088
households (household waste)	2008	2 422 410	947 517	3 369 928
households (household waste)	2009	2 389 947	932 832	3 322 779
households (household waste)	2010	2 343 524	943 479	3 287 003
households (household waste)	2011	2 379 195	951 948	3 331 143
industry (industrial waste)	2004			14 245 859
industry (industrial waste)	2005			16 804 942
industry (industrial waste)	2006			17 195 422
industry (industrial waste)	2007			12 569 320
industry (industrial waste)	2008			11 822 295
industry (industrial waste)	2009			11 130 025
industry (industrial waste)	2010			11 676 066
energy (industrial waste)	2004			1 121 035
energy (industrial waste)	2005			1 395 759
energy (industrial waste)	2006			1 330 705
energy (industrial waste)	2007			1 385 912
energy (industrial waste)	2008			1 190 722
energy (industrial waste)	2009			1 415 580
energy (industrial waste)	2010			1 247 862
agriculture (industrial waste)	2004			132 664
agriculture (industrial waste)	2005			194 812
agriculture (industrial waste)	2006			305 251
agriculture (industrial waste)	2007			261 129
agriculture (industrial waste)	2008			165 141
agriculture (industrial waste)	2009			176 891
agriculture (industrial waste)	2010			116 451
trade & services, excl. waste processing companies (industrial waste)	2004			4 761 924
trade & services, excl. waste processing companies (industrial waste)	2005			4 925 344
trade & services, excl. waste processing companies (industrial waste)	2006			4 150 865
trade & services, excl. waste processing companies (industrial waste)	2007			4 689 914
trade & services, excl. waste processing companies (industrial waste)	2008			4 254 337
trade & services, excl. waste processing companies (industrial waste)	2009			3 855 139
trade & services, excl. waste processing companies (industrial waste)	2010			4 217 199
other (industrial waste)	2004			11 859
other (industrial waste)	2005			3 308
other (industrial waste)	2006			1 360
other (industrial waste)	2007			1 858
other (industrial waste)	2008			2 331
other (industrial waste)	2009			4 067
other (industrial waste)	2010			1 440

Flanders (total primary waste)	2004	23 622 617
Flanders (total primary waste)	2005	26 635 636
Flanders (total primary waste)	2006	26 268 059
Flanders (total primary waste)	2007	22 327 221
Flanders (total primary waste)	2008	20 804 753
Flanders (total primary waste)	2009	19 904 481
Flanders (total primary waste)	2010	20 546 021

data for household waste: database version 4 October 2012; data for industrial waste: database version 22 November 2012

Source: OVAM

Table 7b: Production of secondary waste in tonnes (Flanders, 2004-2010)

sector	year	total
waste processing companies	2004	11 085 373
waste processing companies	2005	13 855 235
waste processing companies	2006	18 896 499
waste processing companies	2007	14 988 319
waste processing companies	2008	16 981 138
waste processing companies	2009	17 336 492
waste processing companies	2010	20 685 934

database version 22 November 2012

Source: OVAM

Table 8: Discharges of industrial waste water per sector (Flanders, 2000-2011)

sector	year	BOD (tonnes O_2)	COD (tonnes O_2)	particulate matter (tonnes)	N (tonnes)	P (tonnes)	As (kg)	Cd (kg)	Cr (kg)	Cu (kg)	Hg (kg)	Ni (kg)	Pb (kg)	Zn (kg)	flow (1 000 m^3)
industry	2000	16 839	53 246	8 414	4 300	704	1 124	271	3 837	5 606	40	5 971	1 549	28 242	232 412
industry	2001	15 077	51 447	9 622	4 127	700	1 450	352	3 036	5 692	42	9 158	1 567	28 451	228 646
industry	2002	13 159	45 575	8 754	3 626	625	1 116	481	2 639	3 964	23	6 100	1 449	26 498	219 760
industry	2003	11 747	43 754	7 755	3 665	554	807	404	1 933	3 853	23	5 506	1 790	23 450	214 285
industry	2004	12 079	42 603	7 210	3 373	474	1 277	245	2 140	3 393	13	4 762	2 316	18 159	218 937
industry	2005	11 144	37 553	6 218	3 020	420	780	360	1 879	3 245	23	4 530	3 575	19 797	223 709
industry	2006	12 049	39 796	7 041	3 086	439	1 034	214	1 767	3 430	18	4 924	1 635	19 601	222 809
industry	2007	11 871	39 935	7 124	2 893	415	920	165	1 829	3 477	14	4 459	2 301	21 885	225 417
industry	2008	11 040	36 818	6 435	2 924	394	854	148	1 656	2 929	11	3 516	1 619	20 828	212 607
industry	2009	9 419	30 591	5 507	2 245	335	800	68	1 132	2 660	10	2 410	689	16 413	192 121
industry	2010	9 966	32 396	5 631	2 406	338	794	105	1 043	2 053	11	2 614	3 750	15 043	206 046
industry	2011	8 794	29 744	5 334	2 379	399	647	103	849	1 563	9	2 711	916	11 941	206 811
energy	2000	169	1 385	445	285	10	43	0	24	71	1	85	352	1 179	22 245
energy	2001	109	975	350	215	8	106	3	3	16	0	82	82	986	19 405
energy	2002	150	1 158	350	271	8	91	1	1	30	2	138	178	895	20 726
energy	2003	131	1 053	354	238	9	43	2	133	48	2	140	19	865	19 012
energy	2004	142	1 233	590	248	11	36	2	21	65	2	100	46	1 058	20 562
energy	2005	155	1 113	449	274	10	39	4	22	77	1	57	34	1 035	22 462
energy	2006	168	1 387	455	233	10	41	14	39	78	2	113	46	1 024	21 698
energy	2007	178	1 322	671	236	9	43	5	42	66	2	114	60	1 498	21 114
energy	2008	168	1 138	419	220	7	47	3	24	61	1	71	51	943	21 779
energy	2009	226	1 364	349	243	10	68	0	27	32	1	26	7	914	22 719
energy	2010	194	1 096	325	213	11	29	0	19	30	0	60	4	686	22 636
energy	2011	167	840	319	183	12	41	0	22	12	0	25	4	648	19 000
trade & services	2000	5 374	11 549	3 088	705	217	35	11	337	1 138	11	257	359	6 600	21 118
trade & services	2001	5 143	11 205	2 871	684	211	34	10	238	1 079	13	286	307	5 138	20 826
trade & services	2002	5 227	11 498	3 170	693	217	35	8	233	1 132	18	190	271	5 238	20 917
trade & services	2003	5 529	12 268	3 245	735	227	37	6	223	1 179	18	242	254	5 626	21 162
trade & services	2004	5 598	12 225	2 964	774	227	51	5	178	1 235	22	275	257	5 186	23 052
trade & services	2005	5 304	11 578	2 715	777	207	43	7	156	1 340	11	218	230	4 907	22 356
trade & services	2006	5 558	11 963	2 855	871	211	41	11	170	1 384	10	600	251	5 518	23 249
trade & services	2007	6 291	13 190	3 023	887	209	49	14	164	1 412	9	399	233	5 604	24 808
trade & services	2008	6 004	12 515	2 746	827	204	33	12	147	1 269	8	235	199	5 342	23 104
trade & services	2009	6 231	13 198	2 866	827	198	40	14	144	1 262	9	171	166	5 233	22 675
trade & services	2010	6 081	12 824	2 771	803	183	38	10	144	1 385	7	161	142	4 685	22 254
trade & services	2011	6 081	13 090	2 871	824	188	36	10	155	1 408	8	185	158	4 751	22 197

database version 1 July 2012

Note: the data concern the pollutant loads in the waste water from the Industry, Energy and Trade & Services sectors. The figures concern both the companies sampled by VMM itself from these three sectors as well as the companies that were not sampled but are estimated. These figures do not take any treatment at a public WWTP into account. In addition, there are still minimal pollutant loads from a few agriculture companies and a number of unknown companies. These pollutant loads are not included in the table.

Source: VMM

Table 9: Pressure on surface water from households and diffuse discharges from agriculture (Flanders, 2000-2011)

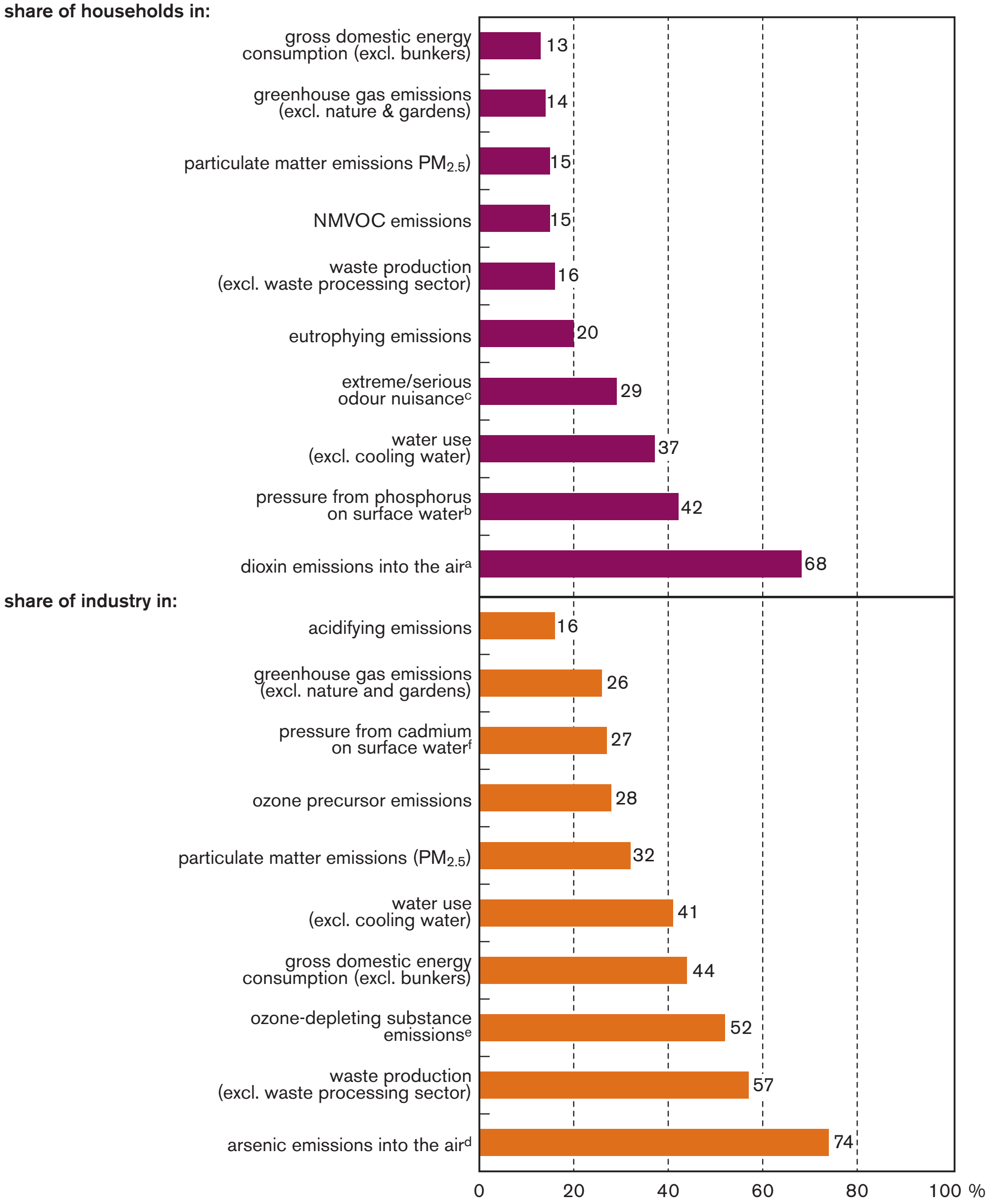
sector	year	BOD (tonnes O_2)	COD (tonnes O_2)	particulate matter (tonnes)	N (tonnes)	P (tonnes)
households	2000	34 585	91 419	30 908	15 239	1 811
households	2001	32 466	88 241	29 274	14 387	1 733
households	2002	30 423	83 019	27 444	13 601	1 670
households	2003	28 980	78 719	26 359	12 548	1 609
households	2004	27 441	75 760	25 247	11 676	1 561
households	2005	26 763	74 550	24 595	11 258	1 551
households	2006	20 112	58 199	18 829	10 288	1 351
households	2007	18 692	56 283	17 778	9 799	1 273
households	2008	17 117	52 023	15 796	9 002	1 184
households	2009	16 414	50 258	15 278	8 673	1 156
households	2010	15 712	48 494	14 760	8 345	1 128
households	2011	15 009	46 730	14 242	8 016	1 099
agriculture (diffuse discharges)	2000				23 152	1 515
agriculture (diffuse discharges)	2001				24 592	1 468
agriculture (diffuse discharges)	2002				24 063	1 439
agriculture (diffuse discharges)	2003				16 550	1 298
agriculture (diffuse discharges)	2004				18 293	1 338
agriculture (diffuse discharges)	2005				17 370	1 316
agriculture (diffuse discharges)	2006				18 795	1 293
agriculture (diffuse discharges)	2007				18 306	1 152
agriculture (diffuse discharges)	2008				17 932	1 134
agriculture (diffuse discharges)	2009				19 268	1 137
agriculture (diffuse discharges)	2010				19 745	1 168
agriculture (diffuse discharges)	2011				16 248	1 154

database version 1 July 2012 (households) and 1 November 2012 (agriculture)
Remarks:
- For households, the total amount of discharges relates directly and indirectly to the surface water and via WWTP.
- For agriculture, the diffuse COD, BOD and particulate matter discharges have not been estimated.

Source: VMM

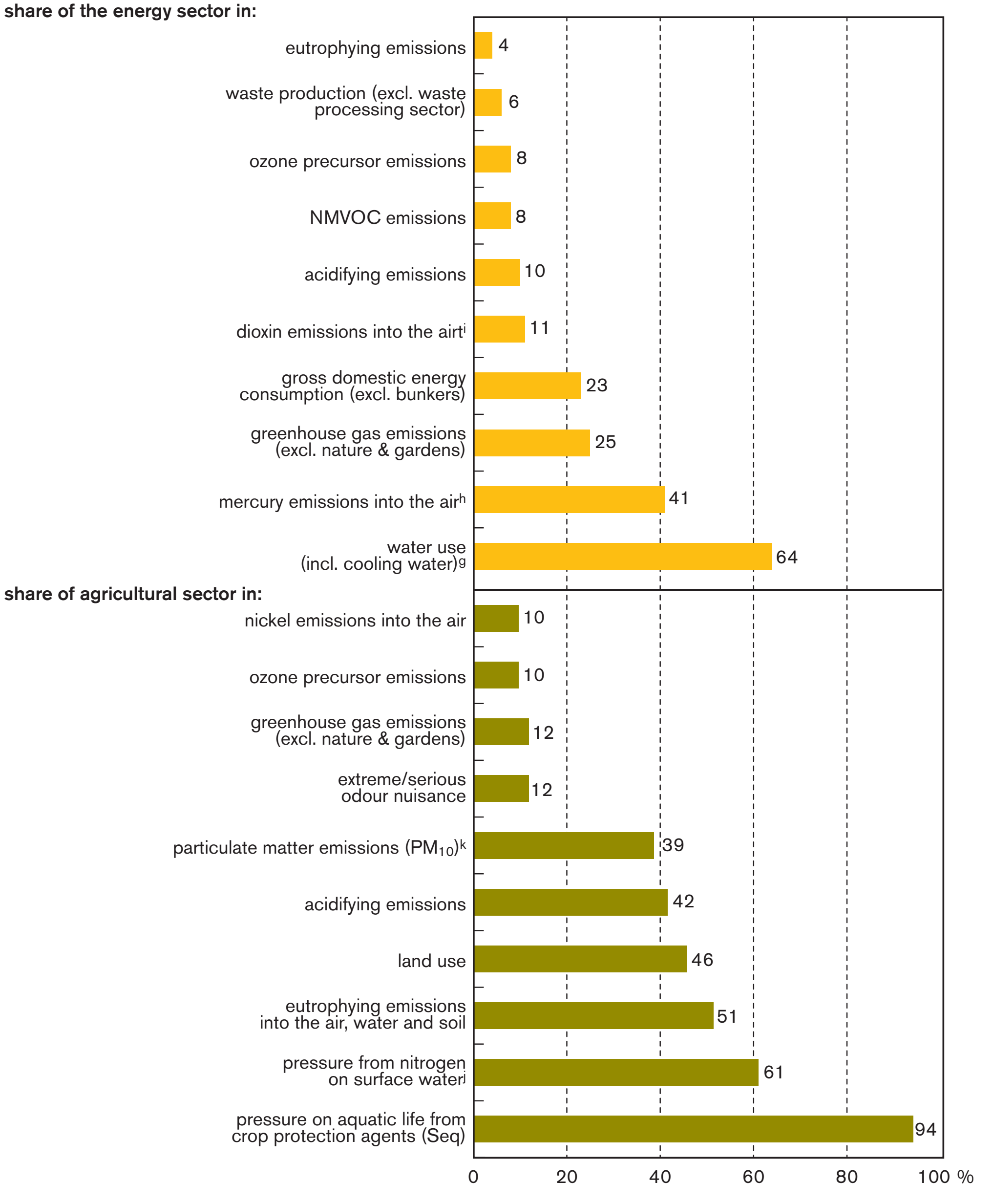
Environmental profile of sectors

The environmental profiles show the contribution of the different sectors to the environmental pressure in Flanders. For each sector, the ten biggest shares in use of natural resources and emissions are shown.



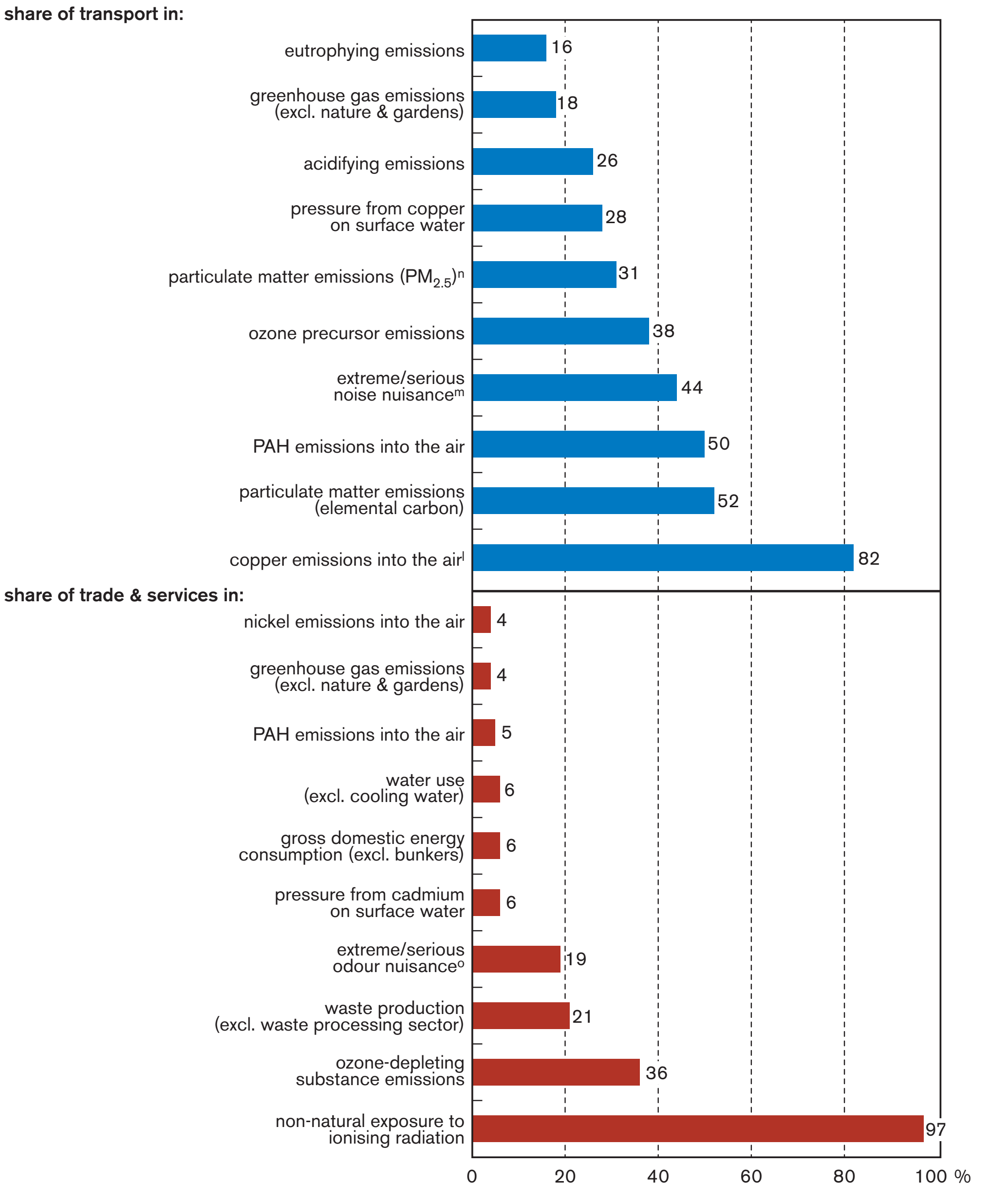
[a] share of households in PAH emissions into the air: 32 %, and CO emissions into the air: 18 %; [b] share of households in pressure from nitrogen on surface water: 30 % and with copper: 16 %; [c] share of households in extreme/serious noise nuisance: 21 %; [d] industry also has a major share in emissions of other heavy metals into the air, such as lead: 72 %, cadmium: 66 %, nickel: 56 %, zinc: 47 %, mercury: 42 %; [e] incl. energy sector; [f] share of industry in pressure from nickel on surface water: 27 %

households: data for 2011, excluding water consumption, waste production (2010), eutrophying emissions (2009); nuisance (2008); pressure on surface water with copper (2005)
industry: data for 2011, except for the production of waste (2010) and water consumption (2010)



[g] share of the energy sector in water consumption (excl. cooling water): 7 %; [h] share of the energy sector in nickel emissions into the air: 21 %, cadmium: 18 %, chromium: 13 %, arsenic: 11 %, lead: 6 %, zinc: 3 % and copper: 2 %; [i] mostly from waste incineration with energy recovery (electricity and heat production); [j] share of agricultural sector in phosphorous pressure on surface water: 44 %; [k] share of agricultural sector in fine particle emissions ($PM_{2.5}$): 20 %; share of the agriculture sector in elemental carbon emissions (EC): 20 %

energy: data for 2011, except for the production of waste, water consumption (2010) and eutrophying emissions (2009)
agriculture: data for 2011, excluding pressure on aquatic life (2010), land use (2010), eutrophying emissions (2009) and odour nuisance (2008)



[l] share of transport in chromium emissions into the air: 45 % and zinc: 43 %; [m] share of transport in extreme/serious light nuisance: 42 % and odour nuisance: 29 %; [n] transport share in emissions of particulate matter (PM_{10}): 26 %; [o] share of trade & services in extreme/serious light nuisance: 15 % and noise nuisance: 8 %

transport: data for 2011, except for eutrophying emissions (2009), extreme/serious noise nuisance (2008) and pressure from copper on surface water (2005)
trade & services: data for 2011, except for emission of ozone-depleting substances, waste production, water consumption (2010); nuisance (2008); non-natural exposure to ionising radiation (2006); pressure from cadmium on surface water (2005)

File on Flanders

	Flanders	Belgium	EU-27
total population (2012)	6 350 765	11 035 948	503 492 041
surface area	13 522 km²	30 528 km²	4 422 773 km²
population density (2011)	466 inhabitants/km²	355 inhabitants/km²	113 inhabitants/km² (2010)
population growth (2003-2012)	5.9 %	6.6 %	3.5 %
share of population aged 65 and older (2011)	18.3 %	17.2 %	17.5 %
share of population younger than 20 (2011)	21.9 %	22.8 %	21.2 %
gross domestic product (GDP) (2011)	210.6 billion euros	367.1 billion euros	12 454.0 billion euros
GDP per inhabitant (2011)	29 200 euros	29 400 euros	25 200 euros
average real annual GDP growth in 2002-2011	3.2 %	3.2 %	2.5 %
level of employment (a) (2011)	66.2 %	61.9 %	64.3 %
level of unemployment (b) (2011)	4.3 %	7.2 %	9.7 %
number of fatal traffic victims per 100 000 inhabitants (2011)	6.8	7.8	6.2 (2010)
life expectancy (at birth) (2010)			
men	78.5 years	77.4 years	76 years (2009)
women	83.3 years	82.6 years	81.9 years (2009)
proportion of CHP in gross electricity consumption (%) (2010)	19.3 (2011)	16.0	11.7
share of renewable energy sources in gross final electricity consumption (%) (2010)	7.5 (2011)	6.8	19.9

(a) number of employed as a % of the population between 15 and 64 years
(b) number of unemployed as a % of the population between 15 and 64 years

Source: Statistics Belgium (Statistics and Economic Information), Eurostat (Thematical statistics database), Research Service of the Flemish Government, Department of Employment and Social Economics, Flanders Energy Balance VITO

Glossary of Terms

Acid equivalent (Aeq): unit for measuring the level of acidity of contaminated substances. This unit enables to compare different acidifying substances with each other. One acid equivalent corresponds to 32 g of sulphur dioxide, 46 g of nitrogen dioxide or 17 g of ammonia.

Acidification: combined effect and impacts of mainly sulphur and nitrogen compounds (sulphur dioxide, nitrogen oxides and ammonia) that are brought into the environment via the atmosphere.

Acidifying emissions: see potentially acidifying emissions.

Adoption: increase in the proportion of diesel vehicles in the fleet of passenger vehicles.

Aerodynamic diameter: diameter of a spherical particle with a density of 1 g/cm³ that behaves in the same way as the particulate matter in the surrounding air.

$AOT40_{ppb}$-vegetation: excess above 80 µg/m³ of all hourly ozone concentration values between 8 am and 8 pm (Central European Time) during the months of May, June and July.

$AOT60_{ppb}$-max 8h: excess above 120 µg/m³ of the highest 8-hour average ozone concentration per day, totalled over all the days of one calendar year.

Battery-electric vehicle: vehicle with an electric transmission that draws all of its energy from a rechargeable battery.

Best available technique (BAT): collection of the technical measures that enable companies to work in the most efficient way for the protection of humans and the environment. The measures must be available (hence not experimental) and their costs must be proportionate and bearable for the industry sector concerned.

Bio-accumulation: accumulation of foreign substances in plant and animal tissue.

Biodiversity: variability in living organisms of various origins, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

Biofuel: liquid or gaseous vehicle fuel that is produced from biomass.

Biomarker of effect: measurement in the human body or another biological medium, which shows early biological effects.

Biomonitoring (human): to estimate the population's exposure to toxic substances and their effects on the population, biological monitoring is used, among other things, whereby the determination of the overall exposure level relies on measurements of the internal amount of a substance in the blood, urine or other biological media. Moreover, effect biomarkers can be measured to link the internal exposure to early reversible effects.

Carbon-intensive fuel: fuel whose combustion emits a relatively large quantity of CO_2 per unit of primary energy from that fuel.

CFC-11-equivalent (CFC-11-eq): measurement unit by which the ozone-depleting capacity of a product (ozone depletion potential or ODP value) is measured against the ozone-depleting capacity of CFC-11, whose ODP value is by definition equal to 1.

Chain euro: with the application of chain euros the volume increase between two successive periods, t and t+1, is calculated by using the prices of the year t. This eliminates the price effect and the increase in volume is accurately reflected.

Chemical oxygen demand: amount of oxygen that is required for each litre of polluted water to completely break down the organic substances (by oxidation, a chemical reaction).

Climate change: change in the climate as a result of increased concentrations of greenhouse gases in the atmosphere. The increased concentrations lead to an increase in the average temperature on earth, with shifts in climatic belts and extreme weather events as a consequence. Features of climate change are its global nature, the large uncertainties associated with the complexity of its constituting processes, the feedback mechanisms that can intensify or weaken a potential for major irreversible damage, gases persisting for a long time in the atmosphere, a big time lag between emissions and effects, and wide regional variations in terms of causes and certainly of effects.

CO_2 equivalent (CO_2-eq): measurement unit used to indicate the warming capacity (global warming potential) of greenhouse gases. CO_2 is the reference gas against which other greenhouse gases are measured. For example, 1 tonne CH_4 corresponds to 21 tonnes of CO_2 equivalents, because the heating capacity of CH_4 is 21 times greater than that of CO_2 for the same gas mass.

Cogeneration (combined heat and power - CHP): simultaneous conversion of an energy flow into power (mechanical energy) and heat (thermal energy) with a useful purpose. Depending on the process and the purpose, the heat is supplied at different temperature levels. The power generally drives an electricity generator or sometimes directly a machine (pump, compressor, etc.).

Conservation objectives: nature objectives established for the Flemish Region and per habitat area which indicate the form of nature to which to evolve in that area.

Critical load: maximal allowed deposition per unit of area for a certain ecosystem without – according to current knowledge – harmful effects appearing in the long term.

Crop erosion sensitivity: relative measure of the erosion sensitivity of a particular type of crop or land use, where a value of 0 indicates no soil erosion by water for this land use and a value of 1 indicates that soil erosion by water is maximal for this land use, that is, as severe as for completely uncovered (unprotected) soil.

Decoupling: occurs when the rate of increase of a pressure indicator is less than the rate of increase of an activity indicator or an economic indicator (expressed in constant prices). Decoupling is absolute if the increase in the pressure indicator is zero or negative. Decoupling is relative if the increase in the pressure indicator is positive, but not as great as that of the activity or economic indicator.

Defragmentation: spatial integration of fragmented elements; the defragmentation of one component (e.g. the defragmentation of residential areas through the construction of roads) caused mainly by the fragmentation of other components.

Degree-days: unit used to determine the yearly heating demand. Each average daily temperature is compared with a constant daily average of 15 °C, in other words every degree that the average daily temperature is below 15 °C is called a degree-day. Adding up all the days of the year gives the number of degree-days per year. The more degree-days a year has, the colder it was and the more fuel for heating was needed.

$DeNO_x$, $DeSO_x$: post-treatment processing techniques, cleaning systems that use catalysts to convert NO_x and SO_2, respectively, in flue and exhaust gasses into less toxic substances.

Deposition: quantity of a substance or group of substances that is deposited from the atmosphere in an area, expressed as a quantity per unit of area and per unit of time (e.g. 1 kg SO_2/ha/y).

Descriptive soil survey (DSS): soil survey in which the seriousness of the soil contamination is determined. The survey describes the nature, quantity, concentration and source of the contaminating substances or organisms, their possible distribution, the risk of exposure for humans, plants, animals and ground and surface water, and a prognosis of the spontaneous change in the contaminated soil.

Dioxins: group of 75 chlorinated dibenzo(p)dioxins and 135 chloro-dibenzofurans which are formed during the incomplete combustion of organic material in the presence of a source of chlorine.

Disability adjusted life years (DALYs): number of healthy life years that a population loses due to illness. This is the total number of the years lost due to death from the illness concerned (years of life lost) and the years lived with the illness, taking into account its severity (illness year equivalents).

Dispersion equivalent (Seq): measure of the pressure on aquatic life exerted by chemical agents. This weighs the volume used in terms of ecotoxicity and persistence in the environment.

Eco-efficiency: comparison of the environmental pressure caused by a sector/region (emissions, resource utilisation) against an activity indicator for this sector/region (production, volume, gross value added, etc.). An increase in eco-efficiency leads to an improvement in the natural environment only when the pressure also decreases in absolute terms.

Elemental carbon: harmful fraction of particulate matter mainly derived from incomplete combustion reactions and determined on the basis of chemical composition.

Emissions Trading System (ETS system): system in which a market price is established for the emission of 1 tonne of CO_2 or 1 tonne of greenhouse gases.

Emissions trading: trading in transferable rights to an emission (e.g. 1 tonne CO_2-eq).

End-of-pipe technique: purification technique which is applied at the end of the production chain.

Environmental expenditure: expenditure for the prevention and treatment of environmental pollution and nuisance on the one hand, and for nature conservation on the other hand. Expenditure is the amount of money actually spent in a certain year: it is the running or operational expenditure (the annual expenditure to keep environmental facilities operational – e.g. staff costs) and investment expenditures.

Euro x: term that appeared at the start of the 1990s to indicate an environment-related vehicle generation. A Euro 4 vehicle is more recent than a Euro 1 and complies with stricter European emissions limits. Standards for freight traffic are identified by Roman numerals.

Eutrophication: enrichment of soil, water (surface and ground water) with nutrients (nitrogen, phosphorus and potassium) as a result of which the ecological processes and the natural cycles can be disrupted. These disruptions can lead to eutrophication of fresh and salt surface water, elevated nitrate concentrations in surface and groundwater, a decrease in biodiversity and qualitative deterioration of food crops and drinking water supply pollution.

Exploratory soil survey (ESS): soil survey that answers the question of whether there are serious indications of the presence of soil pollution at certain sites; includes a limited historical investigation and limited sampling.

F gases: category name for greenhouse gases in Kyoto basket that contain fluorine: HFCs, PFHs and SF_6.

Fragmentation: division of spatial entities into smaller or less cohesive pieces.

Fungicide: pesticide against fungi.

Green cover: crop that covers the soil with leaves to a large extent in order to bridge the period between the harvesting of one crop and the sowing of another. Examples are clover, lucerne, yellow mustard and phacelia.

Gross domestic electricity consumption: all consumption of electricity in a country or region, including own production used on site, own consumption by the power plants and network losses.

Gross domestic energy consumption (GDEC): total primary energy consumption of a country or region minus the energy used for international shipping and aviation bunkers. This is also the total of the energy consumption by all end-users, on the one hand, and the energy losses (including from transformation) and the energy consumption by the energy sector itself, on the other hand.

Gross domestic product (GDP): indicator of the economic prosperity of a region or country. This is the sum of the gross value added (at base prices) that is produced in that region or country in the course of one year, plus product-related taxes minus product-related subsidies.

Gross final energy consumption: total of the energy raw materials supplied for energy purposes to all sectors outside the energy sector (electricity and refineries), but including the use of electricity and heat by the energy sector itself and the network losses during the production and distribution of electricity and heat. Not included is the non-energy end-use by industry and the transformation losses of the energy sector.

Gross value added: market value of the production without the amounts paid to other producers for the supply of raw materials, prefabrications and services that are needed for production.

Heat day: (or tropical day), day during which the maximum temperature is 30 °C or more.

Heat island effect: phenomenon where the temperature in an urban area is on average higher than the surrounding rural area. The most important causes are the absorption of sunlight by the dark material present in the city and the relatively low wind speeds. As a result, the problems during heat waves, such as heat stress, are exacerbated.

Heat wave: a period of at least five consecutive days during which the maximum daily temperature is 25 °C or more, and during which the temperature is above 30 °C for three days.

Herbicide: weed killer.

Hybrid vehicle: vehicle that uses at least two energy sources (such as a combustion engine and an electric motor).

Insecticide: pesticide against insects.

Integrated control: crop protection where biological and chemical pesticides are used in order to decrease the use of chemical pesticides in accordance with given specifications.

Low NO_x burner: type of burner with low NO_x emissions. The principle is generally based on lowering the combustion temperature since nitrogen oxides are mainly formed at higher temperatures.

Manure processing: treatment or processing of animal manure in such a way that the nutrients, contained in animal manure, are either (a) mineralised and the solid residue that remains after mineralisation is not deposited on agricultural land within the Flemish Region, unless the residue is first converted into artificial fertiliser, or (b) recycled and the final recycled product is not put on agricultural land within the Flemish Region.

Manure surplus: residual fertiliser supply expressed in kg nutrient (nitrogen or phosphorus) which, after relocation to own ground, the ground of third parties or for manure processing, for which no deposit possibility exists.

Mating disruption technique: control technique for plant-eating insects in agriculture, where female pheromones are dispersed so that the male insects can no longer find the female ones. This largely excludes the supplementary use of insecticides and is also species-specific so that no other organisms are affected.

Medical environmental network: three-line structure in the Flemish public administration responsible for environmental and health policy. The first line is provided by the medical environmental experts in the local health organisations and ensures the implementation of concrete projects and the initial reception of questions from citizens; the second line involves the tasks of environmental health services in the environment and health care administrations. They also handle, amongst other, more difficult and less common questions from citizens and prepare policy. The Flemish Centre of expertise on Environment and Health provides the third line, mainly through the implementation of policy-supporting environmental and health research.

MINA plan: Flemish environmental policy plan for a period of 5 years.

Mode: means of transport, such as moving with a passenger car, motorcycle, bicycle, bus, train, ship, plane, etc., or walking.

Natura 2000: European network of habitat and bird directive areas. According to Directive 92/43/EEC (Habitat Directive), a habitat directive area is a defined area which aims to conserve the natural habitat and the wild flora and fauna part of it. A bird directive area is a special protection zone designated in implementation of the Bird Directive (79/409/EEC) and designated by the decision of the Flemish Government of 17 October 1988.

NEC Directive: EU Directive on National Emission Ceilings (2001/81/EC) with the objective of limiting the emissions into the air of acidifying, eutrophying and ozone-forming emissions.

$NET60_{ppb}$-max 8h: number of days per calendar year during which the highest 8-hour average ozone concentration of that day is higher than 120 µg/m^3.

Net international investment position: difference between a country's claims on others and the claims of foreigners on the country.

Non-energetic use of energy sources: use of energy resources as a raw material for producing other products (e.g. natural gas for manure production) or use for non-energetic purposes (e.g. use as a lubricant or solvent).

Non-ferrous industry: produces non-ferrous metals (e.g. aluminium, copper) and prefabrications (from ores, primary and/or secondary raw materials).

Nutrient: (plant) feed including nitrogen, phosphorous and calcium.

Off-road: not intended for road use.

Offshore: in the sea, away from the coast.

Ozone precursor: precursor substance, substance from which ozone is created by the action of sunlight. Nitrogen oxides and non-methane volatile organic compounds (NMVOCs) are the most important ozone precursors.

Pact 2020: new future pact for Flanders contracted between the Flemish Government and the Flemish social partners with targets and actions towards 2020.

Particulate matter: category name for various fractions of smaller particles found in the air (e.g. PM_{10}, $PM_{2.5}$).

Passenger-kilometres: total number of kilometres covered in a certain time by all persons who travel with a certain category of means of transport.

Payment credit: credit in the budget that indicates the approval to actually make payments. The payment credit is taken into account when drawing up a budget agreement.

Phase plan: procedure aimed at formulating policy responses to results available from human monitoring campaigns. This procedure involves the active participation of stakeholders via participative processes.

Phreatic groundwater: upper part of the groundwater layer, just underneath the groundwater level in a relatively permeable layer and above a first poorly permeable or impermeable layer; liable to season-related fluctuations and sensitive to pollution.

Plug-in hybrid vehicle: hybrid vehicle with a battery that can be recharged via a plug with electricity from the mains network.

PM_{10}: fraction of the particulate matter with an aerodynamic diameter of less than 10 µm.

$PM_{2.5}$: fraction of the particulate matter with an aerodynamic diameter of less than 2.5 µm.

Policy credit: credit in the budget that identifies the policy freedom made available for entering engagements.

Polychlorobiphenyls (PCBs): collective name for organic compounds with 1 to 10 chlorine atoms that are used as solvents, degreasing agents, pesticides etc. They are readily soluble in organic solvents, oil and grease and are difficult to degrade. Consequently, they can be deposited in animal (and human) fatty tissue where they have a disrupting effect on hormones and can affect the immune system.

Polycyclic aromatic hydrocarbons (PAHs): category name for hundreds of organic substances that have various benzene rings at the basic structure. The best known, and at the same time most toxic, are the benzo(a)pyrene series.

Potentially acidifying emissions: total of the emissions of sulphur dioxide, nitrogen oxides and ammonia into the air; the acidifying effect depends on the neutralisation by bases and the buffering in soil and water.

Precursor substance: precursor, substance that acts as the precursor for another substance and that is part of the new substance.

Primary energy: the total energy content of the fuels purchased, plus the quantity of fuel needed for the generation of purchased secondary energy carriers and resources such as electricity and heat (steam etc.).

Primary energy consumption: quantity of energy that a country or region needs over a period of time to be able to meet its energy demand. Primary energy consumption is equal to the sum of primary energy production and net energy imports.

Primary waste: primary waste is created when a product becomes waste for the first time, namely at the first waste producer.

Real animal manure production: animal manure production calculated on the basis of excretion figures and prepared according to nutrient balances as specified in the Manure Decree and implementation decrees. In contrast, there is the flat-rate calculation based on fixed excretion figures per animal category.

Renewable energy source: energy source that is inexhaustible and can be used over and over again for generating energy. Examples are water power, solar energy, wind energy, energy from biomass (e.g. composting of vegetable, fruit and garden waste, composting of manure or silt and wood waste incineration), geothermal power, wave energy and tidal energy.

Residual waste: the non-separately collected household waste products (household waste, including the sorted residue of PMD waste; bulky waste; municipal waste).

Risk ground: ground on which an installation is or was located and at which an activity is or was carried out that is included in the list of activities that can cause soil contamination. This list is included as Appendix 1 to the Vlarebo (Flemish regulations on soil remediation).

Second general water level: reference level for sea level measurements at the Belgian coast established in 1947 by the Belgian National Geographic Institute as a vertical reference level for the whole of Belgium.

Secondary particulate matter: particulate matter that is created in the atmosphere by chemical reactions from gaseous components.

Sensitive area: area demarcated in implementation of the Nitrate Directive within which specific measures must be taken to prevent nitrate contamination from agriculture.

Significant: statistical term that indicates or can be assumed to indicate that a difference has occurred whether by coincidence or not. A difference is said to be significant when it strongly supports the conclusion that it has not occurred through coincidence but has been caused by something else.

Sink: activity or phenomenon that reduces the amount of greenhouse gases in the atmosphere. Sometimes also called a 'well'.

Soil contamination: presence of substances or organisms, caused by human activity, on or in the soil or buildings, which have a direct or indirect negative effect on or could affect the quality of the soil.

Soil erosion sensitivity: erosion sensitivity as determined by the soil texture (sand, loam, clay) and the percentage of organic material in the soil, regardless of land use. The incline is sometimes also taken into consideration.

Soil remediation project (SRP): study in which it is determined how the soil remediation will be carried out. Hereby, consideration is given to the best available technical solutions that have been successfully used in practice and whose price is not unreasonable in proportion to the result to be achieved in protecting humans and the environment, independent of the financial resources of those who are held to carry out the remediation.

Soil remediation work (SRW): work to carry out a soil remediation project.

Stratosphere: atmospheric layer located between an altitude of approximately 6 to 16 km (depending on the meteorological conditions) and approximately 50 km.

Summer day: day on which the maximum temperature is 25 °C or more.

Sustainable investment: sustainable investment is also called responsible or ethical investment. In this form of investment, not only the financial aspects are considered. At least as important is how a company performs with regard to humans, the environment and sustainable enterprise.

Sustainable saving: all forms of deposit in financial institutions that are subject to extra-financial criteria and strive for an added value for society. In concrete terms this means that, against the savings payments collected by banks, credits or reinvestments meet ethical or sustainability criteria. Many financial institutions also often make a financial solidarity contribution to partner organisations for projects in the 'social' or 'solidarity' economy.

Target value: a level that is specified with the aim of avoiding, preventing or reducing harmful consequences for human health and/or the environment as a whole and that – if possible – must be achieved within a specified period.

Tide amplitude: the difference between high and low water. For the Belgian coast, this is about 5 metres in the west and 4 metres in the east.

Tonne-kilometres: number of kilometres covered per transported tonne with a certain category of transport mode, multiplied by the number of tonnes of freight transported.

Toxicological equivalent (TEQ): expresses the toxicity of dioxin-like compounds using toxicological equivalence factors (TEF).

Troposphere: atmospheric layer located between ground level and an altitude of approximately 6 to 16 km (depending on the meteorological conditions).

Abbreviations

ADSEI: Directorate General Statistics and Economic Information

AEI: average exposure index

Aeq: acid equivalent

ALBON: Land and Soil Protection, Subsoil, Natural Resources Division of the Flemish Department of the Environment, Nature and Energy

AMS: Monitoring and Study Division of the Flemish Department of Agriculture and Fisheries

ANB: Flemish Agency for Nature and Forest

BAT: best available techniques

BBI: Belgian Biotic Index

BEAMA: Belgian Asset Managers Association

BOD: biochemical oxygen demand

CFC: chlorofluorocarbon

CFC-11-eq: CFC-11-equivalent

CHP: combined heat and power

CHPC: combined heat and power certificate

CNG: compressed natural gas

CO_2-eq: CO_2 equivalent

COD: chemical oxygen demand

CRED: Centre for Research on the Epidemiology of Disasters

DALY: disability adjusted life year

DIV: Flemish Vehicle Registration Directorate

DSS: descriptive soil survey

DU: Dobson unit

EC: elemental carbon

ECRAMS: environmental complaint registration and monitoring system

EEA: European Environment Agency

EIL: Emission Inventory Air of the Flemish Environment Agency

ESS: exploratory soil survey

ETS: European Emissions Trading System

EU: European Union

EU-15: European Union before the addition of 10 extra Member States in 2003

EU-25: European Union of 25 Member States

EU-27: European Union of 27 Member States

FOD Economy: Federal Public Service Economy

FOD MV: Federal Public Service Mobility and Transport

FOD VVVL: Federal Public Service for Health, Food Chain Safety and Environment

GDEC: gross domestic energy consumption

GDP: gross domestic product

GFT: vegetable, fruit and garden waste

HFC: hydrofluorocarbon

ICI: Institution for Collective Investment

INBO: Flemish Research Institute for Nature and Forest

INR: Federal Institute for the National Accounts

IPPC: Integrated Pollution Prevention and Control

IRCEL: Belgian Interregional Environment Agency

ISEW: Index for Sustainable Economic Welfare

KMI: Royal Meteorological Institute of Belgium

KU Leuven: Catholic University Leuven

LDAR: leak detection and repair

LNE: Flemish Department of the Environment, Nature and Energy

LPG: liquefied petroleum gas

LV: Flemish Department of Agriculture and Fisheries

MAP: Manure Action Plan

MINA plan: Environmental policy plan of Flanders

MIRA: Environment Report Flanders

MMIF: multimetric macro-invertebrate index for Flanders

NARA: Nature Report Flanders

NEC: national emission ceilings

NGI: Federal National Geographical Institute

NMBS: National Belgian Railways Company

NMVOC: non-methane volatile organic compound

OCP: organochlorine pesticide

OFDA: Office of U.S. Foreign Disaster Assistance

OVAM: Public Waste Agency of Flanders

PAH: polycyclic aromatic hydrocarbon

PBV: Promotion Office for Inland Navigation in Flanders

PCB: polychlorobiphenyl

PFH: perfluorohydrocarbon

PM: particulate matter

PSMSL: Permanent Service for Mean Sea Level

PV: photovoltaic

RDW: Dutch driver and vehicle licensing agency (Nederlandse Rijksdienst voor Wegverkeer)

RIO: residual interpolation optimised for ozone

RLR: Revised Local Reference

Seq: dispersion equivalent

SRP: soil remediation project

SRW: soil remediation work

STEG: steam and gas turbine or gas turbine with a combined cycle

SVR: Research Centre of the Government of Flanders

TAW: Second General Water Level

TEQ: toxicological equivalent

TOFP: tropospheric ozone forming potential

UGent: University of Ghent

VITO: Flemish Institute for Technological Research

VLAREM: Flemish Regulation on Environmental Permits

VLM: Flemish Land Agency

VLOPS: Flemish operational model for priority substances

VMM: Flemish Environment Agency

VOC: volatile organic compound

VREG: Flemish Regulator of the Electricity and Gas market

W&Z: Flemish Waterway and Sea Canal Authority

WEI: Written Environmental Investigation

WHO: World Health Organization

WIV: Belgian Scientific Institute for Public Health

Chemical symbols

As: arsenic

Cd: cadmium

CH_4: methane

CO: carbon monoxide

CO_2: carbon dioxide

Cr: chromium

Cu: copper

Hg: mercury

N: nitrogen

N_2O: laughing gas or nitrous oxide

NH_x: reduced nitrogen compounds (NH_3 and NH_4^+)

NH_3: ammonia

NH_4^+: ammonium

Ni: nickel

NO_x: nitrogen oxides, both nitric oxide and nitrogen dioxide

NO_y: collective term for oxidised nitrogen compounds (NO, NO_2, NO_3, HNO_3 …)

NO_2: nitrogen dioxide

NO_3: nitrate

O_2: oxygen

o-PO_4: orthophosphate

P: phosphorus

Pb: lead

PO_4: phosphate

SF_6: sulphur hexafluoride

SO_x: sulphur oxides

SO_2: sulphur dioxide

Zn: zinc

Units

dB(A): A-weighted decibel

dB: decibel

DU: Dobson unit

g: gram

ha: hectare

J: joule

m: metre

tonne: 1 000 kg

W_e: Watt-electric

W_{e+m}: Watt-electric and mechanical

Wh: Watt-hour (1 Wh = 3 600 J)

Unit prefixes

10^{1}	= da	(deca)	10^{-1}	= d	(deci)
10^{2}	= h	(hecto)	10^{-2}	= c	(centi)
10^{3}	= k	(kilo)	10^{-3}	= m	(milli)
10^{6}	= M	(mega)	10^{-6}	= µ	(micro)
10^{9}	= G	(giga)	10^{-9}	= n	(nano)
10^{12}	= T	(tera)	10^{-12}	= p	(pico)
10^{15}	= P	(peta)	10^{-15}	= f	(femto)

Data display conventions

Decimal code: .

Symbols used in tables:

.	= not applicable
..	= data not available
-	= nil (non-existent)
0	= less than 0.5 of the existing unit
0.0	= less than 0.05 of the existing unit
*	= provisional data

The **Flemish Environment Agency (VMM)** contributes to the realisation of the targets of the environmental policy by preventing, reducing and reversing the harmful effects in water systems and the atmosphere. Moreover, it reports on the state of the environment and contributes to the realisation of the integral water policy. Further information on the Flemish Environment Agency at www.vmm.be.

The task determined by decree[1] of the **Environment Report Flanders (MIRA)** is threefold:

- a description, analysis and evaluation of the current state of the environment;
- an evaluation of the environmental policy conducted to date;
- a description of the expected environmental developments in case of an unchanged policy and a changed policy according to a number of scenarios that are thought relevant.

Moreover, broad publicity must be given to the environment reports. MIRA provides the scientific foundation for environmental policy planning in Flanders. More information about the Flanders environmental reporting and the MIRA publications at www.environmentflanders.be.

[1] DABM, decree concerning general provisions on environmental policy of 5 April 1995, Belgian Official Journal 3 June 1995.

Colophon

MIRA Indicator Report 2012 is a publication of the Flemish Environment Agency (VMM) and produced by MIRA, the Environment Reporting unit of the Air, Environment and Communication department (ALMC).

The use of text from this report with acknowledgement of source is permitted and even encouraged. To quote: MIRA Indicator Report 2012 (2013) Marleen Van Steertegem (final editing), Flanders Environment Report, Flemish Environment Agency.

MIRA Indicator Report 2012 is available from www.environmentflanders.be.

Questions or suggestions?
MIRA: tel. 00 32 15 451 461,
e-mail: mira@vmm.be.

Layout and cover design:
Kaat Flamey, KA.AD

Typesetting:
Berthold Akzidenz Grotesk

Design:
Vanden Broele Grafische Groep

Illustrations:
Vanden Broele Grafische Groep

Translation:
Tradas nv/sa

Publisher:
Philippe D'Hondt, VMM
D/2013/6871/016
ISBN 9789491385216
(May 2013)

Flanders Environment Report
MIRA Indicator Report 2012

www.environmentflanders.be
www.vmm.be/mira

VMM
VLAAMSE MILIEUMAATSCHAPPIJ

Vlaamse overheid