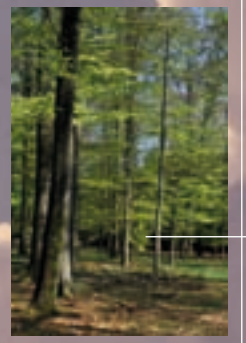

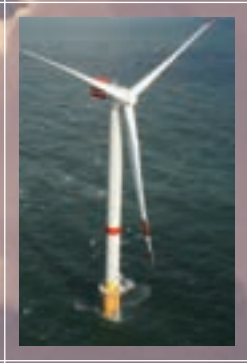

2009

BELGIUM'S FIFTH NATIONAL COMMUNICATION

CLIMATE CHANGE

Under the United Nations Framework Convention on Climate Change

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1. Executive summary

National circumstances relevant to greenhouse gas emissions and removals

Geography & Climate

Belgium has a relatively limited territory with moderate elevation levels. It is crisscrossed by an important network of waterways and a very dense communications network (roads and railways). The country is bounded by the North Sea. Belgium is highly urbanised and densely populated. The population's low growth rate results primarily from immigration. Belgium has a temperate maritime climate, characterised by moderate temperatures, predominantly westerly winds, cloudy skies and frequent rains. The evolution of temperatures in the past century reveals an upward trend, a phenomenon that has been accentuated in recent years. Flora and fauna in Belgium are typical of other areas of Europe with a temperate climate. Presently, only 20% of Belgian territory is still covered in woodland (forests of broad-leaved trees or conifers). This surface area has decreased slightly since 1990, as has agricultural land, which nevertheless still occupies the greater part of the territory.

Institutions

Belgium is a Federal State, composed of three language-based communities and three regions, each with its own executive and legislative bodies. Given the complexity of the structure of the country's institutions and of the division of powers between the different levels of power, the implementation of climate policy is decentralised. Cooperation bodies provide coordination and integration of the policies conducted by the different authorities, and ensure the consistency of national climate policy. Cooperation structures in the area of climate policy have been strengthened in recent years, in particular through the negotiation of a cooperation agreement for implementation of the National Climate Plan and the creation of a National Climate Commission charged with implementing the agreement.

Economy

Belgium has a very open economy, situated at the heart of a zone of intense economic activity. Exports of goods and services represented 92.1% of GDP in 2008 and imports 92.6%. The Belgian economy is currently dominated by the services sector. GDP at current prices in 2008 amounted to 344,206 billion EUR, i.e. per capita GDP 28,4% above the European Union average (27 countries) (22,5% above of EU 25).

Since 2002, economic growth in Belgium is higher than the average for the euro area, although almost equally between 2005 and 2007. 2008 was marked by the beginning of the world economic crisis whose effects could have consequences, particularly on employment, until 2011-2012.

Energy

Primary energy intensity has declined on the whole in Belgium since 1998, reflecting the uncoupling of economic growth and primary energy consumption. Buildings constitute the leading end consumer of primary energy (31%), followed by industry (30%) and transport (23%). Total final energy consumption decreased at a yearly rate of 0.9% between 2000 and 2007. Final consumption of iron and steel has continued a downward trend since 1979. Petroleum remains the dominant energy (49% in 2003) at end consumer level, followed by gas (26%), electricity (17%), solid fuels (4.7%), renewable fuel (2%) and heat (1.0%). Petroleum covers primarily the needs of the transport and residential sectors as well as non-energy uses (feedstocks). Electricity and natural gas, on the other hand, play a major role in industry and the residential sector, while the use of solid fuels is mainly confined to the iron and steel industry.

Electricity generation raised an average of 0.8% a year from 2000 to 2007. Nuclear plants generate 54% of electricity and classic thermal power stations 39%; the remaining 7% is generated by pumping power stations, hydraulic energy, wind energy and renewable recovery fuels. The share of liquid fuels in electricity generation has been declining for a number of years (from 52.7% in 1971 to 0.9% in 2007).

Electricity consumption is almost identical for the industrial sector (48.4%) and the residential and tertiary sectors (49.6%). Renewable energy constitutes a very small share of primary energy generation (5% in 2007), notably due to the relatively low potential for this type of energy in Belgium (small territory and limited availability of hydraulic, geothermal and solar resources). In time, renewable energy, which is being developed intensely, is nevertheless expected to constitute a substantial share of primary energy generation. Wind energy in particular is being developed through numerous projects. Renewable energy currently (2007) represents 5.4% of primary electricity generation.

Transport

Transport is a constantly growing sector given Belgium's situation as a country of transit, with an economy turned largely to export. This growth particularly concerns road and air transport. The number of passenger cars has risen spectacularly (motorisation rate in Belgium: one car for every two inhabitants). Growth is even higher for goods transport vehicles. Demand for fossil energy in the sector is expected to continue to rise. The development of new technologies to improve vehicle energy efficiency is taking a long time producing an impact on emissions in the sector. Road is by far the main mode of transport in Belgium, both for passengers (75.2% by private cars in 2007, compared to 4.8% for public transport) and goods (76% by trucks).

Industry

Industry in Belgium has changed profoundly since 1960 and its weight in the economy has declined. The metallurgy sector, constituted mainly of large companies situated in the heart of the former industrial areas of Wallonia, has undergone considerable restructuring as a result of the crisis that began in the sector in the 1970s. The textile sector, which has also had to cope with major difficulties during the same period, has tended to merge its activities. In contrast, the agri-foods industry has evolved into Belgium's third largest industrial sector. Chemicals account for one fifth of the turnover of Belgian industries; Belgium ranks tenth worldwide in this sector. The automotive industry in Belgium is limited to assembly, which takes place mostly in large plants owned by multinationals. Railway construction and the highly technological aviation sector also have a strong presence in Belgium.

Waste

Between 2004 and 2006, waste production increased by 6%. There has also been remarkable progress in the recycling of packaging. In 2008, the rate of recycling and recovery of packaging reached 96.6%, making Belgium a pioneer in this field.

Housing

Belgian housing stock is characterised by a high proportion of old buildings. The presence of central heating in Belgian housing reaches 80.3% (2007). Natural gas has now totally surpassed fuel oil as the main source of heat (54.1% vs. 34.5%). Coal has also shown a marked decline (1.3% in 2007). Housing equipment rate of appliances using energy is still in progress.

Agriculture

Belgian agriculture is specialised in market-garden and horticultural crops, cereals, potatoes, sugar beets, livestock and milk production. Fishing has relatively limited importance in the economy. Although agricultural land in use has remained relatively stable, the number of farms and the active population in this sector have continued to decline significantly in recent years, continuing a trend under way since the Second World War. The active population in agriculture and fisheries currently represents barely 1% of the population. In spite of this decline, agriculture and fisheries are still important economic sectors.

Greenhouse gas inventory information

In Belgium, greenhouse gas emissions were 9.9% less in 2007 by comparison with the reference year. However, this favourable trend masks contrasting tendencies as among the various sectors.

On the one hand, emissions caused by road transport have been increasing continually since 1990 on account of the growing number of cars and traffic that has become more intense.

Emissions from the residential and tertiary sectors fell in 2006 and 2007 by comparison with recent years although a number of indicators are rising such as the increasing number of dwellings and a greater number of employees in the tertiary and institutional sectors. This is because of two exceptionally mild winters which have had a considerable impact on the global trend for emissions in Belgium. This being so, the trend for the tertiary sector since 1990 continues to be a net increase for emissions.

On the other hand, the switch from solid fuel to gaseous fuels is observed in the electricity production sector and industry. Together with the development of biomass fuels in some sectors, this has resulted in a reduction of the CO_2 emission factor for a given level of energy consumption. The more rational use of energy is also developing but it often goes together with greater use of electricity, so its impact on actual emissions is generally more difficult to quantify. Finally, the closure of certain iron and steelworks over the past few years has also helped to cut emissions.

In agriculture, CH_4 and N_2O emissions are decreasing, reflecting a drop in the livestock population and certain changes in agricultural practices. In solid waste disposal, biogas recovery and use has resulted in a net reduction of CH_4 emissions.

Policies and measures

In the Belgian federal system, policies and measures to reduce greenhouse gas emissions are mapped out at different levels of responsibility based on the division of powers between the federal government and the regions. Each level of power establishes its own priorities for environment and climate policy. Coordination bodies have been set up to harmonise and create synergy between the policies implemented by the federal government and the three regions, the National Climate Commission being the most important. The general context for the preparation of climate change policies and measures is consequently determined by the plans established by the federal and regional authorities setting out policy objectives and strategies.

Through the cooperation agreement for the national burden sharing dated 8 March 2004, each federal entity has been assigned a target for reducing emissions by comparison with 1990: -5.2% for the Flemish Region, -7.5% for the Walloon Region and +3.475% for the Brussels-Capital Region. The balance, still in accordance with Europe's burden sharing, allows to Belgium a target of -7.5%, this means 2,442 million tons of CO_2 equivalent per year for the period 2008 to 2012 which falls to the Federal State.

At regional level a number of climate plans have been implemented. There is the climate policy plan for 2006 - 2012 for the Flemish Region, and the air and climate and atmosphere plan for the Walloon Region and the air and climate plan for 2002 to 2010 for the Brussels-Capital Region. Some of these plans have already been assessed and structures are already in place for preparing the next plans.

Under the aegis of the National Climate Commission a National Climate Plan has been set up. This is based on the various regional plans and federal measures. It is called 'Belgium's National Climate Plan for 2009 to 2012 - an inventory of the measures in existence as at 31 December 2008'. This plan is based on six sectoral strategic axes. These are to optimise the production of energy, to use energy rationally in building, to exert influence on industrial processes, to develop sustainable transport modes, to foster sustainable management of agricultural and forestry ecosystems, to reinforce efforts having regard to waste management and five auxiliary strategic axis that are more horizontal. These are to step up research efforts on the subject of climate change, to create awareness among Belgian protagonists of the fight against climate change, to reinforce direct involvement of the res publica in the reduction of greenhouse gas emissions, to implement flexibility mechanisms and to integrate the climate dimension into policy on development aid. Each of these axes has its corresponding series of concrete policies and measures. Within the framework of this chapter of this 5th National Communication these axis have been slightly modified.

Energy

Green certificates: this system assures an increasingly larger proportion of electricity produced from renewable energy sources; it works in tandem with a guaranteed price policy and the access of producers and consumers of 'green' electricity to the liberalised segment of the electricity market ; Investment support: investments designed to improve energy efficiency, increase the use of renewable sources of energy or cogeneration, and promote rational use of energy are encouraged by tax deductions or subsidies granted to companies and/or individuals ; these measures are supplemented with a number of provi-

sions, in particular concerning voluntary agreements, energy pricing, energy audits, insulation standards for buildings, the promotion of renewable energy sources and new infrastructure (notably wind energy).

Buildings

RUE measures and the use of RES mainly draw on financial incentives. These are mainly tax measures or premiums with the amounts being updated on a yearly basis, as well as the system of third-party financing enabling large-scale projects to be carried out with energy bill savings being reimbursed. Measures taken are part of the transposition of European directive 2002/91/EC on the energy performance of buildings.

Industry

Measures designed to reduce industrial non-energy-related greenhouse gas emissions come within the scope of regulations on environment permits (restriction on the use of fluorinated gases, introduction of best available technologies, etc.) and the voluntary agreements negotiated between the regional authorities and industrial federations (iron, steel, chemistry and paper). A 2008-2012 allocation plan for energy intensive companies also governs a CO_2 emissions reduction trading scheme.

Transport

In the transport sector, the actions undertaken by the federal and regional authorities focus basically on checking the growth of car traffic and promoting a 'modal shift' (to rail and waterway): Better public transport systems: Improvement of infrastructure, etc. ; Promotion of alternative means of transport: A set of measures to encourage people to use public transport, bicycling, business transport plans, etc ; Reduction of pollution from vehicles, taxation based on vehicle performance in terms of pollution and eco-driving.

Agriculture and forestry

Actions in agriculture focus primarily on reducing the factors of energy (greenhouse consumption), the factors of production (establishing new land application standards for animal manure, limiting growth of the livestock population) and improving farming practices (treatment, storage and spreading of manure, recovery of waste, combating soil degradation, etc.). Reforestation and forest conservation are encouraged by specific laws.

Waste

The policies implemented to reduce the volume of waste and to optimise treatment are based on environmental taxation (favouring re-usable packaging), stricter regulations (ban on landfill, compulsory treatment of landfill gases, standards for incinerators) and the development of specific channels for treating and recovering waste materials.

Flexible mechanisms

Belgium will use the Kyoto mechanisms to fulfill its emission reduction commitment. The National Climate Commission has been designated as the Belgian Designated National Authority (DNA) and Focal Point.

The federal government aims to purchase emission rights at the level of 12,2 million equivalent tonnes of CO_2 over the 2008-2012 period. Funding will be provided by the Kyoto Fund which is financed to the tune of approximately 25 million EUR a year.

The estimate for the Flemish emission credit requirement was amended in the Progress Report 2008 of the Flemish Climate Plan 2006 – 2012. The estimated requirement for the period 2008 – 2012 is currently 8.9 Mton CO_2-eq. By mid 2008 the Flemish Government has already invested 55.4 million EUR, or 57 %, of the total emission credit requirement in the period 2008 – 2012, assuming that the current prognoses are correct and assuming an average purchase price of 10 EUR per tonne.

In Wallonia, an objective of 575 000 tonnes of CO_2 for the 2008-2012 period has been set.

The Brussels-Capital Region has decided to invest $9.5 million over the 2005-2014 period in the World Bank's CDCF. This investment should generate around 97.5 kt of CO_2 equivalent for the region in CER (certified emissions reduction) for the first period.

Projections and the total effect of policies and measures

The 'with measures' scenario indicates the likely evolution of greenhouse gas emissions in Belgium under current policies and measures. This scenario includes all policies and measures adopted at the end of 2008 and described in the National Climate Plan of Belgium for the period 2009 – 2012. Under these policies, greenhouse gas emissions in Belgium (excluding LUCF) are expected to increase from 145.7 Mton CO_2-eq in the base year to 150.8 Mton CO_2-eq in 2020 (+3%). Main factors explaining the significant increase after 2010 are the assumed increased electricity demand combined with the nuclear phase out and increased production in industrial sectors producing process emissions.

Uncertainties regarding exogenous variables such as economic growth, climate conditions, electricity imports exist and their level influences the resulting greenhouse gas emissions, notably in the sectors covered by the EU ETS.

The additional measures presented in this report show an additional reduction effect of 11.3 Mton in 2020, reducing the total CO_2-eq in the 'with additional measures' scenario to 139.5 Mton CO_2-eq.

With the approval of the National Allocation Plan for the period 2008 – 2012 under the EU Emissions Trading Scheme, the Belgian Kyoto target is translated into a target for the sectors not covered by the EU ETS. This target equals 76.3 Mton CO_2-eq. The average non-ETS emissions level in the Kyoto period is estimated to be 79.9 Mton CO_2-eq or 3.6 Mton CO_2-eq above the annual target. Belgium will make use of the Kyoto Mechanisms to cover these remaining emissions.

Vulnerability assessment, climate change impacts and adaptation measures

Adaptation measures have been developed since the 4th National Communication. Firstly, with regard to the political framework, in 2007 the European Commission adopted a green paper on adapting to climate change in Europe. The paper gave rise to a wide-ranging public and interinstitutional consultation and was followed by the publication of a white paper on adaptation aiming to list community political instruments and set a short and medium-term work programme. Structures were created in Belgium to implement the adaptation.

Climate change projections

Some signs suggest that climate change is already underway in Belgium with very high annual average temperatures being recorded over the past two decades, roughly a 7% increase in annual rainfall since 1833 and early migration of some species of birds. Projections for Belgium predict an increase in winter (summer) temperatures of 1.7°C to 4.9°C (2.4°C to 6.6°C) at the end of the 21st century, a moderate increase in winter precipitation (from 5 to 20%) and a decrease in summer rainfall. The frequency of extreme climate events should increase and it is predicted that the speed at which sea levels are rising will quicken.

Ecosystems and biodiversity

Changes have already been observed in certain ecosystems with species attempting to adapt and / or migrate north or to altitude. In the wake of climate change, some accidentally imported exotic species have been able to establish themselves in our regions, while changes to phenology are threatening certain indigenous species and causing secondary impacts.

Agriculture and forests

If local temperatures do not rise by more than three degrees, climate change will have little impact on agriculture in Belgium. Furthermore, crop dynamics are fortunately proving stronger than those of climate change. However, this is not the case for forestry, and adaptation measures must be discussed and implemented without delay.

Flood risk and water resources

Water, agriculture and forestry are three of the areas that have made the most progress. Studies have already built knowledge and evaluation and management plans have been in place and in force for several years.

Seasonal water table level variations should more or less balance each other out over the course of a year. However, these variations can cause surface water pollution problems. Water body research and monitoring projects are underway in an attempt to better evaluate the future impact.

Human health

Heat waves, ozone problems and the emergence of new diseases are likely to become more frequent issues in the future. Studies are underway and plans have been put in place at a political level.

Vulnerability summary and evaluation

Vulnerability depends on climate variations, and the system's sensitivity to these variations and its capacity to adapt. Vulnerability is relatively difficult to asses as it depends on a range of factors.

However, we are starting to obtain interesting data on future climate change from emissions scenarios and socio-economic forecasts. Current data leads us to believe that ecosystems and forests will be vulnerable, even if average regional temperatures rise by less than 3°C (2°C worldwide) (in summer from the end of the 20th to the start of the 21st century). The coastal region, water resources, flood risk and human health could also be a concern in such a scenario, but there is still great uncertainty about the issue. Ecosystems and forests will probably be seriously threatened if temperatures rise by 3°C or more. Droughts and heat waves are likely to pose major health and water availability problems and could prove harmful for agriculture and the soil. The vulnerability of the coastal area should be limited during the 21st century as the rise in sea levels is a relatively slower process. A sharp and significant drop in emissions is however

needed to avoid sea levels rising by several metres over the coming centuries.

Financial resources and technology transfer

The Law of 25 May 1999 on international cooperation is the reference for Belgium's development cooperation policy. The most important goal is sustainable human development.

The direct bilateral ODA targets 18 countries, 13 of which are located in Africa. Five sectors are given priority: i) basic health care; ii) education and training; iii) agriculture and food security; iv) basic infrastructure; and v) conflict prevention and the consolidation of society. On top of these priorities four cross-sector themes relate to gender, environment, children's rights and welfare economics.

In a memorandum published in November 2008, the Minister for Development Cooperation confirmed that Belgium would wholeheartedly support the goals of the international community to realise the Millennium Development Goals (MDGs), with a catch-up action for Africa and special attention for fragile states. The fight against climate change, with a focus on adaptation to climate change by the LDCs, is one of the priorities.

In a difficult economic context, the government has decided for the 2009 budget to maintain its promise to spend 0.7 % of the gross domestic product on development cooperation in 2010. In order to achieve the agreed growth path, the government will realise 0.6 % in 2009.

For the fifth communication to the UNFCCC, the data for the calculations on expenditure relating to climate change were obtained from the ODA database of the DGDC. A sector analysis was performed, in which the following sectors were discussed in their entirety: environmental protection, water supply and waste water disposal, agriculture and stock farming, forestry, energy and fishing/aquaculture. Other sectors were partially included: humanitarian aid (sub sectors: coordination, prevention and reconstruction), industry (sub sectors: administration, research, agricultural industry, forestry industry) and multi-sectorial (sub sectors: general, alternative development, research, urban development, education and rural development). We estimate the contribution to climate-related programmes and projects in these sectors as a whole to be approximately 20 % for the period 2005 – 2008, or more than 259 million EUR. The largest part of this contribution to adaptation and mitigation will occur via direct bilateral cooperation with the Belgian partner countries (115 million EUR in the examined period). The multilateral cooperation is also an important channel (nearly 99 million EUR). Finally, we estimate that the climate-related contribution via cooperation with indirect participants (NGOs, universities, scientific institutions, etc.) is approximately 45 million EUR for the period 2005 – 2008.

The majority of field activities in the area of capacity building and technology transfer will be guided by multilaterals and indirect participants (NGOs, universities and other scientific institutions). The support of the International Agricultural Research via the CGIAR (Consultative Group on International Agriculture Research) is worthy of a mention. Belgium gives more than 6 million EUR annually to centres of the CGIAR.

Research and systematic observation

Science, technology, and innovation (STI) are policy areas under the authority of all the federated and federal entities of Belgium: the Flemish, Walloon, and Brussels-Capital Regions in the case of economically oriented research and technological development, the Flemish, French, and German Communities in the case of basic research and research carried out in institutes of higher education, and the Federal Government, in the case of research on specific topics. Both the Communities and the Federal Government are competent for a number of scientific institutes.

Autonomously or in mutual collaboration, different federated and federal entities manage research infrastructures, research dissemination structures, and collaboration at different levels. As a result, the Belgian science and innovation system is rather a blend of three major systems interacting to some extent in a number of areas, yet functioning independently within the Belgian context.

For all the federated and federal entities, international cooperation involves participation in a number of European and international bodies, research infrastructures, and programmes.

The Federal Science Policy Office funds several programmes, focusing mainly on space science, science in Antarctica, and science in a sustainable development context, including climate research and

earth observation. It also funds research infrastructures and research management and support tools such as thematic platforms, etc. Climate research and the observation of climate parameters are also performed in a number of federal institutes.

The Walloon Region develops projects and manages programmes and funds in support of R&D and technological innovation in companies, research centres, and universities of the region. Several ministries are responsible for STI activities in their own areas of competence: natural resources and the environment, social programmes and health, town and country planning, equipment and transport, sustainable energy and building, etc.

The French Community funds basic scientific research including climate research. In this context, ARC projects (Concerted Research Actions) are important science policy instruments.

In the Flemish Region and Community, a (new) policy area has been created, namely "Economie, Wetenschap, en Innovatie" (EWI, Economy, Science, and Innovation) in order to prepare, monitor, and evaluate public policy in the field of economic support and to stimulate scientific research and technological innovation. It plays a coordinating role in this policy area. Several Flemish research centres carry out climate-relevant research pertaining to forestry, agriculture, fisheries, and technological research. In addition, the Flemish Community funds basic scientific research including Climate research.

In the Brussels-Capital Region, science policy administration, including international cooperation, is managed by the IRSIB-IWOIB (the Institute for the Encouragement of Scientific Research and Innovation of Brussels). The main topics addressed concern the environment. More specifically, projects focus on CO_2 emissions as they relate to the region's climate policy.

In the German-speaking Community, funds for scientific research including climate research are mainly used for doctoral and postdoctoral grants.

The "Observation" section of this chapter is a short version of the GCOS report requested by the UNFCCC, providing additional information on national and worldwide observation activities relevant to global change. It covers both national and foreign ground-based observations and ongoing satellite observations.

Education, training and public awareness

The issue of climate change is an important preoccupation of the Belgian population and is increasingly coming to the forefront of public debate.

According to a European Commission survey conducted at the start of 2009, Belgians said that global warming was the world's second biggest problem after poverty and hunger and ranked it at the same level as the economic crisis.

More than six in ten Belgians (64%) claim that they have taken personal measures to fight climate change, while just over a third (35%) says they have not.

However, the Belgian public still needs more information in order to understand the phenomenon and causes of global warming.

A large number of general environment and more specific global warming awareness raising campaigns are run at the different political levels in Belgium (federal, regional and community).

Children and young people are being targeted. Environmental education is now well established in the Belgian education system. It is supplemented by a range of awareness raising initiatives outside of school. Sustainable development educational activities are run both in and outside of school by an increasing number of stakeholders who draw on public funding.

Higher education is also increasingly focusing on the issue of climate change with classes on the issue and units focusing on environmental issues, climate change, glaciology and climatic architecture.

The many awareness-raising and information campaigns, events, exhibitions, publications, training and competitions organised by or for the public authorities mainly focus on rational use of energy, particularly in daily life and in the buildings (construction, insulation, heating, solar and photovoltaic panels) and on travel and mobility.

These large-scale initiatives are supplemented by more targeted awareness raising initiatives and easy to implement practical solutions targeting certain groups, such as managers with a remit for energy in companies and certain professions (architects, teachers, heating engineers, mobility managers etc).

The chapter includes a list of websites aimed at the general public.

Climate awareness raising projects and training run in partnership with developing world countries are also mentioned.

2. National circumstances relevant to greenhouse gas emissions and removals

The preparation of this chapter was coordinated by:

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DG Environment – Climate Change Section

A brief overview of Belgium [1]

Population (on 1 January 2008):	10,666,866 inhabitants
Surface area:	30,528 km²
Federal capital:	Brussels
Head of State	HM King Albert II
Prime Minister	Herman Van Rompuy
National languages	Dutch, French and German
Currency	Euro (€)
GDP 2008 (current prices):	343,941 billion EUR
Annual GDP growth (in chained euros - reference year 2006)	1.0% (2008)
Active population by sector (2008): Agriculture: Industry: Construction: Services:	 81,700 619,100 263,900 3,471,400
Population density	349 inhabitants per km² (2008)
Highest point	Signal de Botrange (694m)
Average temperature (Uccle, 2000-2008):	10.8 ° Celsius
Precipitation (Uccle, 2000-2008):	881 mm
Hours of sunshine (Uccle, 2000-2008):	1,544 hours

2.1. Institutional structure

2.1.1. Federal structure of the state

Belgium is a Federal State composed of communities and regions[1]. After becoming independent in 1830, Belgium gradually evolved from a unitary to a federal structure. Five successive constitutional reforms (in 1970, 1980, 1988-89, 1993 and 2001) have resulted in the present-day governing structure [2].

The division of powers under the successive reforms evolved on the basis of two main criteria. The first is language, and more broadly, culture, which gave rise to the communities. The concept of 'community' refers to the people that make it up and the ties which unite them, namely language and culture. Belgium has three official languages: French, Dutch and German. Modern-day Belgium is therefore composed of three Communities: the Flemish Community, the French Community and the German-speaking Community. They correspond to population groupings. The French Community exercises its authority in the Walloon provinces, with the exception of the German-speaking municipalities, and in Brussels; the Flemish Community exercises its authority in the Flemish provinces and in Brussels; the German-speaking Community exercises its authority in the municipalities of the German-speaking region, all of which are situated in the Province of Liege (Figure 2.1).

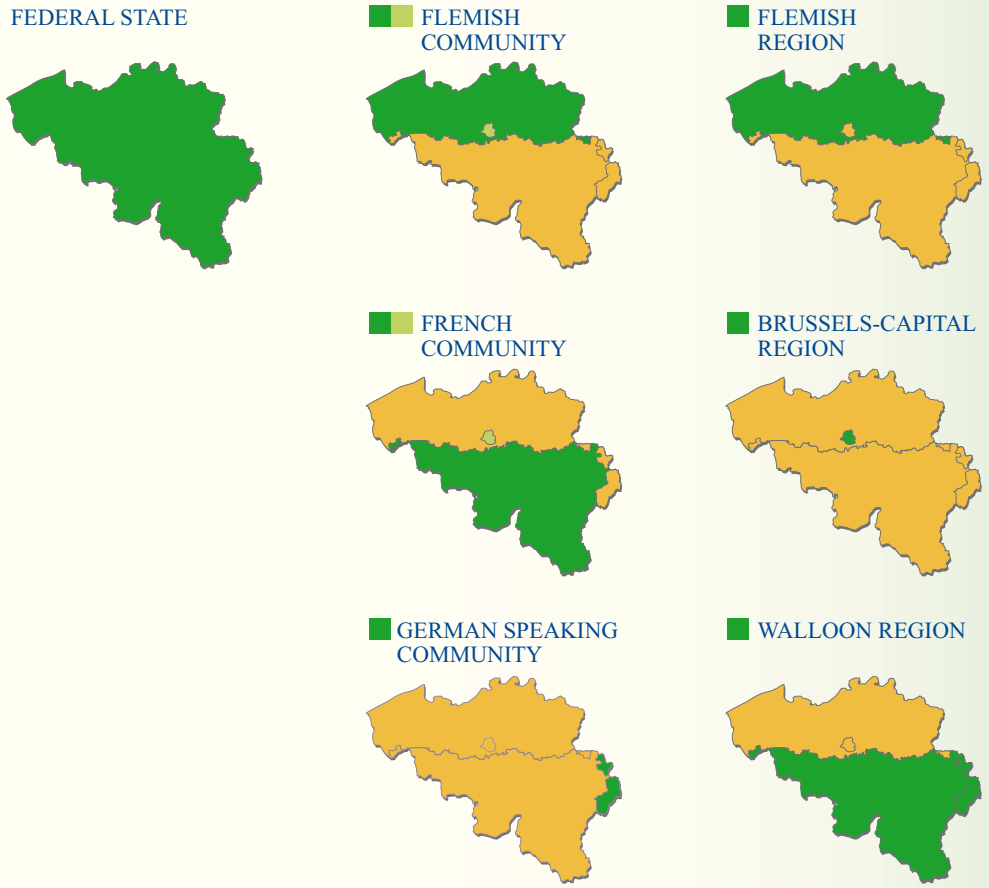
The second main thrust of the constitutional reform is rooted in history and in particular the aspiration of some for greater economic autonomy. The creation of three regions is the result of these aspirations. The three regional institutions are named after their territories, i.e. from north to south, the Flemish Region, the Brussels-Capital Region and the Walloon Region (Figure 2.1). Their powers have expanded during the different phases of the reform. Currently, each of the three regions has legislative and executive bodies: the regional council and the regional government. In Flanders, the community and regional institutions have merged, so there is only one Flemish council and one Flemish government.

The constitutional reform has thus created a three-tier system. The upper tier comprises the Federal State, the communities and the regions, all equal under law. They intervene on an equal footing but in different areas.

The middle tier comprises the 10 provinces. They act within the framework of the

[1] First article of the Belgian constitution.

Figure 2.1 Belgium, a Federal State



Source : FPS Chancery of the Prime Minister

federal, community or regional powers and are subordinate to all higher authorities.

The bottom tier of the edifice comprises the municipalities (589 in all), which are the level of power closest to the citizen. Like the provinces, they too are subordinate to the higher authorities. Depending on the area of power being exercised, they are therefore accountable to the federal government, the community or the region. They are financed and controlled primarily by the regions.

2.1.2. Division of powers

The federal government is responsible for key policies such as foreign affairs, defence, justice, finance, social security and an important part of public health matters and internal affairs. The communities and the regions are nonetheless responsible for establishing foreign relations for matters under their authority.

The powers of the communities concern matters related to 'persons': culture (theatre, libraries, audiovisual, etc.), education, use of languages and matters that can be 'personalised', including health policy (preventive and curative medicine) and assistance to individuals (child protection, social assistance, family assistance, reception of immigrants, etc.). The communities are also responsible for scientific research and international relations in the areas under their authority.

The regions have powers in areas related to occupation of the 'territory' in the broad sense. The Flemish Region, the Brussels-Capital Region and the Walloon Region are thus responsible for the economy, employment, agriculture, water policy, housing, public works, energy, transport (with the exception of the national railway, SNCB), the environment, town and country planning, rural revitalisation, nature conservation, credit, foreign trade, and provincial, municipal and intermunicipal administration. They are responsible for scientific research and international relations in the above-mentioned areas.

2.1.3. Coordination structures relating to climate policy

The Interministerial Conference for the Environment and the Coordination Committee for International Environment Policy

Given Belgium's federal structure and the division of powers, several structures have been created to promote consultation and cooperation between the different levels of power and to ensure consistency in the action of the Federal State and its entities. Sixteen interministerial conferences, each related to a particular policy area, have been created. The interministerial conferences are specialised committees whose members are the ministers concerned from the different governments.

One of these bodies, the Interministerial Conference for the Environment (ICE), is made up of the Federal Minister for the Environment, the Environment Ministers of each of the three regions (Brussels-Capital, Flanders and Wallonia) and the Federal Minister for Science Policy. Depending on the matter being addressed, and given the transversal nature of many environmental issues, this conference can be enlarged to include other ministers concerned. The ICE focuses on matters for which intergovernmental cooperation is required to implement environment policies. It plays a key role in climate policy. The decisions of the ICE are prepared and implemented by different working groups, which are answerable to the Coordination Committee for International Environment Policy (CCIEP), comprised of representatives of the different departments of the Federal and Regional public administrations concerned.

The CCIEP is the main body responsible for coordinating international environment policy, with the exception of matters related to European environment policy, which is the responsibility of the Directorate-General Coordination and European Affairs (DGE) of the Federal Public Service Foreign Affairs, External Trade and Development Cooperation. DGE plays a pivotal role, providing coordination for follow-up of Belgium's European policy, and consulting and collaborating with the partners of the federal and federated entities. It approves Belgium's positions for meetings of the Council of the European Union. The ICE and the CCIEP operate on the principle of consensus, which rules out unilateral decisions.

The principal CCIEP working group dealing with climate policy is the Greenhouse Effect Coordination Group. It is made up of representatives of all the federal and regional administrations and policy units as well as the federal and regional cabinets concerned with Belgian and international climate policy. This group's main task is to participate, by providing coordination for Belgium, in the development of strategy papers, decisions, recommendations, legislation and other European and multilateral regulations on climate change or on policy in the broad sense when climate change is one of the subjects addressed. The Greenhouse Effect Coordination Group also maintains contacts with other relevant Belgian policy and consultation bodies. It organises consultation with stakeholders on the above-mentioned subjects. The Coordination Group secretariat is provided by the Climate Change Section of the Federal DG Environment, which also serves as the National Focal Point for the UNFCCC.

The CCIEP Emissions Working Group is charged with preparing the national inventories of atmospheric pollutant and greenhouse gas emissions, in accordance with European and international reporting obligations. Methodology related to estimating historical emissions, including the harmonisation of the methodologies used by the three regions, is handled by this

group, which also contributes to emission inventories and reporting at European and multilateral level. The CCIEP Emissions Working Group contributes to efforts to implement obligations relating to inventories of atmospheric pollutant and greenhouse gas emissions.

The National Climate Commission

Established by the Cooperation Agreement of 14 November 2002 between the federal level and the three regions, the National Climate Commission, which was put into place at the end of 2003, is responsible for a number of tasks related to national implementation of climate policy. Its central responsibilities are implementation and follow-up of the National Climate Plan, follow-up and adaptation of the Plan's policies and measures, and the preparation of compulsory reports.

The National Climate Commission can also advise the CCIEP on international policy on climate change and greenhouse gas emissions. It is made up of four representatives of each of the Contracting Parties, appointed by their governments.

It is assisted by a permanent secretariat and thematic working groups which are mandated by the National Climate Commission to address different issues. Working groups have been set up to work on:

- PAMs (e.g. monitoring National Climate Plan policies and measures).
- Projections (e.g. harmonise greenhouse gas emissions projections made by the federal and regional authorities).
- Flexible mechanisms (e.g. 15 May 2007: law approving the cooperation agreement between the federal authority, the Flemish Region, the Walloon Region and the Brussels-Capital Region on the implementation of certain Kyoto Protocol measures, concluded in Brussels on 19 February 2007).
- Register (e.g. 18 June 2008 – cooperation agreement between the Federal State, the Flemish Region, the Walloon Region and the Brussels-Capital Region relating to the organisation and administrative management of Belgium's standardised and secure register system in accordance with the European Parliament and Council directive 2003/87/EC and decision 280/2004/EC of the European Parliament and Council.)
- DNA/FP (coordination of the tasks of the Belgian Designated National Authority (DNA) and Focal Point (FP)).
- Harmonise the energy balance developed by the regional and federal authorities.

Flanders Climate Policy Task Force

In Flanders, the Flanders Climate Policy Task Force (established on 20/04/01) is the consultation platform on climate policy involving the various levels of government. This Task Force covers all climate-relevant policy areas and is primarily responsible for drawing up, implementing and monitoring the Flemish climate policy plan. The Task Force was responsible for the development of the Flemish Climate Policy Plan 2006-2012 and its associated progress reports. The Task Force also ensures the preparation of the Flemish policy standpoint concerning the national and international climate policy. A number of working groups reporting to the Task Force are examining specific technical dossiers, such as the working group on 'emissions and forecasts', 'allocation plan' and 'flexibility mechanisms' and 'post-2012'.

Walloon Region Air-Climate Plan

A Walloon government civil servant was recruited to monitor the Air-Climate Plan which was finally adopted on 15 March 2008. An administrative task force bringing together the director generals of the administration and the public interest bodies affected by the plan (ISSeP, FOREM, SOFICO, SRWT, SWCS, SWL, FLW and the Wallonia Air and Climate Agency) was also set up. A steering group is managing the plan and driving it forward. The group sets priorities for the administrative task force.

Brussels-Capital Region Air Climate Plan

On 13 November 2002, the Brussels-Capital Region government adopted the "2002-2010 Plan for Structural Improvement in Air Quality and the Fight against Climate Change". The plan is the region's first air climate plan.

On 6 December 2007, the Brussels-Capital Region government approved a road map for an integrated climate plan by 2020. An inter-cabinet task force was tasked by the government with identifying the policies and measures planned by each of the regional authorities. The task force receives technical support from the Climate Plan department of Brussels Environment (IBGE), the Brussels administration of environment. This draft plan aims to cover all the region's competences which have an impact on the climate, namely buildings, town and country planning, socio-economic aspects, transport, the public authorities leading by example, funding and energy production. The second half of 2009 will be devoted to negotiating the measures resulting from this work with a view to drafting the second Climate Plan for the Brussels-Capital Region.

2.2. Population profile

2.2.1. Population distribution

Belgium is presently one of the most densely populated countries in Europe, with average density (2008) of 349.4 inhabitants/km^2 (third highest in Europe). However, this density varies considerably from one part of the country to another. The highest densities are found in a central

triangle formed by Antwerp, Brussels and Ghent. The Brussels-Capital Region has a density of 6,472 inhabitants/km². High population densities are also found in other areas, particularly in the coastal region and along an axis that passes through Wallonia from Mons to Liege. Inversely, a large part of the south of the country does not exceed 50 inhabitants/km². The Province of Luxembourg is the least densely populated (59.5 inhabitants/km²).

Belgian territory is highly urbanised with 135 towns, the largest of which are Brussels (1,048,491 inhabitants), Antwerp (472,071), Ghent (237,250), Charleroi (201,593) and Liege (190,102). The ten biggest towns make up close to 25% of the population. The major demographic process at work is the redistribution of urban populations in the new suburbs of cities or even in rural regions. Currently, the Flemish Region makes up 57.8% of the population, the Walloon Region 32.4% and the Brussels-Capital Region 9.8% (Table 2.1). Fertility is currently lower in Flanders than in Wallonia (1.76 vs. 1.84 – 2008 DGSIE estimations).

2.2.2. Growth and composition of the population

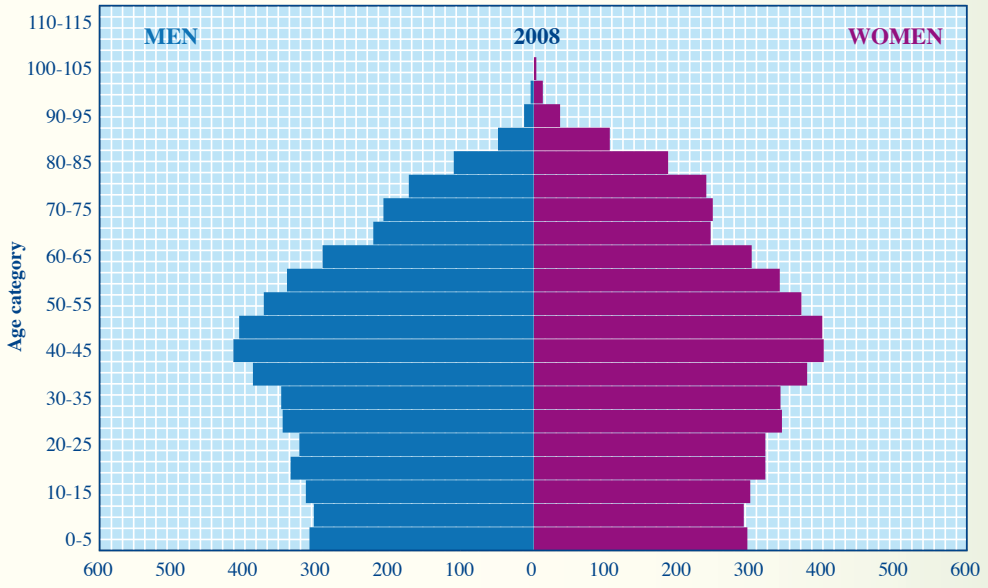
The Belgian population is growing yearly at the rate of 0.5% (Table 2.1). This growth, which is more sustained in the Brussels Region (1.2%) than in Flanders or Wallonia (0.4%), results in particular from immigration (nearly 9.1% of the population is of foreign origin). The declining birth rate, a decrease in the balance of immigration, marked improvement in medical care and a more selective immigration policy have gradually led to a reduction in natural growth and the ageing of the population (Figure 2.2). Foreign nationals, nearly two-thirds of whom are from European Union countries, reside primarily in Brussels (28.1% of the population of Brussels-Capital), and in the industrial regions of the Sambre and Meuse valleys, Belgian Lorraine, the mining regions of Limburg and in border regions.

Table 2.1 Population on 1 January 2008 and annual change

	Population	Annual change (2000-2008)
Belgium	10,666,866	0.51%
Flemish Region	6,161,600	0.46%
Walloon Region	3,456,775	0.43%
Brussels-Capital Region	1,048,491	1.16%

Source: FPS Economy – Directorate-General Statistics and Economic Information, Demographics Department.

Figure 2.2. Structure of the population on 1 January 2008
(by five-year age categories and for 1,000 inhabitants)



Source: FPS Economy – Directorate-General Statistics and Economic Information, Demographics Department.

2.3. Geographic and climatic profile

2.3.1. Geographic situation and relief

Belgium is a small country (surface area of 30,528 km²) in north-west Europe. It has 1,482 km of borders with the Netherlands, Germany, Luxembourg, France and the North Sea (its coastline is 73.1km long). The Walloon Region occupies the biggest part of the territory (55.2%), followed by the Flemish Region (44.3%) and the Brussels-Capital Region (0.5%) Belgium has three zones of elevation, oriented east-west and south-west: the coastal plain, the central plateau and the uplands. The highest points of the uplands constitute a ridge peaking at 694 metres at the 'Signal de Botrange'.

2.3.2. Climate

Its latitude and the proximity of the sea warmed by the Gulf Stream give Belgium a temperate maritime climate characterised by moderate temperatures, prevailing westerly winds, abundant cloud cover and frequent precipitation. Inland, the months of July and August are the rainiest, while on the coast the autumn months have the highest precipitation levels. The widest temperature range in the course of the year occurs in Belgian Lorraine, in the southern, most continental part of the country, and in Campine, owing to the type of soil [3].

Wind

Winds are predominantly southerly to westerly across the entire country. Average speeds are relatively uniform for the entire territory, except on the coast where they are higher. Storms can occur throughout the country between November and March, but are often most violent along the coast.

Temperature

In spite of its small surface area, Belgium presents temperature variations according to its geographic zones. The primary factor responsible for variations is the distance from the sea. The climate is the most continental in the south-east, in Belgian Lorraine, and is characterised by a greater temperature range between summer and winter. The second factor is elevation, from the coast to the Ardennes. The highest regions have colder average temperatures than the lower-lying lands. The diversity of the relief also gives rise to local differences between the plains and valleys. The different types of soil can also explain regional differences in extreme temperatures. The range of temperatures between the north and south of Belgium is not large in summer. During the winter months, however, the contrast is slightly more pronounced between the coastal region and the Ardennes, the latter combining the effects of altitude and an inland situation.

The average annual temperature for the 20th century, with readings taken at Uccle, has evolved in an ascending curve relatively in parallel with global warming (Figure 2.3). This evolution is characterised by an abrupt initial warming during the first half of the 20th century, followed by a second from the mid-1980s. The average temperature for the period 2000-2008 is 1.4°C above the normal value for the period 1968-2000. It is also remarkable that the 15 warmest years since meteorological readings began at Uccle have all occurred during the past 20 years (since 1988). Furthermore, the past ten years (since 1999) all form part of the 15 hottest years with two consecutive years – 2006 and 2007 – being the hottest in the series.

Table 2.2 Meteorological data

Normal values (1901-2000 and 1968-2000 for temperatures) and averages for the last eight years (2000-2008) (readings taken at Uccle, in the centre of the country.)

	Normal values	Average 2000-2008
Sunshine (hours)	1 554	1 544
Average real temperature (0-24 h) (°C)	9.7	11.1
Average maximum temperature (°C)	13.8	14.8
Average minimum temperature (°C)	6.7	7.4
Total precipitation (mm)	804.8	881
Number of days of precipitation (rain ≥ 0.1 mm)	207.2	197
Number of days of frost (min < 0°C)	46.8	42
Number of days of winter (max < 0°C)	7.8	3
Number of days of summer (max ≥ 25°C)	24.6	29
Number of days of heat wave (max ≥ 30°C)	3.3	5

Source: Royal Meteorological Institute of Belgium.

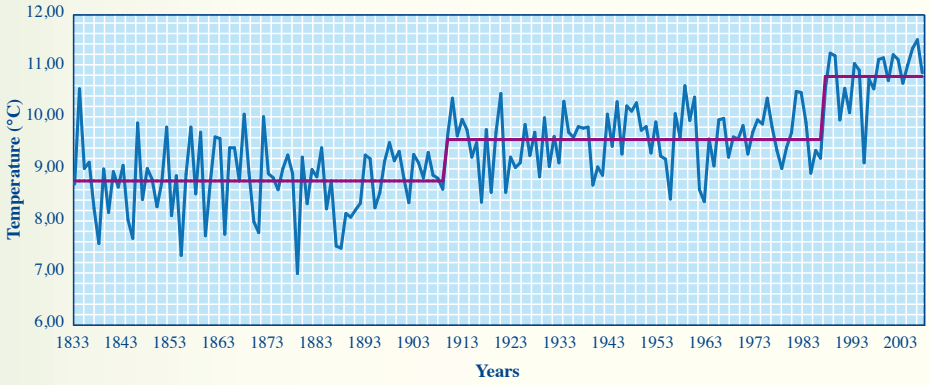
The annual average minimum and maximum temperatures during the 2000-2008 period systematically exceeded the averages over the past 40 years. There has on average also been an annual increase in the number of heat waves since the mid-1990s.

Remarkably, in 2008, there were no "days of winter", i.e. days when the maximum temperature dropped below 0°C, which is a highly exceptional situation (occurring on average once every 100 hundred years).

Precipitation

In the north of the country, precipitation increases from west to east, up to the Scheldt estuary. The region with the highest elevation, in the east of Belgium, has the highest precipitation levels. The Hautes Fagnes region has an annual average of 1,400 mm of precipitation, while the centre and north of the country receive from 700 to 850mm. It rains an average of 220 days a year in the highest points of the Ardennes, compared to 200 days in the rest of the country. The characteristics of snowfall in Belgium depend first and foremost on the altitude of the location, but also on the trajectories of air masses.

Figure 2.3 Evolution of the average annual temperature at Uccle (1833-2008)



Source: Royal Meteorological Institute of Belgium.

2.3.3. Hydrography

The abundant precipitation occurring throughout the year in Belgium and the presence of often impermeable soil have favoured the creation of an important network of waterways. Along with an abundant groundwater supply, these provide the national territory with an important quantity of drinking and industrial water, especially in Wallonia.

Two large rivers, the Scheldt and the Meuse, occupy a major place in the Belgian waterway system. They drain most of the territory although neither river has its source or mouth in Belgium. The basin of the Yser, the third biggest Belgian river, is almost entirely coastal. Small parts of Belgian territory form part of other hydrographic basins: namely the Rhine and Seine basins. In the north-west, the North Sea borders the Belgian coast along more than 73.1km.

Maritime Flanders is made up of a coastal region, composed of a narrow strip of beaches and dunes, behind which lie the polders. This strip of extremely fertile clayey soil some 15 km wide that follows the coastline extends along the lower Scheldt up to Antwerp and has been reclaimed from the sea and the estuaries through drainage. This zone is protected by dykes and is criss-crossed by drainage canals.

2.3.4. Ecosystems

In spite of the small size of the country and its slight topographical gradient, the climate and geological conditions have generated several types of ecosystems: Atlantic (dunes, heaths, marshes, peat bogs, prairies, deciduous forests), southern (calcareous prairies, groves, forests) and northern (peat bogs, pine forests). Belgian flora, which is typical of temperate zones, is characterised by forests of broad-leaved trees and conifers, and vegetation of prairies and heaths. At present, only 20% of the territory is still wooded. Forests remain in regions where the soil is the least suited to farming and grazing, primarily in the south of the country.

The flora has undergone significant modification, with certain species growing scarce or disappearing. The main causes are the abandonment of traditional farming practices, the intensification of agriculture, the increase in built-up areas and roads, the fight against floods, the regulation and pollution of waterways, and atmospheric pollution.

Belgian fauna is typical of temperate Europe. The most common small species include weasel, ferret, hare, rabbit, hedgehog, fox and squirrel. The forests are home to wild boar, roe deer and stags. Wild birds, including falcons, chaffinches, nightingales, owls, pigeons, sparrows and thrushes make up a large part of the animal population. Fish found off the Belgian coast include cod, mackerel, herring and flat fishes (skate and ray, sole, plaice and dab). They are very important commercially because they are caught at sea for their flesh.

Table 2.3 Land use - relative figures (% of total surface area, 2007)

	Surface area (km²)	Proportion occupied (%)
Total agricultural land(1)	17,352.32	56.7%
Forest and woodlands	6,058.99	19.9%
Built-up and related areas(2)	5,958.41	19.7%
Miscellaneous(3)	908.21	3.0%
Water(4)	250.00	0.8%

(1) including idle land
(2) except for scattered farm buildings
(3) fens, heaths, marshes, waste ground, rocks, beaches, dunes
(4) OECD estimate

Sources: FPS Economy – Directorate-General Statistics and Economic Information and FPS Finance (land registry). Calculations: FPS Economy– Directorate-General for statistics and Economic Information and FPS Finance based on OECD/Eurostat definitions

Table 2.4 The communications network (2005)

	Length (km)	Evolution 2005/1990	Density (km for 1,000 km²)
Roads	152,256		4,987.4
of which motorways	1,763	5.05%	57.8
Railways	3,544 3,374 (2007)	-1.58%	116.1 110.5 (2007)
Navigable waterways	1,516		49.7

Sources: FPS Economy– Directorate-General Statistics and Economic Information and FPS Mobility and Transport

2.3.5. Land use and communications

Agricultural land occupies the largest part of the national territory, while forests occupy close to 20% (table 2.3). The country is also criss-crossed by a very dense communications network (table 2.4).

Belgium has the second densest rail network in the European Union (after the Netherlands) and the second densest road network. Per thousand km², it has four times as many motorways and more than twice as many rail lines as the European Union average. Between 1990 and 2005, the length of the motorway network increased by 5.05%, while that of the rail network decreased by 1.58%.

2.4. Economic profile

2.4.1. Generalities

Until the middle of the 19th century, the Belgian economy was dominated by agriculture, but the country was quickly influenced by the industrial revolution that began in England. The construction of the railway contributed largely to that process, as did the presence of coal, which facilitated the development of heavy industry (especially in the south of the country).

Today, the weight of the manufacturing industries in the Belgian economy has diminished: over the last 30 years, the industrial sector has been surpassed in large measure by services, which currently make up close to 70% of the added value of the different branches of economic activity. The employment market has followed the same trend. In 1970, the industry and service sectors offered approximately the same number of jobs. In 2007, services employed nearly four times as many people as industry.

Belgium has a very open economy, situated at the heart of a zone of intense economic activity. In addition, the port of Antwerp ranks second in Europe (after Rotterdam) and is one of the world's top 10. Exports of goods and services represented 92.1% of GDP in 2008 and imports nearly 92.6%, meaning that the country registered a slight deficit.

This trade occurs in large measure with the European market. Half of Belgium's exports are sold to Germany, France and the Netherlands, and one fourth to other EU Member States. Imports follow more or less the same proportions. This situation reflects Belgium's role as the hub of the European Union.

Belgium also benefits from the presence of the European Commission in its capital, along with a high concentration of international agencies and service companies. Other international organisations, such as NATO, are also headquartered in Belgium.

2.4.2. Recent developments [4]

A gradual slowdown of economic activity was perceptible from 2006 onwards in Belgium. As in all the European countries, it was caused by world trade slowing down, the price of raw materials and the Euro rising. During the fourth quarter of 2008, the Belgian and European economies were hard hit by a sharp downturn in the general economic situation following on from financial tensions which intensified in September 2008.

In this difficult context over the whole of 2008 Belgium's gross domestic product (GDP) increased in volume by 1.1% (table 2.5). Growth was in fact 1.0% once seasonal effects had been taken into account.

In 2008, the progression of added value slowed down in all the branches of economic activity (table 2.6). Services experienced a moderate slowdown whereas the slowdown in the construction industry was a lot more marked. Finally, added value in industry dropped by 0.5%.

The economic growth observed in 2008 was based on both domestic (private and public consumption and investment) and foreign demand (exports).

As regards domestic spending, 2008, just like 2007, was marked by sharp gross growth of businesses' fixed capital (7.4% in volume), which did however slow down during the second half of the year at the same time as business prospects started to decrease in an increasingly difficult domestic and international economic climate.

Individuals on the other hand cut their spending, both in terms of final consumption (0.9% compared with 2.1% the previous year) and investment in property construction and renovation (1.0% following on from 1.3% in 2007).

Spending on final consumption by the public authorities rose by 2.1%, a similar rhythm to that observed in 2007.

The volume of goods and services exports for the whole of 2008 increased by 2.2%, down on the previous year's figure of 4.0%. This result conceals contrasting trends over the course of the year with an acceleration during the first six months followed by a slowdown which turned into a nose dive in the fourth quarter, thus reflecting the swift decline of international markets. Export trends also impacted on the import of goods and services due to exports having a high content of imported products. The progression of the latter was further boosted by strong investment from business. Imports therefore grew more than exports (3.3%) generating a negative 1.0 percentage point international balance of trade contribution to the growth of GDP.

The structure of employment in Belgium has changed profoundly over the last 35 years (Table 2.7). The number of people employed in agriculture and industry continued to fall while numbers working in the service sector increased.

Table 2.5 Real GDP growth rate (volume) – Variation (%) from previous year

	2000	2001	2002	2003	2004	2005	2006	2007	2008
OECD (1)					3.2	2.7	3.1	2.7	0.8
EU (27) (2)	3.9	2.0	1.2	1.3	2.5	2.0	3.2	2.8	0.9
Euro Zone (2)	3.9	1.9	0.9	0.8	2.1	1.7	2.9	2.7	0.7
Belgium (2)	3.7	0.8	1.5	1.0	3.0	1.8	3.0	2.8	1.1

(1) Source: OECD Economic Outlook 85 database, [5]
(2) Source: Eurostat

Table 2.6 Elements of GDP
(gross volume figures and variation (%) from previous year)

	2002	2003	2004	2005	2006	2007	2008
Gross domestic product	1.5	1.0	3.0	1.8	3.0	2.8	1.1
Agriculture, forestries and fisheries	4.3	-7.6	5.3	-11.6	-4.3	3.4	-3.1
Industry	-0.8	-1.2	2.9	0.1	3.6	2.6	-0.5
Construction	-1.5	0.9	3.5	3.7	8.4	3.6	1.9
Services	2.2	2.1	2.1	2.3	2.4	2.6	1.7

Source: ICN (=Belgian Institute of National Accounts)-BNB (=Belgian National Bank)

The labour market experienced appreciable growth throughout 2008. In total, employment rose by 71,000 in 2008, having increased by over 77,000 in 2007. Over 64,000 jobs were created in 2008 mainly in business and home services. The creation of new self-employed posts – some 7,000 people in 2008 – continued following on from an upturn observed since 2005.

A sharp drop in domestic employment is expected following the forecast drop in GDP in 2009 and its stagnation in 2010. An upturn could begin in 2011 or 2012 but it will take the labour market until 2013 or 2014 to return to its 2008 level.

2008 saw the start of the first major world economic crisis of the 21st century. Economic growth held up well during the first two quarters of 2008 in Belgium, especially when compared with other EU member states. However, like many other countries, Belgium experienced a very clear downturn in the fourth quarter. The economic decline is forecast to continue in 2009.

Annual average inflation rose to 4.5% in 2008 exceeding 3% for the first time since the 1989-1991 period. Inflation peaked at 5.91% in July 2008 following the sharp rise in energy prices, but since then has systematically slowed down. The Federal Planning Bureau forecasts that it will drop to an average level of 0.3% in 2009. May 2009 saw inflation drop to -0.37% with the last recorded negative inflation rate in Belgium being in December 1960.

According to the Federal Planning bureau's *2009-2014 Economic outlook* (May 2009), Belgium will only emerge from the crisis very gradually and a zero growth rate is expected for 2010. Economic growth is only forecast to recover from 2011 onwards at a rate similar to the historic trend (2.3% a year on average over the 2011-2014 period). [6]

Table 2.7 Evolution of employment by sector (sector % and thousands of people for the total figure)

	1973*	2000	2001	2002	2003	2004	2005	2006	2007	2008
Agriculture	4.4%	2.3%	2.2%	2.2%	2.1%	2.0%	2.0%	2.0%	1.9%	1.8%
Industry	39.5%	22.7%	22.5%	21.9%	21.4%	20.9%	20.5%	20.3%	20.1%	19.9%
Services	56.1%	75.0%	75.2%	76.0%	76.6%	77.1%	77.5%	77.7%	78.0%	78.3%
Total	**363.3**	**4092.7**	**4150.0**	**4144.5**	**4070.4**	**4138.9**	**4235.4**	**4264.0**	**4380.3**	**4436.3**

*Source: Eurostat, *INS (=National Statistical Institute)*

2.5. Energy profile

2.5.1. Primary consumption

Belgium has limited energy resources and is consequently highly dependent on other countries for supply, particularly since the end of the coalmining era (the last mine was shut down in 1992). Belgian energy policy is therefore guided by the diversification of both sources of supply and suppliers. Along with petroleum imports, the country has considerably expanded the use of natural gas. The government has also programmed the withdrawal from nuclear energy and is working to step up the use of renewable energy sources.

Primary energy consumption dropped on average by 0.3% a year over the 2000-2007 period (table 2.8). There are marked differences from one source to the next within this general decrease. Coal declined sharply (-45.2% a year) and only represented 7.8% of total consumption in 2007, in particular due to declining demand by certain sectors (coking plants and power stations). Consumption of petroleum and of nuclear energy remained relative stable. The overall rate of dependence (ratio of net imports to gross internal consumption of primary energy) was 88.1% in 2007. The relative rate of dependence on petroleum and petroleum products, which had slipped below the 50% mark in 1999 and

2000, moved back over that level in 2007, to 53.3%.

Primary energy intensity, the ratio of primary energy consumption to GDP expressed as a volume (1990 price), has been marking a break with the long-term trend since 1998.

Energy intensity measures the quantity of energy consumed by the economy to produce a production unit.

Having dropped sharply between 1980 – 1985, energy intensity continued to grow until 1998, when it began dropping regularly until 2002. It then increased slightly in 2003 before decreasing once again in 2006 and 2007. Energy intensity in 2007 is at the same level as in 1985 (figure 2.4).

A loosening of the link between economic growth and primary energy consumption can be seen over the 1980-2007 period, with this often being cited as one of the objectives of sustainable development [7].

2.5.2. Final consumption

Final energy consumption is a country's gross apparent primary energy consumption after deduction of processing activities and energy loss. Belgium registered an overall drop of 2.9% in 2007.

Industry's total final consumption dropped by 1.9% between 2006 and 2007, while the trend observed since 1979 indicates an average yearly reduction of 0.4%.

Industry's consumption – excluding the iron and steel industry – rose slightly by 0.3% in 2007.

The iron and steel industry recorded an 8.0% drop whereas the trend observed since 1979 indicated an average yearly decrease of 2.4%.

Despite a 1.2% drop in consumption in 2007, the transport sector is one of the sectors which has seen the most spectacular increases in final consumption over the 1979-2007 period (+60.4%).

The residential sector, considered as a whole, saw its final consumption drop quite considerably by 8.2% in 2007.

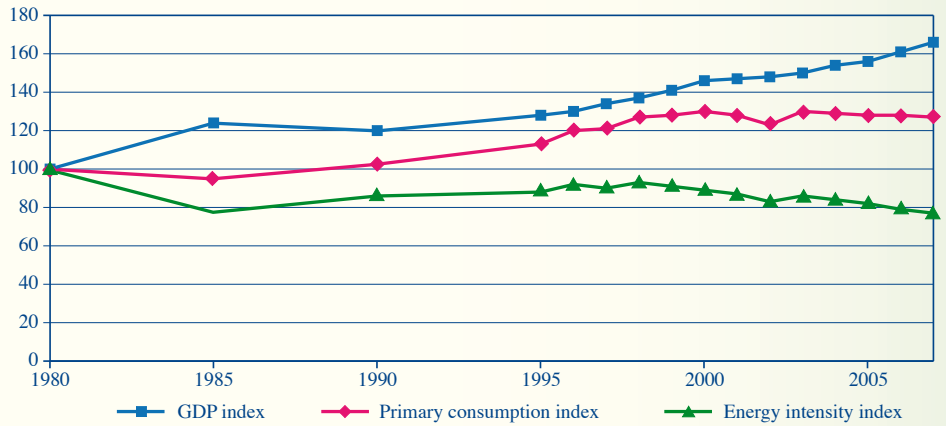
Table 2.8 Evolution of primary energy consumption

Gross apparent consumption in 2007, in Ktoe (NCV), and average annual growth rate in % calculated for the period 2000-2007

	2007		Evolution 2000-2007 (annual %)
Solid fuels	4,612	7.8%	-8.2%
Petroleum, petroleum products	23,073	39.2%	-0.9%
Natural gas	14,969	25.4%	+1.6%
Renewable fuels	2,917	5.0%	+17.1%
Nuclear energy	12,566	21.4%	+0.0%
Other (primary electricity)	682	1.2%	+7.4%
TOTAL	**58,819**		**-0.3%**

Source: FPS Economy, SMEs, Self-Employed and Energy, the energy market 2007

Figure 2.4 Primary energy intensity



Source: FPS Economy, SMEs, Self-Employed and Energy, the energy market 2007

While the consumption of the domestic sector dropped by 9.0% in 2007 following the reduction of degree days, the consumption of the tertiary sector (business and services) followed the same trend and also dropped by 9.0%.

Non-energy uses, which are an activity indicator for the petrochemical industry (naphtha, natural gas), also increased by 3.9% in 2007.

The iron and steel sector experienced a 50.0% drop in final consumption over the 1979-2007 period, while industry as a whole saw its final consumption decrease by 10.4% over the same period. However, industry (excluding the iron and steel industries) consumption increased by 20.8% over the same period.

The final consumption of the residential (and equivalent) sector dropped by 10.7% over the 1979-2007 period, whereas that of the non-energy sector increased by 29.0%.

Table 2.9 Evolution of final energy consumption (consumption in 2007, in Ktoe (NCV), and average annual growth rate in % calculated for the period 2000-2007)

	Final consumption (Ktoe) 2007	Growth as a % 1979-2007	Annual average rate as a % 1979-2007	Annual average rate as a % 2000-2007	Share as a % 1979	Share as a % 2007
Iron and steel industry	3,076 (7%)	-50.0	-2.4	-6.7	16.4	7.3
Other industries	9,450 (23%)	+20.8	+0.7	+0.5	20.9	22.6
Transport	9,510 (23%)	+60.4	+1.7	-0.1	15.8	22.7
Residential and equivalent	12,988 (31%)	-10.7	-0.4	-1.4	38.8	31.0
Non-energy uses	6,848 (16%)	+29.0	+3.0	+0.8	8.1	16.4
TOTAL	**41,872**	**+11.9**	**+0.4**	**-0.9**	**100.0**	**100.0**

Source: FPS Economy, SMEs, Self-Employed and Energy- The energy market in 2007 – 2008 edition

Final business consumption increased by 14.1% over the same period.

In Belgium, buildings (residential and tertiary) are the number one final consumer of primary energy (31%), followed by industry (29.9%) and transport (22.7%). Non-energy uses, which are an activity indicator for the petrochemical industry (naphtha, natural gas) also account for a substantial part of consumption (table 2.9). Overall final energy consumption dropped at an annual rhythm of 0.9% between 2000 and 2007. The final consumption of the iron and steel industry continued to drop following an underlying trend which began in 1979 (-50%) [8].

In terms of market share of total final consumption, petroleum remains the dominant energy (49.1% in 2007), followed by gas (26.3%), electricity (17%), solid fuels (4.7%) and heat (1.0%). Renewable fuels account for the remaining 2%. In the industrial sector, petroleum (8.4%) is now well surpassed by natural gas (42.2%), electricity (27.5%) and solid fuels (14.5%). Heat (2.7%) is now surpassed by renewable fuels (4.7%). As for the residential sector, natural gas (40.3%) became the leading fuel in terms of market share in 2007 followed by petroleum (32.3%), electricity (23.1%), solid fuels (1.6%) and heat (0.2%). Petroleum, which still has a preponderant share of the country's total final consumption, primarily covers the needs of the transport and residential sectors, as well as non-energy uses (feedstocks). Electricity and natural gas, on the other hand, play a major role in industry and the residential sector, while the use of solid fuels is basically limited to the iron and steel industry. In 2007, final consumption of renewable fuels in the residential sector exceeded that of solid fuels.

2.5.3. Liberalisation of the electricity and gas markets

The opening up of European electricity and gas markets is regulated by Directives 2003/54/EC and 2003/55/EC. Implementation at federal level of these Directives, transposed into Belgian legislation, has necessitated the adoption of important regulatory provisions with a view to the organisation of the Belgian electricity and gas markets: authorisations for electricity generating installations and direct lines, provisions governing management of the electricity transmission grid, authorisations for the supply of natural gas, measures organising consumers' eligibility, definition of public service obligations, authorisation scheme applying to intermediaries operating in the electricity sector, authorisation system relating to gas transmission installations, etc. Regional measures have also been adopted to ensure the full transposition into Belgian law of the above-mentioned Directives.

The Commission for the Regulation of Electricity and Gas (CREG) has been tasked with monitoring the application of laws and regulations relating to the organisation and workings of the electricity and

natural gas markets. The commission also acts as an advisory body to the public authorities.

The progression of domestic electricity prices since market deregulation has been affected by varying distribution costs in the different regions. Therefore, consumers in Flanders have benefitted from more advantageous conditions due to geographic and urban planning related factors. A system of 100 free kWh per connection and household member is also in place in the region and inhabitants therefore pay less for their electricity consumption. However, clients in Brussels and Wallonia who do not benefit from this system have seen their bills go up, with this situation worsening since the increase in distribution tariffs in 2008 [9].

The MWh price of gas increased from May 2007 to December 2008 before beginning to drop in January 2009 [10].

2.5.4. Electricity market

In 2007, total primary electricity generation amounted to 88,820 GW, increasing on average by 0.8% a year over the 2000-2007 period (table 2.11). In 2007, it was generated by nuclear power plants (54.3%) (figure 2.9) and by standard power stations (38.9%) (solid fuels 7.3%, gaseous fuels 30.7% and liquid fuel 0.9%). The remaining +/-6.8% was generated by pumping power stations (1.5%), hydraulic energy (0.4%), wind (0.6%), solar energy (0.3%) and renewable/recovery fuels connected to the electricity system (4.1%). The share of liquid fuels in electricity generation has been dropping for a number of years. From 52.7% in 1971, it had slipped to a mere 0.9% in 2007. Final electricity consumption increased at an annual rate of 1.0% during this same period. Consumption by the industrial sector (48.4%) is roughly equal to that of the residential and tertiary sectors (49.6%), with residential sector consumption progressing more quickly than industrial consumption (1.8% vs 0.1%) that it has exceeded since 2006. The remaining 2.0% is consumed by the transport sector.

2.5.5. Renewable energy

The main renewable energy source used in Belgium is biomass (figure 2.5). Renewable energy still represents only a small share of primary energy generation in

Table 2.10 Evolution of domestic electricity prices in Belgium between 2000 and 2007

Type of residential consumer	Evolution from 2000-2007
Da (annual consumption: 600kWh)	+ 23%
Db (annual consumption: 1200kWh)	+9%
Dc (annual consumption: 3500kWh of which 1300kWh at night)	+10%
Dd (annual consumption: 7500kWh of which 2500kWh at night)	+13%
De (annual consumption: 20000kWh of which 15000kWh at night)	+36%

Source: Eurostat

Table 2.11 Electricity generation: structure (2007) and evolution (average annual growth rate as % calculated for the period 2000-2007)

		2007		2000	Evolution 2000-2007 (yearly %)
PRIMARY PRODUCTION		88,820		83,894	0.8%
Nuclear		48,227	54.3%	48,157	0.0%
Hydraulic		389	0.4%	459	-2.3%
Pumping power stations		1,294	1.5%	1,240	0.6%
Geothermal, solar, wind, etc,		743	0.8%	15	74.6%
Renewable and recovery fuels		3,643	4.1%	1,219	16.9%
Liquid fuels	Fossil fuels	813	38.9%	32 804	0,7%
Gaseous fuels		27,238			
Solid fuels		6,473			
IMPORTS		15,816		11,645	4.5%
EXPORTS		9,037		7,319	3.1%

Source: FPS Economy, SMEs, Self-employed and Energy

Belgium (less than 1% for the period 1990-2000 and 5.0% in 2007) [11]. This situation is related to a number of factors, including the relatively low potential of this type of energy in Belgium. The small territory and the limited availability of hydraulic (whose potential has almost been completely harnessed), geothermal and, to a lesser extent, solar resources, are obstacles to the development of renewable energy in Belgium. The public authorities are nonetheless endeavouring to promote the development of renewable energy as a response to the issues of security of energy supplies and polluting emissions, and with a view to enhancing the value of local resources and creating jobs. In time, renewable energy is expected to constitute a substantial share of primary energy generation. Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources establishes an indicative target of 6% of electricity from renewable sources in gross electricity consumption, to be attained by 2010. Various wind energy projects in particular are being implemented. In 2007, renewable energy (hydraulic, wind, biomass and recovery fuels) represented 5.4% of primary electricity generation.

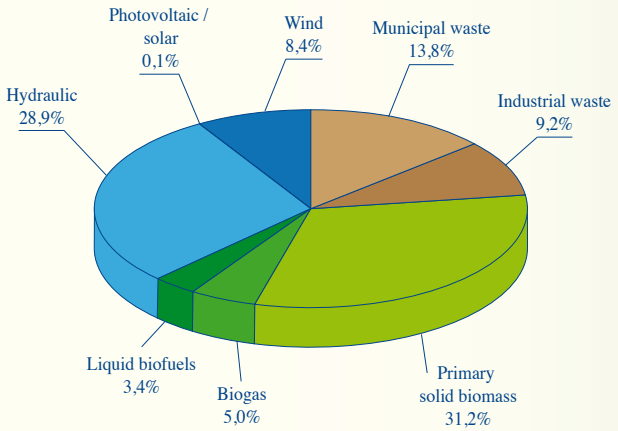
In the Walloon Region, 2.6% of electricity generation is derived from renewable sources and the region's capacity reached 306 MW in 2007. These figures are continually evolving. Wind electricity generation is being developed to an ever larger extent. In the Flemish Region, green energy production increased in the period 2004 – 2007 from 630 GWh to 1641 GWh. This increases the share of Flemish green energy in energy supply to 2.7 % in 2007.

Table 2.12 Sector electricity consumption (in GWh)

	2007	2000	Annual evolution (2000-2007)
Industry	40,133 (48.4%)	39,868	0.1%
Transport	1,675 (2.0%)	1,443	2.2%
Domestic and equivalent	41,088 (49.6%)	36,231	1.8%
Final consumption	82,896 (100%)	77,542	1.0%

Source: FPS Economy, SMEs, Self-employed and Energy

Figure 2.5 Contribution of different sources to primary generation of renewable energy (2007)



Source: FPS economy

2.6. Transport

2.6.1. General description

Belgium, densely populated and located at the centre of Europe, is an important centre of transit. The country's economic activity, which is strongly export oriented, requires a dense road and rail network (one of the densest in the European Union). The expansion of the intra-European area has further increased transit traffic, resulting in constant growth of transport, a large consumer of petroleum products (figure 2.6). This growth particularly concerns road and air transport, which have the highest growth rates. Road transport is the most energy-consuming means of transport in Belgium (8,196,000 toe in 2007). It also consumes the most energy per unit transported per km on land. The number of passenger cars has skyrocketed and is not conditional upon the economic context (motorisation rate in Belgium: one car for every two inhabitants).

The motorisation rate remains high with over 5 million cars for 10.5 million inhabitants. Since 2000, the ARCI index has been close to 133, which represents an average of 15,000km a year per private car, with this trend also being observed in other European countries. Moreover, 70% of Belgians use their car on a daily basis compared with only 53% of the Dutch.

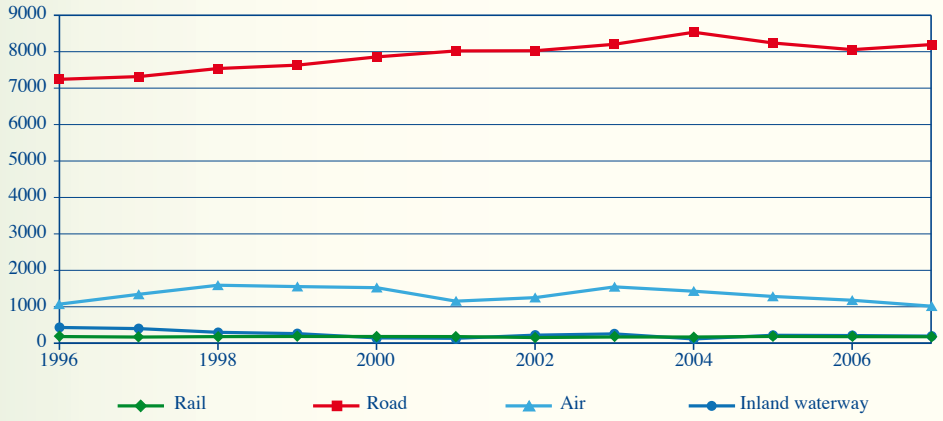
Recent trends also tend to demonstrate that new technologies serving to boost vehicle fuel efficiency are not being developed fast enough for the moment to offset the effects of increased road traffic.

2.6.2. Passenger transport

If personal mobility is expressed in passenger kilometres travelled, cars (and motorcycles) are still the main means of transport in Belgium (75.2% of all motorised mobility in 2007). Public transport makes up only 4.8% of passenger transport (Table 2.13).

Passenger car use has continued to rise over the past years, although to a lesser extent than public transport (bus, underground and railway). This continuing rise

Figure 2.6 Transport final energy consumption – by each mode of transport (1,000 toe)



Source: Eurostat

Table 2.13 Evolution of road mobility in 2007 (expressed in passenger kilometres)

Billions of passenger km / year	CARS and motorbikes	PUBLIC TRANSPORT (underground, tram, bus, accredited coach)	OTHER COACHES (private owner, foreign companies)	RAILWAY
TOTAL 150.79	113.38	7.25	20.22	9.932
Flanders	62.89	3.94	5.68	5.74
Wallonia	45.14	1.79	7.28	3.36
Brussels-Capital Region	4.25	1.53	0.65	0.83
Relative share as a % 2006:	75.2% 76.0%	4.8% 4.8%	13.4% 12.6%	6.6% 6.6%
EVOLUTION 2006-2007	+2.1%	+4.4%	+9.4%	+3.4%
1960:	47	Increase since 1960	221%	

Source: FPS Mobility and Transport, INS and SNCB

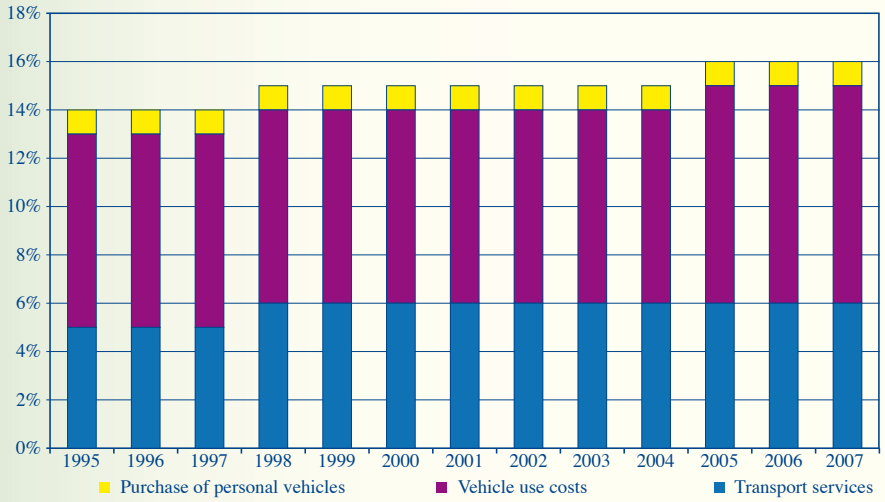
in the use of motor vehicles for passenger transport can be explained by the following factors:

- 'De-urbanisation' and the dispersion of housing (or the growth of outlying urban areas).
- Development of the services sector, combined with limited polarisation in the establishment of businesses and companies.
- An increase in households' available earnings and leisure time.
- Taxation that has so far remained favourable to the acquisition of company cars and to vehicle use.
- The development of Brussels as national capital and seat of the European institutions, which generates employment, but also commuters.
- The increasing complexity of mobility patterns, encouraging more frequent use of cars.
- Mobility practices and households' choice of comfortable vehicles whose occupation rate is ever lower. (See high motorisation rate).

The combination of these factors, which all lead in the same direction, risks having consequences for ongoing growth of road traffic for passenger transport and the resulting emissions (according to the Federal Planning bureau, the number of passenger kilometres will increase by 30%, the number of tonnes - kilometre by 60% and greenhouse gas emissions by 18% between 2005 and 2030). The growing saturation of roads, moreover, is leading to an increase in fuel consumption (and emissions) that surpasses the increase in kilometres travelled. Paradoxically, deteriorating traffic conditions caused by the reduction of the average speed on the road network is encouraging people to use their cars (*to save time*) rather than public transport, which further worsens the problem. Finally, the growing use of diesel fuel in Belgian passenger cars (57% of cars in Belgium now run on diesel) is also having an impact on the evolution of emissions (lower for CO_2, but higher for NO_x and PM). Moreover, in 2008, 79% of the newly registered cars were diesel-driven. The use of air conditioning is also rising sharply.

Household spending on transport rose more rapidly than total consumption, increasing from 13.7% in 1995 to 15.8% in 2005. The increase was primarily caused by a rise in spending on vehicle use and to a lesser extent by the purchase of vehicles [12].

Figure 2.7 Evolution of spending on transport as part of total household consumption in Belgium (%)



Source: Federal Planning bureau

FEBIAC (the Belgian automobile and cycling association) announced that the sale of clean cars – which entitles purchasers to a financial incentive provided by the state[2] – increased two-fold in Belgium in 2007, passing the 31,000 mark. Clean vehicles gained an 8.2% market share in 2008.

As alternative means of transport, the sale of two-wheeled motor vehicles is rising and the cycling culture is still popular in northern Belgium, while there is an emerging cycling culture in Brussels and the Walloon Region. All the public modes of transport are expanding significantly following efforts by the authorities to provide more sustainable transport and more customer-focused private policies.

Public transport

The decrease in market share experienced by public transport in the past has stopped and the various public transport companies are investing significantly to increase their capacity.

2.6.3. Transport of goods

All modes of freight transport are increasing significantly in Belgium due to the country's geographic location – at the heart of the main European markets – and its logistics and transport expertise. Global transport volumes have increased in 2007 and this growth is forecast to continue due

[2] See PAMs: NCP measure TR-C01

to global economic growth (China, Brazil and India, for example).

Road transport (with an approximate 75% market share) accounts for most of land transport, as it continues to be flexible, reliable and offer a competitive price, and wins out over rail transport (an approximate 11% market share) and inland waterways (around 14%). However, there has been a significant growth in the amount of freight transported by rail and the inland waterway network.

There has been an increase in the total tonnage transported for all modes of transport (see table 2.14).

2.7. Industrial sector

In the past, iron and steel, mechanical engineering, textiles and chemicals were the flagships of Belgian industry. Their output was exported to a large extent. Since 1960, however, in Belgium as in other parts of Europe, the profile of industry has changed significantly. Its importance in the economy has declined and its structures and spatial distribution have been transformed.

2.7.1. Metallurgy

This declining sector includes iron and steel and the processing of steel and non-ferrous metals. It is mainly made up of large firms situated at the heart of the former industrial regions of Wallonia but also in Flanders, where sites are more dispersed. In the 1970s, the crisis in the sector resulted in major restructuring plans.

Following an extremely favourable economic situation in 2007 driven by demand from user sectors, which even led to a furnace being reopened, the bursting of the financial bubble and resulting crisis completely reversed the trend.

2.7.2. Agri-foods

The agri-foods industry is Belgium's third most important industrial sector in terms of added value. It is also the second largest employer and is characterised by a very high number of SMEs. Exports account for half its turnover. The most important sectors are breweries, slaughterhouses and meat, and bread and pastries.

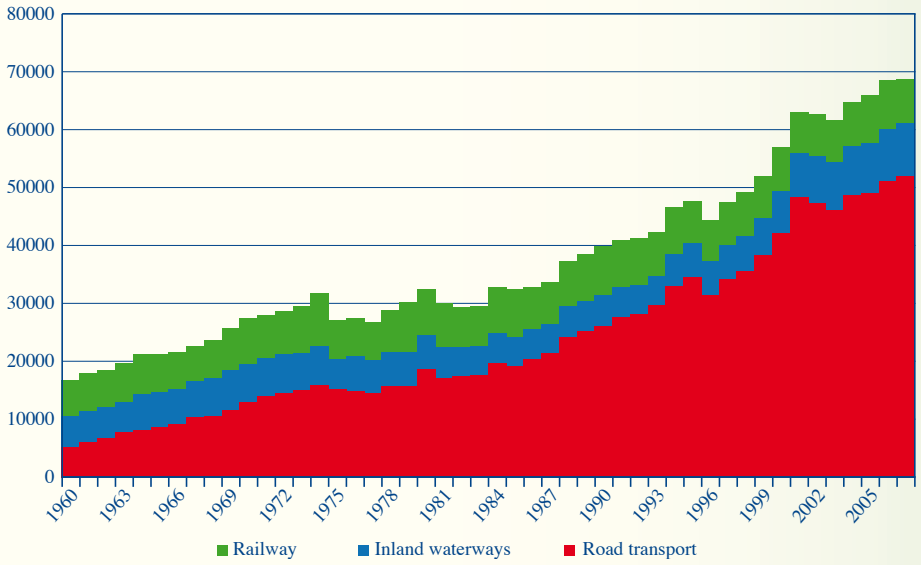
Table 2.14 Evolution of goods transport

	Million tonnes km		Relative share (%)		Evolution (%)	Evolution (yearly %)
	(2000)	(2007)	(2000)	(2007)	2000-2007	2000-2007
Inland waterways	7 313	9 393*	12.6 %	14.3 %	(28.4 %)*	(3.6 %)*
Rail	7 574	7 713	13.0 %	11.7 %	1.8 %	0.3 %
Road	43 297	48 566	74.4 %	74.0 %	12.2 %	1.7 %

*2007 data is not comparable with data from previous years as the method was altered due to a new regulation.

Source: [2008] Key figures - FPS Economy, Directorate-General Statistics and Economic Information

Figure 2.8 Goods transport expressed as million tonnes km (1960-2007)



Source: FPS Economy, Directorate-General Statistics and Economic Information

2.7.3. Textiles

For several centuries, textiles were an important and renowned activity in both the north and south of Belgium. In recent decades, this industry has contracted and is now limited mostly to the Flemish Region, which accounts for 90% of national production. The sector has suffered from the lower wage costs practiced outside of Europe.

In 2008, textile production dropped by 12% and turnover decreased by 14.3% in the wake of a very adverse economic situation [13].

2.7.4. Chemicals

Chemicals represent more than one fifth of the turnover of Belgian industries and more than 20% of the country's total exports. Belgium ranks 10th globally in the chemical sector, accounting for around 4% of global trade. The Belgian chemical sector produces a wide range of products.

The sector is one of the most specialised in the world and is the second biggest manufacturing sector in Belgium. Turnover exceeded 54 billion EUR in 2007 and accounted for 1/5 of the manufacturing industry's total turnover and 16% of total manufacturing industry employment. The chemicals and life sciences sector is very export orientated. Exports reached a level of 99.2 billion EUR in 2007 (including transit). In 2007, foreign trade of chemical and pharmaceutical products, plastics and rubber generated a positive balance of trade of over 18 billion EUR and contributed to the growth of the Belgian economy. Since 2005, the chemical and life sciences industry's balance of trade has exceeded Belgium's total balance of trade. Investment in the industry reached 1.96 billion EUR in 2007 accounting for over a quarter of total investment in Belgian industry. This figure encompasses both new investment and the expansion of production capacity. Almost half of this investment is carried out in base chemicals of which two-thirds in the Antwerp region [14].

2.7.5. Mechanical engineering

The automotive industry in Belgium is limited to assembly, which takes place mostly in large plants owned by multinationals. Railway construction has a strong presence in Belgium, as does the highly technological aviation sector.

The entire automotive industry (assemblers, manufacturers and importers) has a considerable influence on the economy and employment. The automotive industry and related services (vehicle and fuel trades, maintenance and repairs etc) accounts for over 126,000 jobs (table 2.15).

Table 2.15 Number of sites and jobs in the automotive sector (2007)

	Number of sites in 2007	Number of sector employees in 2007	Number of sector self-employed in 2006
Walloon Region	3,389	21,758	5,333
Brussels-Capital Region	747	8,949	1,419
Flemish Region	5,521	78,910	9,802
Belgium	9,657	109,617	16,607

Sources: FPS Economy, DGSIE 2006 and ONSS (=National Social Security Office) 2007. Calculation: Le Forem [15]

Table 2.16 Economic activity waste production (2006)

	2004 (in thousands of tonnes)	2006 (in thousands of tonnes)
Agriculture, hunting and forestry	1,185	360
Fishing and aquaculture	2	2
Extraction industries	384	159
Manufacturing industries excluding recovery	18,177	15,308
Electricity, gas and water production and distribution	990	1,285
Construction	11,037	13,090
Other economic activities (services)	8,689	7,039
Waste management	7,021	17,364
Household waste	5,325	4,745
TOTAL	**52,809**	**59,352**

Source: Eurostat

2.8. Waste

Overall, waste generated in Belgium rose to 59,352 thousands of tonnes (2006) up 6% compared with 2004. The major waste producers were the waste management industry (29.26%), the manufacturing industry (25.79%) and construction (22.05%) (see table 2.16). Apart from the waste management industry (which bears the shift from other sectors), the highest volume increases were in the electricity, gas and water production and distribution sectors (+14%) and construction (+9%).

From 1996 to 2007, the quantity of municipal waste increased by 9.8% (figure 2.9). This increase has fortunately been balanced out by significant improvements in waste treatment enabling the amount of waste simply being put into landfills to be sharply reduced (figure 2.10). However, the problem of reducing waste production remains a priority issue for the authorities[3].

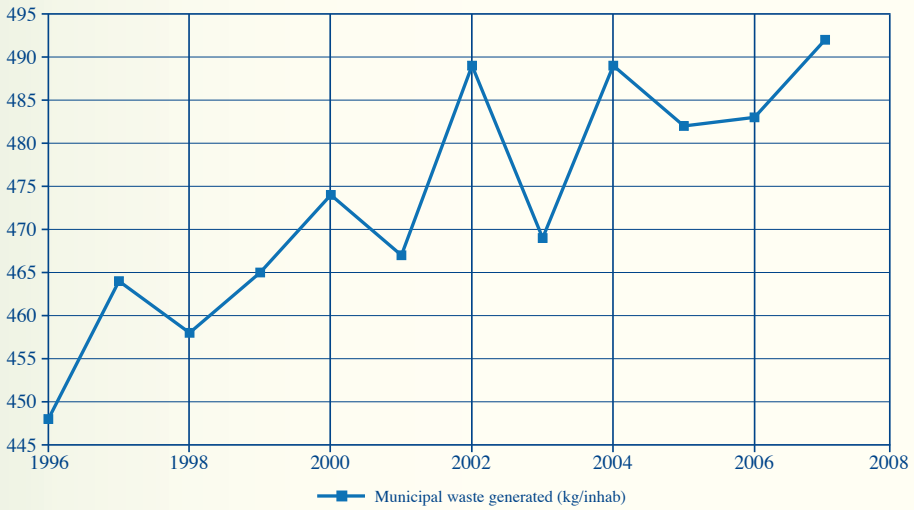
There has also been remarkable progress in the recycling of packaging.

A new interregional cooperation agreement (ACI) transposing directive 2004/12/EC modifying directive 94/62/EC on packaging and packaging waste has been implemented. This agreement sets new objectives for packaging recovery (90%) and recycling (80%) and funding from the regional accredited body for household packaging (0.5 EUR per inhabitant per year) in order to contribute to their policy on packaging waste prevention and management.

A body approved by that Commission (FOST Plus) has to oversee the company responsible for collecting household waste. Collection is based on a mixed system: door-to-door collection from households and voluntary return by consumers via container parks and a network of bottle

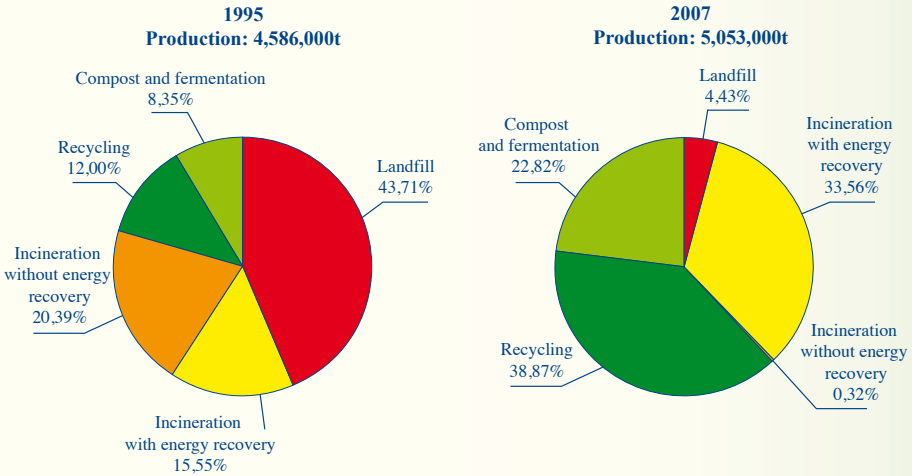
[3] See PAMs: NCP measure WA-A01

Figure 2.9 Evolution of the quantity of municipal waste generated per inhabitant (1996-2007)



Source: Eurostat

Figure 2.10 Distribution of municipal waste treatment methods in 1995 and 2007



Source: Eurostat

Table 2.17 New recycling objectives

	2004 European directive	ACI 1997		ACI 2009		Fost Plus 2008 results
		Household packaging	Industrial packaging	Household packaging	Industrial packaging	
Glass	60%	15%		60%		111.7%
Paper and cardboard	60%	15%		60%		122.6%
Beverage cartons		15%		60%		77.5%
Metal	50%	15%		50%		98.0%
Plastics	22.5%	15%		30%		36.4%
Wood	15%	15%		15%		n.a.
Recycling	55-80%	50%	50%	80%	80%*	93.0%
Recovery	60%	80%	80%	90%	85%*	96.6%

*: From 2010

Source: Fost Plus

Table 2.18 Packaging waste: quantities recycled (2008) and evolution 1995-2008

	Quantities recycled in 2008 (tonnes/year)	Evolution 1995-2008
Glass	310,248	155%
Paper / cardboard*	191,867	732%
Metals	86,276	280%
Bottles and flacons	87,919	2520%
TOTAL	**676,310**	**293%**

* Including beverage cartons.

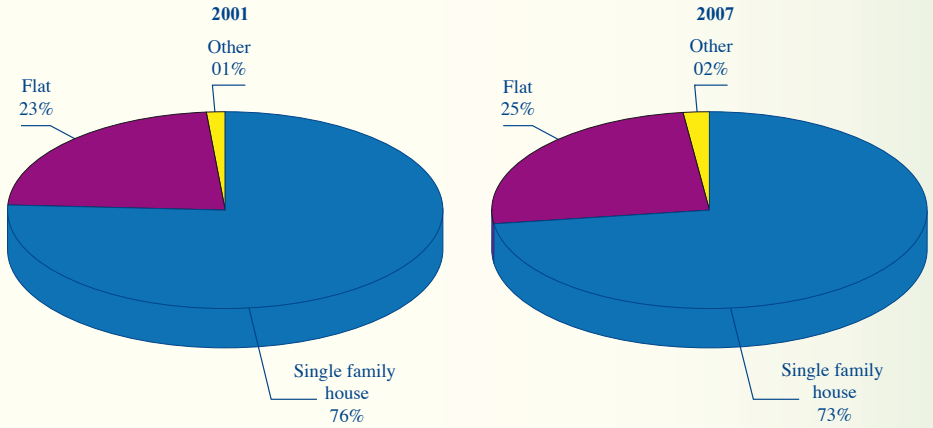
Source: Fost Plus

banks. Thanks to this system, Belgium is among the leaders in selective collection and recycling of household packaging waste in the European Union. In 2008, the recycling and recovery rate was 96.6% (93.0% recycling and 3.6% incineration with energy recovery) (Table 2.18). These high rates of recycling and recovery are also obtained at an annual cost of less than 5 EUR per inhabitant.

The last municipality in Belgium decided to sign up to the Fost Plus system in autumn 2008 having resisted for several years. This means that there has been 100% waste collection coverage in Belgium as of 1 January 2009. Yields have increased once again from a yearly weight of 62.9-63.4kg per inhabitant having stabilised in 2007.

The packaging market has experienced slow growth punctuated by peaks due to a range of factors of which the most remarkable is the impact of the weather. A hot year (for example 2003 and 2006) directly increases the quantity of beverage packaging put on sale [16].

Figure 2.11 Breakdown of types of housing in 2001 and 2007



Source: Directorate-General Statistics and Economic Information – Survey of household budgets 2001 & 2007

2.9. Housing stock

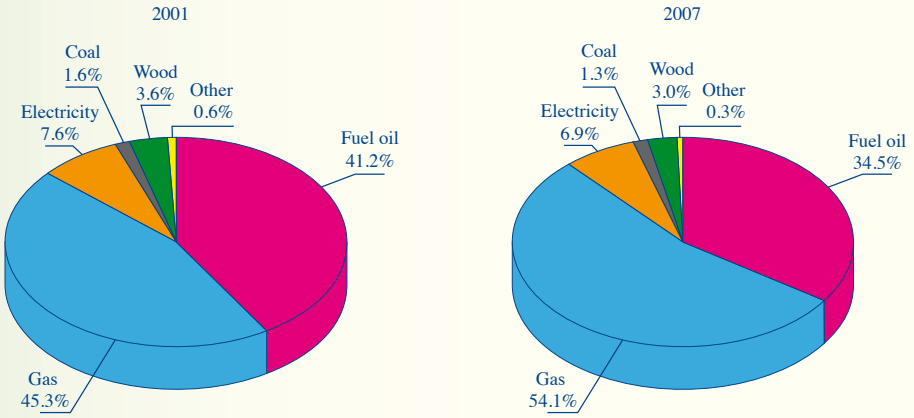
The latest complete set of data on the housing stock in Belgium dates back to the 2001 socio-economic study whose results were presented in the 4th National Communication. Since 1999, monthly surveys of 300 households have been carried out with responses being inferred for the total population. This calculation method for 2001 leads to several differences in the figures between the two sources of information.

In Belgium, in 2007 three households out of four still live in a single-family house (72.9%) and one out of four (25.5%) in a flat. The proportion of households occupying flats has somewhat increased over the past years (see figure 2.11).

In 2007, Belgian housing stock remained old with still only one person in five (23.7%) living in housing built within the past 20 years. However, 70.2% of households owned their homes.

The number of families equipped with central heating has continued to rise and reached 80.3% in 2007 compared with

Figure 2.12 Energy or fuel used primarily for heating



Source: Directorate-General Statistics and Economic Information – Survey of household budgets 2001 & 2007

The principle behind degree days

"Quantifying cold"

Heating consumption results from the difference between inside and outside temperatures. However, temperatures vary from one place to another.

The concept of degree days was introduced to enable the quantity of heat consumed over a given period to be determined and to make comparisons between buildings located in different climatic zones.

Temperature differences between the inside and outside are added up day after day. For example, if the average daytime temperature is 20°C indoors and 5°C outdoors, this would make for 15 degree days. Likewise, three days with an outside temperature of 0°C will be calculated as 60 degree days.

Adding together all the indoor / outdoor daily temperature differences over a given heating period produces a number which conveys the building's heat requirements, known as the building's degree days.

As a general rule, the number of degree days in a heating period is equal to the total number of heated days multiplied by the difference between the building's average indoor temperature and the average outdoor temperature. DD = number of heated days x (average indoor T – average outdoor T).

What is an "average daily temperature"?

Buildings are to some extent inert. Their heating requirements are therefore proportional to the average daily temperature (and not the coldest nighttime temperature). It was agreed to use the average between the minimum nighttime and maximum daytime temperatures.

Therefore, a minimum nighttime temperature at 3am of -5°C and a maximum of +7° at 3pm would be classed as a day with an average temperature of 1°C.

"Normal" degree days using a base temperature of 15/15

Heat required by a building is not solely proportional to the difference between the average outdoor temperature and a comfortable indoor temperature. Buildings can to some extent heat themselves using sunlight and the heat produced by occupants and equipment (internal gains).

Therefore, in the case of a domestic dwelling, experience has shown that in Belgium an average indoor temperature (average across all the rooms and over a 24-hour day) of 18°C is comfortable for occupants.

Free internal and external gains are estimated at an average of around 3°C.

Consequently, the heating system must only heat up to a temperature of 15°C (with sunlight and occupation bringing the temperature up to 18°C).

Likewise, if the outdoor temperature reaches 15°C, the heating can be turned off, as it is no longer the heating season.

Degree days using a base 15 indoor / outdoor temperature are used as the indicator of heating requirements in our region. Therefore, a minimum nighttime temperature at 3am of -5°C and a maximum of +5° at 3pm would be classed as a 15DD using the 15/15 base temperature rule. [17]

Table 2.19. Degree days for 2008 (DD 15/15 at Uccle) and average values over the 1968-2000 period

	2008	Normal values
January	269.8	365.1
February	259.2	327.4
March	268.3	269.8
April	173.4	184.8
May	21.8	75.5
June	18.6	27
July	2.3	5.6
August	1.3	5.4
September	48.8	34
October	140.8	127.4
November	244.7	255.4
December	380.5	339.5
TOTAL	**1829.5**	**2016.6**

Source: RMI

Table 2.20 Proportion of households with domestic appliances in 2001 and 2007

	2001	2007
Large household appliances		
Electric cooker	62.5 %	67.2 %
Natural gas cooker	28.3 %	26.8 %
Gas cooker using gas cylinders	11.5 %	8.0 %
Other type of cooker	3.9 %	3.8 %
Microwave oven	74.2 %	86.5 %
Dishwasher	42.3 %	50.9 %
Fridge	67.7 %	67.1 %
Fridge freezer (two door)	39.2 %	46.0 %
Freezer (chest freezer or upright freezer)	63.2 %	61.2 %
Washing machine	88.9 %	90.3 %
Tumble dryer	53.1 %	60.1 %
Combined washing machine / tumble dryer	1.4 %	1.3 %
Small household appliances		
Sewing machine	46.3 %	39.5 %
Iron	95.7 %	94.9 %
Vacuum cleaner	95.7 %	95.8 %
Entertainment and communications devices		
Mobile phone	63.2 %	92.5 %
Fax	14.3 %	13.0 %
PC	48.8 %	72.0 %
Television	95.2 %	96.0 %
Video	74.8 %	69.3 %
DVD player	-	70.5 %
Music system	77.9 %	72.3 %
CD player (including portable player) separate from a music system	37.1 %	40.2 %
Video camera	18.3 %	18.5 %
Digital camera	-	55.1 %

Source: Directorate-General Statistics and Economic Information – Survey of household budgets 2001 & 2007

76.6% in 2001 with natural gas being the principal source of heat (54.1%). This increase was mainly to the detriment of fuel oil (34.5%) (see figure 2.12). The popularity of coal also continued to wane accounting for only 1.3% in 2007.

Normal degree days established by the Royal Meteorological Institute of Belgium over the past 30 years act as a benchmark for defining the harshness of winter (table 2.19).

In addition to heating, a significant amount of energy is also consumed by domestic appliances. The following table provides an overview of these appliances (table 2.20). The figures reflect both an increase in household mod cons and the development of technology.

2.10. Agriculture and forestry

Agriculture in Belgium, favoured by fertile soil and a temperate climate, is specialised in market garden and horticultural crops, cereals, potatoes, sugar beets, stock farming and milk production. Due to the short coastline, fishing has relatively limited importance as an economic activity.

Although farmland covers most of Belgium, it is decreasing all the time (table 2.21) and is mainly being replaced by

Table 2.21 Total agricultural land

	Total agricultural land (km²) in 2008		Evolution 1990-2008	Evolution 2000-2008
Flemish Region	8,273.42	(47.80%)	-6.68%	-2.37%
Walloon Region	9,023.26	(52.13%)	-4.21%	-1.55%
Brussels-Capital Region	12.60	(0.07%)	-25.49%	-9.35%
Belgium	17,309.28		-5.42%	-1.95%

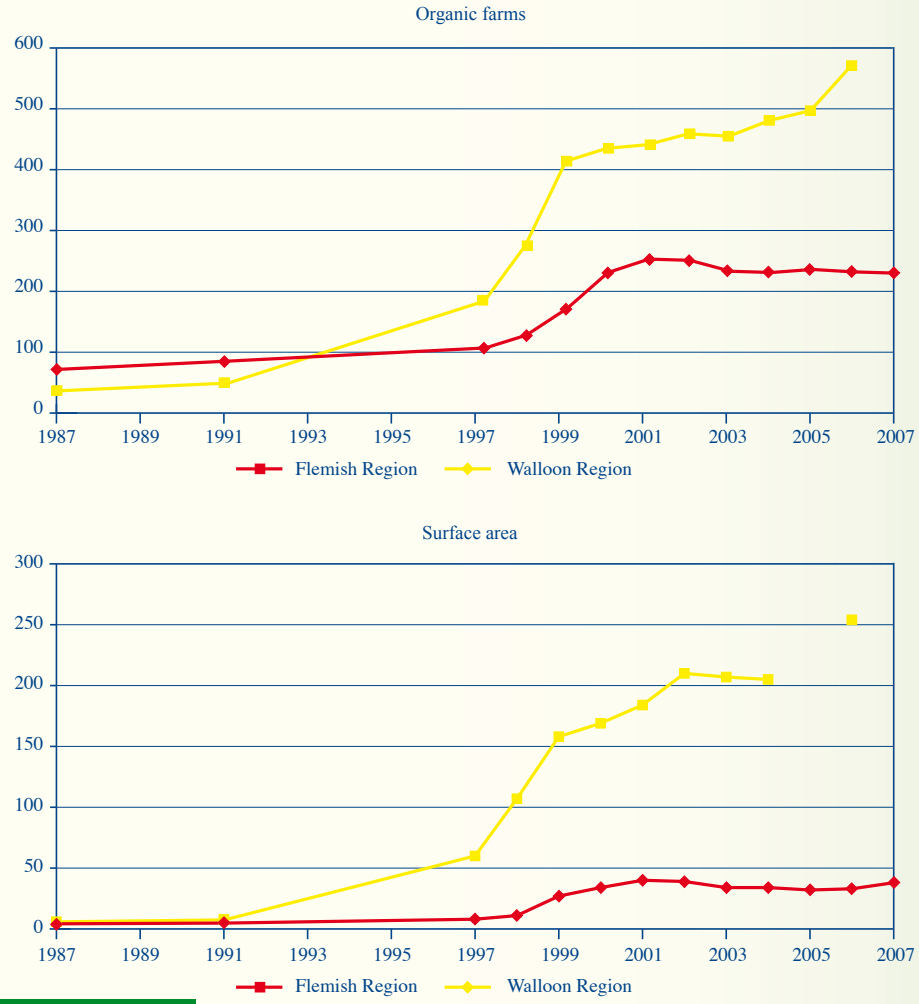
Source: Directorate-General Statistics and Economic Information

Table 2.22 Agricultural and horticultural census (2008)

	2000	2008	Evolution 2000-2008
Number of agricultural and horticultural businesses	61,705	46,687	-24.3%
Agricultural surface area in use (in km²)	13,940.83	13,721.92	-1.6%
Workforce	107,399	87,349	-18.7%
Animals (x1000)			
Number of cattle	3,042	2,613	-14.1%
- of which dairy cows	594	495	-16.7%
Pigs	7,369	6,269	-14.9%
Hens and chicks	15,232	11,818	-22.4%
Broil chickens	24,498	20,386	-16.8%
Crops (km²)			
Cereals (except maize)	2,777.03	2,910.51	4.8%
Sugar beets	908.58	635.23	-30.1%
Maize	2,021.19	2,484.07	22.9%
Potatoes (except seedlings)	639.79	635.21	-0.7%

Source: FPS Economy, Key figures 2008

Figure 2.13 Number of organic farms and surface area (km²) for the 1987-2007 period in Flemish Region and Walloon Region



Source: FPS Economy

buildings. The trend is more marked in Flanders than in Wallonia. There is greater pressure in Brussels but this is caused by the inherent development of an urban structure in a limited area.

In 2008, there were 46,687 agricultural and horticultural businesses in Belgium (table 2.22). Wallonia has more agricultural land than Flanders (55% compared to 45%) but generates half the latter's added value (two-thirds of intensive farming holdings are situated in Flanders). The active population employed in agriculture has been shrinking since the Second World War. Today, the active population in agriculture and fisheries represents barely 1% of the total population (compared to 21.5% in 1910). In recent years, the continuous reduction in the number of sector jobs implies that this is still an ongoing trend. Recently, the number of farms has continued to decrease significantly, as has agricultural land, although to a lesser extent, meaning that on average farms are continuing to grow in size.

While the workforce continues to drop, the number of tractors and other agricultural equipment is rising spectacularly (+18% in 20 years).

In spite of this decline, agriculture and fisheries are still important economic sectors. Over the last 20 years, land used for organic farming has multiplied almost thirtyfold (28); at the same time, the number of organic farms has increased eightfold (figure 2.13).

In 2006, the average surface area of an organic farm was 0.141 km² in the Flemish Region and 0.444 km² in the Walloon Region.

The distribution of forests in Belgium is shown in Table 2.23. Total forest area in Flanders amounted to 1,080.18km² in 2007, while Walloon forests covered 4,960.39km².

Table 2.23 Forest cover in Belgium (1 January 2007)

	Total area (km²)	Forest area (km²)	Forest cover	Belgian forest area
Wallonia	16,845	4,960	29.4%	81.9%
Flanders	13,521	1,080	8.0%	17.8%
Brussels-Capital	162	18	11.4%	0.3%
Belgium	30,528	6,059	19.8%	100.0%

Sources: Ecodata (source: land register)

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3. Greenhouse gas inventory information

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3.1. Summary tables

Inventory information presented in this chapter[4] is extracted from the 2009 submission following the UNFCCC recommendations (Annotated Outline for Fifth National Communications of Annex I Parties under the UNFCCC, including Reporting Elements under the Kyoto Protocol). This inventory includes emissions data for the years 1990 to 2007. The summary tables 10s1 to 10s4 (Common Reporting Format) from the national GHG inventory are reported in annex 2 of this report.

3.2. Analysis of trends

3.2.1. General trends

Total greenhouse gas emissions (without LUCF) in Belgium amounted to 131.3 Mt CO_2 eq. in 2007 – 8.3% lower than in 1990[5]. They dropped by 9.9% in 2007 compared with the base year emissions (Figure 3.1).

Under the Kyoto Protocol and the EU 'burden sharing' agreement, Belgium is committed to reduce its GHG emissions by 7.5%. Assuming a linear target path from 1990 to 2010, total GHG emissions in 2007 were 4 % below above this target path. However, emissions are projected to increase over the coming years (see chapter 5).

The major greenhouse gas in Belgium is carbon dioxide (CO_2), which accounted for 87.2% of total emissions in 2007. Emissions of CO_2 decreased by 3.4% from 1990 to 2007, while CH_4 and N_2O dropped by 33% and 25% respectively over the same period. Fluorinated gas emissions dropped

[4] Expressed as CO_2 equivalents, i.e. taking into account the overall warming effect of each of the gases, which is used to evaluate the relative contribution to global warming of the emission in the atmosphere of a kg of specific greenhouse gas, as opposed to the emission of a kg of CO_2 and taking into account their life spans and their respective radiation powers (CO_2= 1, CH_4 = 21 et N_2O = 310). A kg of CH_4 therefore has the same effect as 21kg of CO_2 over a 100 year period.

[5] In accordance with the Kyoto Protocol, the base year is 1990 for CO_2, CH_4 and N_2O, but 1995 for fluorinated gases.

Table 3.1 Overview of greenhouse gas emissions and removals from 1990 to 2007 (in Gg CO_2-equivalent)[5]

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Net CO_2 emissions/ removals	117204	119707	117098	116092	121038	121926	126163	120450	126927	121334	122147	121268	120724	125252	125478	123062	118025	113071
CO_2 emissions (without LUCF)	118627	120889	118650	117561	122517	123298	127540	121844	128196	122538	123678	124092	123043	126952	126632	123432	119085	114545
CH_4	9993	9815	9674	9471	9491	9508	9197	9066	8921	8740	8472	8050	7599	7269	7131	6925	6765	6658
N_2O	10775	10660	10318	10660	11245	11670	12098	11816	11950	11853	11525	11293	10779	9782	9990	9840	8934	8079
HFCS	439	439	439	439	439	439	527	639	779	817	952	1083	1303	1467	1512	1496	1601	1765
PFCS	1753	1678	1830	1759	2113	2335	2217	1211	669	348	361	223	82	209	306	141	152	172
SF_6	1662	1576	1744	1677	2035	2205	2121	526	271	122	112	129	112	100	84	84	75	81
Total (with net CO_2 emissions/removals)	**141827**	**143875**	**141102**	**140097**	**146362**	**148084**	**152323**	**143708**	**149518**	**143215**	**143568**	**142046**	**140600**	**144078**	**144502**	**141549**	**135552**	**129827**
Total (without CO_2 from LUCF)	**143249**	**145057**	**142654**	**141566**	**147840**	**149455**	**153701**	**145102**	**150787**	**144418**	**145100**	**144870**	**142919**	**145778**	**145655**	**141919**	**136612**	**131301**

[5] The base year emissions used to calculate the Kyoto objective are 145728.763 Gg CO_2 eq (1990 and 1995 figures approved when the inventory was verified in 2007). The figures in table 3.1 present minor corrections to this data.

Table 3.2 Overview of greenhouse gas emissions and removals in the main sectors from 1990 to 2007 (in Gg CO_2-equivalent)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Energy	112544	115303	113005	111985	115608	115970	120959	114904	121159	115259	116308	117214	115225	119122	118459	115216	110902	106670
Energy Industries	30192	29951	28765	28238	30060	29511	29257	28135	30899	27191	28411	26846	28334	29824	29875	29355	27822	26968
Manufacturing Industries and Construction	33254	33319	31775	30646	32295	32519	32085	31221	33693	32124	32899	32481	30557	30267	29323	27919	27550	26437
Transport	20576	20779	21510	22038	22550	22659	23121	23359	24062	24456	24931	25565	25903	26467	27497	26602	26062	25935
Residential, commercial and agriculture	27390	30240	30079	30226	29887	30519	35753	31468	31797	30764	29312	31580	29708	31903	31124	30682	28787	26718
Other combustion	193	201	200	198	199	141	129	135	133	138	128	138	138	136	130	130	130	102
Fugitive Emissions from Fuels	940	814	676	640	616	622	615	586	575	586	628	603	585	525	510	527	551	510
Industrial processes	15717	15038	14935	14955	17499	18731	18394	15889	15449	15079	15185	14550	15071	14575	15310	15163	14427	13658
Solvent and other product use	246	246	249	247	243	240	238	237	236	235	252	250	249	248	248	247	247	247
Agriculture	11340	11208	11171	11303	11344	11485	11324	11286	11324	11372	11047	10889	10608	10173	10083	9936	9836	9621
Land-use Change and forestry	-1422	-1182	-1552	-1469	-1478	-1371	-1377	-1395	-1269	-1203	-1532	-2825	-2319	-1700	-1154	-370	-1061	-1473
Waste	3403	3262	3296	3076	3145	3029	2786	2786	2618	2474	2308	1967	1766	1660	1554	1357	1200	1105

by 59% over the 1995-2007 period. The share of the main sectors is given in Figure 3.2.

Figure 3.4 summarises the impact of the main sectors on the national trend. It clearly shows a rise in emissions from road transport and service sector buildings. Since 1990, those two sectors have been responsible for a 4.6% increase in total emissions.

This trend is counterbalanced by a decrease in emissions in the other sectors, particularly industry, giving an overall decrease of 12.9%, making for an overall trend of -8.3% compared with 1990.

The drivers of these trends are analysed and commented upon in the following pages, sector by sector.

3.2.2. Regional trends

The regional trends in GHG emissions are shown in figure 3.5. In 2007, Flanders accounted for 62% of Belgian emissions as opposed to 35% in Wallonia and 3% in the Brussels-Capital Region.

Flanders

Overall greenhouse gas emissions are going down between 1990 and 2007 in the

Figure 3.1. Belgian greenhouse gas emissions between 1990 and 2007 (excluding LUCF) compared with the Kyoto objective

For fluorinated gases, the assumed base year is 1995, so the index value 100 on the Y-axis corresponds to CO_2, CH_4 and N_2O emissions in 1990 and HFC, PFC and SF_6 emissions in 1995.

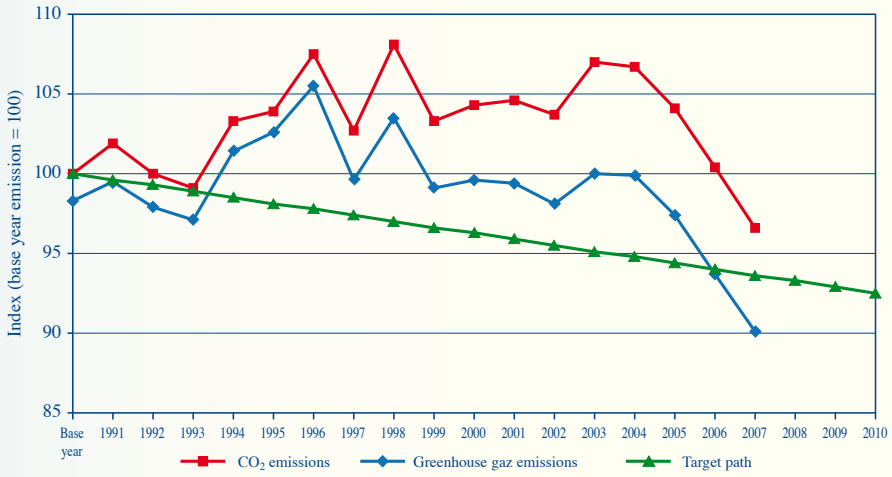
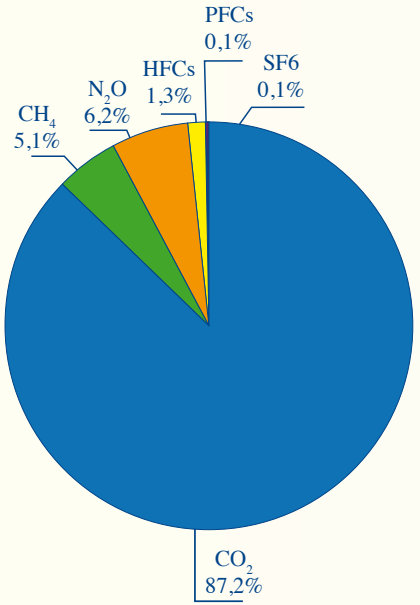


Figure 3.2 Share of greenhouse gas emissions in Belgium (2007)



Flemish Region with about 5% (emissions of road transport calculated with the national approach and emissions of F-gases for 1995). Taken into account the most recent emission figures for road transport calculated with the MIMOSA IV-methodology, emissions are even going down with more than 7% between 1990 and 2007. This new approach will be included in the official reporting obligations to the EC and the UNFCCC in 2010.

An important increase of greenhouse gas emissions is detected in the Flemish Region in the sectors of transport and the 'other sectors' (mainly in the commercial/institutional sector) between 1990 and 2007: The emissions in the sector of transport are increasing since 1990 because of an explosive grow and an important use of the motorised vehicle park. This growth is slowing during the last few years. In the 'other sectors' a reduction of the energy use (and consequently of the emissions of CO_2) is detected after the large increase until 2003 but still the 2007-level is not yet below the 1990-level.

The increase of greenhouse gas emissions in these sectors are undone by the reduction of emissions

1) in the sector of industrial processes (mainly because of the reduction of F-gasses between 1990 and 2003 and the measures taken into the chemical industry to reduce emissions of N_2O),
2) in the sector of energetic industry because of a shift of fuels to the gaseous fuels,
3) at the solid waste disposal sites and
4) in the sector of agriculture (enteric fermentation as well as manure management) mainly because of a decrease of the livestock.

Figure 3.3 Share of the main sectors in 2007

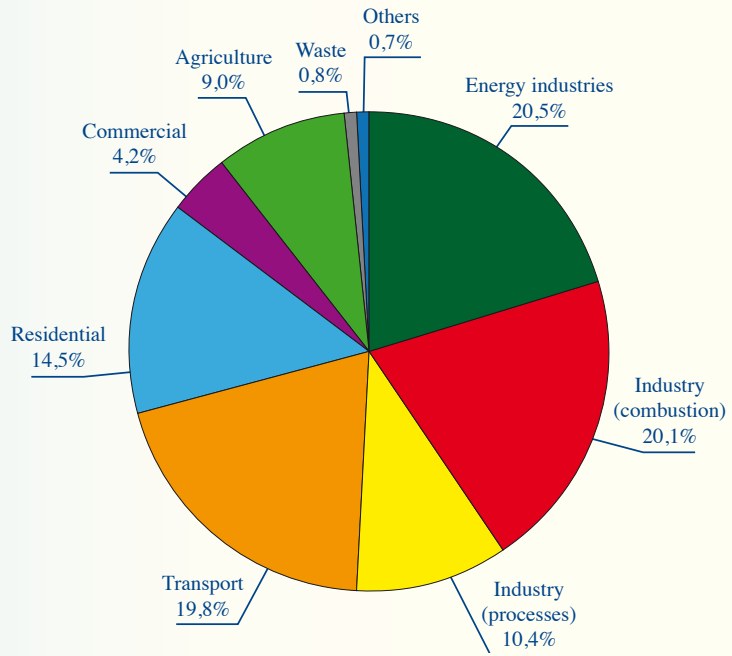
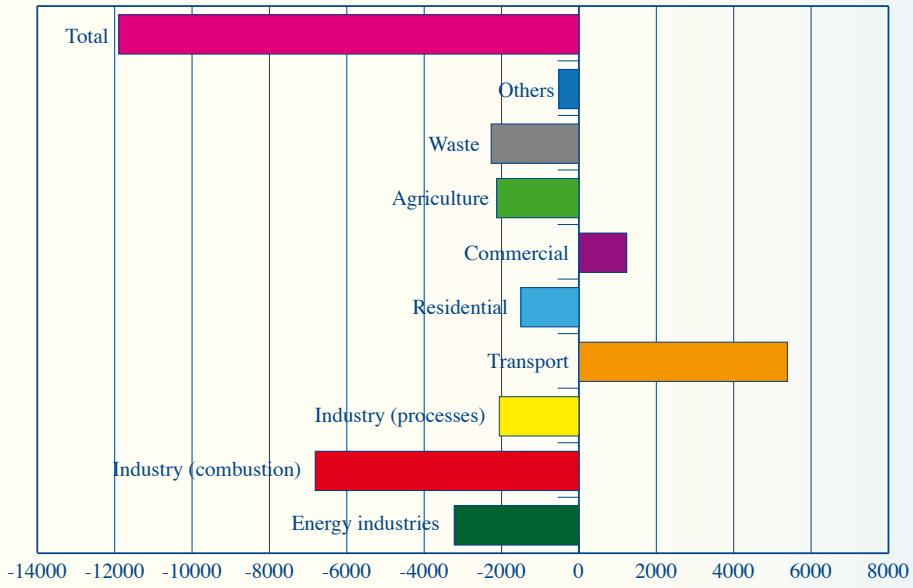


Figure 3.4 Impact of the main sectors on the global trend 1990-2007 (Gg CO_2 eq)



Brussels-Capital Region

The Brussels-Capital Region is a city of one million inhabitants. The industries present in the region (mostly small and medium-sized) are responsible for only a small share (about 7%) of regional GHG emissions. GHG emissions are mostly due to heating in the residential and service industry (around 70%) and to road traffic (around 20%). Heating is logically driven by climatic conditions. The global variations shown in Figure 3.5 follow climatic variations.

Large variations can be observed in smaller emitter sectors, for example a reduction (around 60%) of fugitive emissions, linked to the improvement of the gas distribution network (reduction of leakage) and an increase in fluorinated gas emission from refrigeration activities (including transport) and air conditioning by a factor of around 20 (mainly due to the replacement of gases covered by the Montreal Protocol by gases covered by the Kyoto Protocol). As a result of this increase, these emissions of fluorinated gases are now close to 5% of regional emissions.

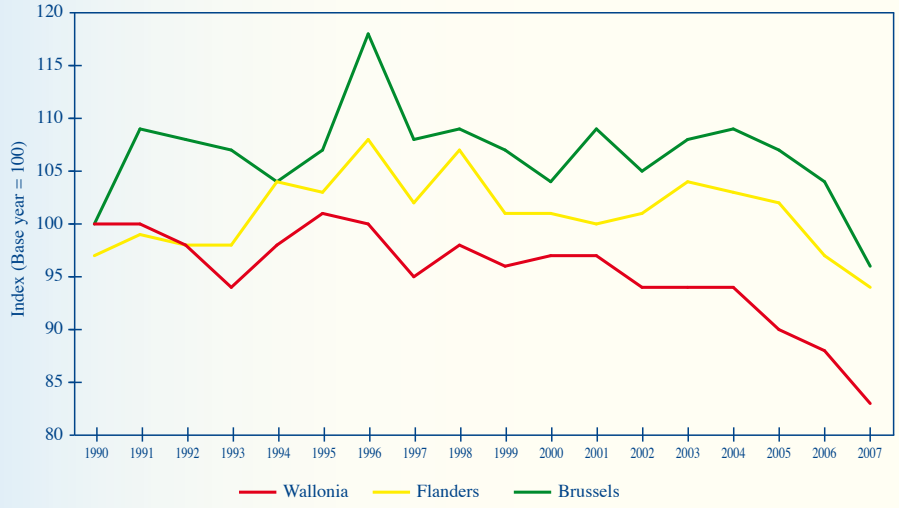
Wallonia

In Wallonia, emissions dropped considerably between 1990 and 2007. This change was caused by several factors: the growing use of natural gas and biomass, and rational use of energy, particularly in the energy production sector and industry, improved industrial processes, the closure of iron and steel plants, biogas recovery and use in solid waste disposal sites and a cut in agricultural emissions following a reduction in the number of livestock.

Finally, the very mild winters in 2006 and 2007 caused a sharp cut in heating-related emissions which in turn had a significant effect on global emissions. However, road transport-related emissions continued to increase. This growth has slowed down since 2005 but road transport nevertheless remains a critical sector, as its emissions have practically increased two-fold since 1990.

Figure 3.5 Regional greenhouse gas emissions trends

For fluorinated gases, the assumed base year is 1995, so the index value 100 on the Y-axis corresponds to CO_2, CH_4 and N_2O emissions in 1990 and HFC, PFC and SF_6 emissions in 1995.



3.2.3. Energy production

The main source for this sector is public electricity and heat generation, which accounted for 82% of sectoral emissions in 2007. Petroleum refining and manufacture of solid fuels accounted for 17% and 1% respectively.

Emissions from the manufacture of solid fuels have decreased by 83% since 1990 (-1815 CO_2 Gg equivalent) due to the closure of four coke plants in 1993, 1994, 1997 and 2002. In the meantime, emissions from petroleum refining have increased by 5%, owing to higher production and the general economic context.

As mentioned above, however, the main driver in this sector is public electricity and heat generation. While electricity production rose by 55% between 1990 – 2007 [1], emissions dropped by 7% due to the switch from solid fuels (coal) to gaseous (natural gas) and renewable fuels (wood) and to technological improvements. This is illustrated in Figure 3.6.

3.2.4. Manufacturing industries

In the manufacturing industries, added value [2] has increased by more than 30% since 1990, while emissions dropped by 20%.

As seen in Figure 3.7, primary energy consumption decreased by 7% between 1990 and 2007. This apparent **decoupling of added value and energy consumption** can be attributed to an increased energy efficiency and various other drivers according to sectors:

– In the iron and steel industry, many plants have switched to electric furnaces since 1990. In Belgium, electricity consumption by the sector increased by 28% from 1990 to 2002 [1]. This is the main cause of the apparent decreasing energy consumption, while stable added value is observed in this sector. This sector represented 31% of energy consumption in 2007 by the manufacturing

industries and consequently has a significant impact on the global trend.

– In the chemistry sector, energy consumption increased by 38% from 1990 to 2006 compared to a 65% growth in added value [1.2]. This relative decoupling is linked to both rational use of energy and high added-value products. This sector represented 32% of energy consumption in the manufacturing industries in 2007.
– Food processing and beverages represent 7% of energy consumption in the manufacturing industries, but 13 to 14% of added value [1.2]. This sector shows the steepest increase in added value compared to energy consumption. The diversity of the plants in this sector does not allow a detailed analysis of the trend; only certain types of plants are commented upon here. In sugar plants, for example, some products with high added value, such as inulin and fructose, have been developed recently, but the main driver is still the sugar beet yield (quantity and sugar content), which is highly climate–dependent.
– In cement works the decoupling between production and energy consumption is caused by production methods: the dry process, which is considerably less energy-demanding, is gradually replacing the wet process and is now used for 73% of production compared to 61% in 1990.

Figure 3.7 also shows a **decrease in greenhouse gas emissions for an equal level of energy consumption.** One reason is the increasing use of gaseous fuels, coupled with a decrease in liquid and solid fuels observed across all sectors. This is illustrated in Figure 3.8.

The increasing use of 'other fuels' (see Figure 3.8) reflects on the one hand the growing numbers of naphtha crackers and the enlargement of existing plants. On the other hand, cement plants have been using more and more substitute fuels since 1990, such as impregnated sawmills, animal waste, tyres, etc. Those fuels now represent 34% of energy consumption, compared to 7% in 1990. The non-biomass fraction of these fuels is included in the "other fuels"

Figure 3.6 Greenhouse gas emissions from public electricity and heat generation, in relation to gross electricity generation (excluding nuclear) [1]

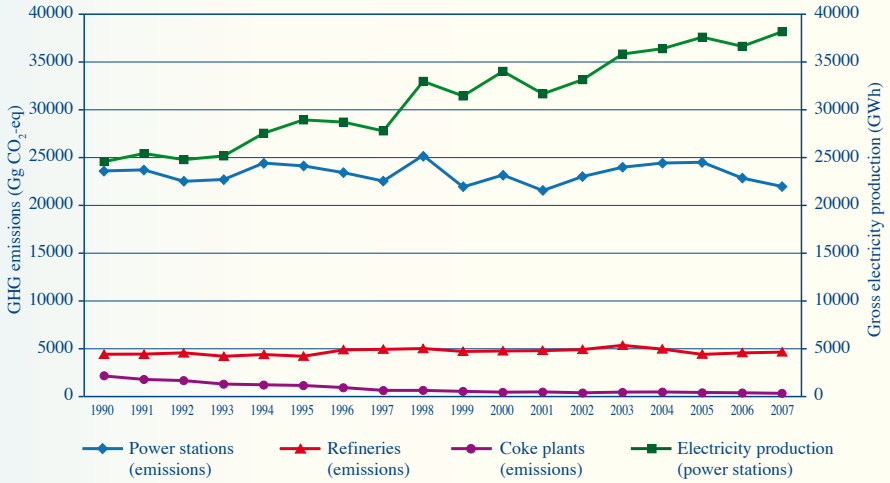
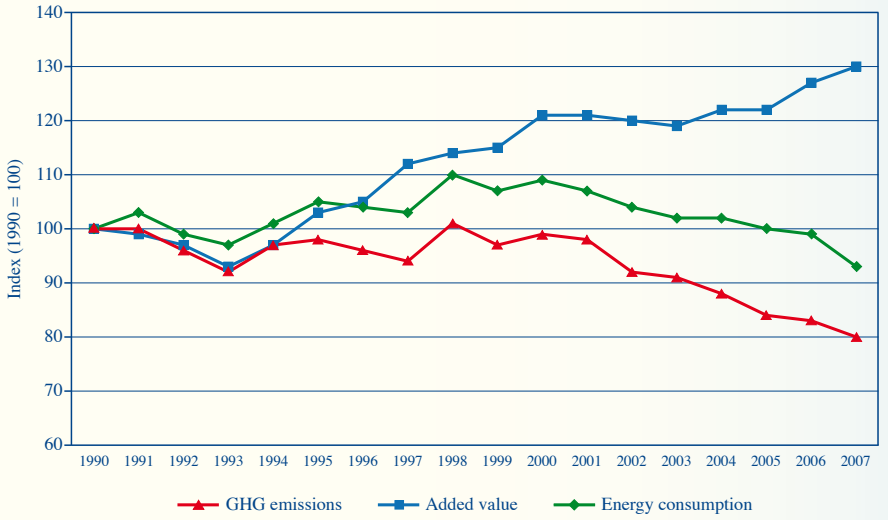


Figure 3.7 Manufacturing industries: index of greenhouse gas emissions, energy consumption and added value [1.2]



category. The biomass fraction of these fuels is included in biomass fuels and not accounted for in the national emissions. Cement works have caused a doubling of the use of biomass fuels since 1990. The other half of the biomass fuels used in Belgium comes from the pulp and paper sector, where part of the woody raw material has always been used as fuel in pulp paper plants.

3.2.5. Industrial processes

The 'industrial processes and F-gases' sector covers the emissions from industrial activity, but which do not result from fossil fuel combustion. In 2007, these emissions of greenhouse gases were mainly caused by mineral products (cement and lime production, 38% of emissions) and the chemical industry (nitric acid and ammonia production, 20% of emissions). Metal production and fluorinated gases accounted for 11% and 14% respectively of total emissions in this sector.

Mineral products

These emissions occur during the decarbonation of calcium carbonates when producing cement and lime. They are closely linked to production levels, which are stable on the whole.

Chemicals

Total production of nitric acid increased by 29% over the 1990-2007 period. Emissions decreased by over 60% during the same period due to improvements to manufacturing processes and catalysers being installed on most production sites. However this is counterbalanced by an increase in production and CO_2 emission from other products, such as ammonia.

Metal production

In the iron and steel sector, CO_2 emissions decreased by 24% in 2007 compared to 1990. This is more or less in line with the production of pig iron.

Figure 3.8 Type of fuels used in the manufacturing industries

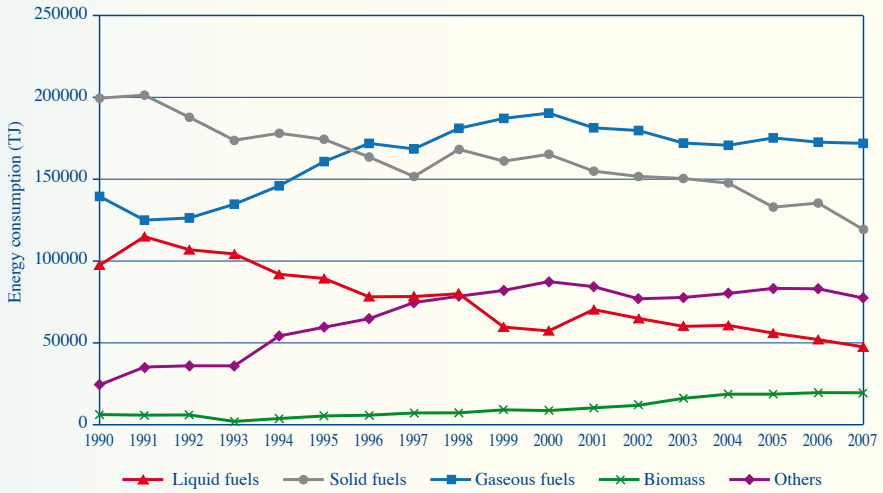
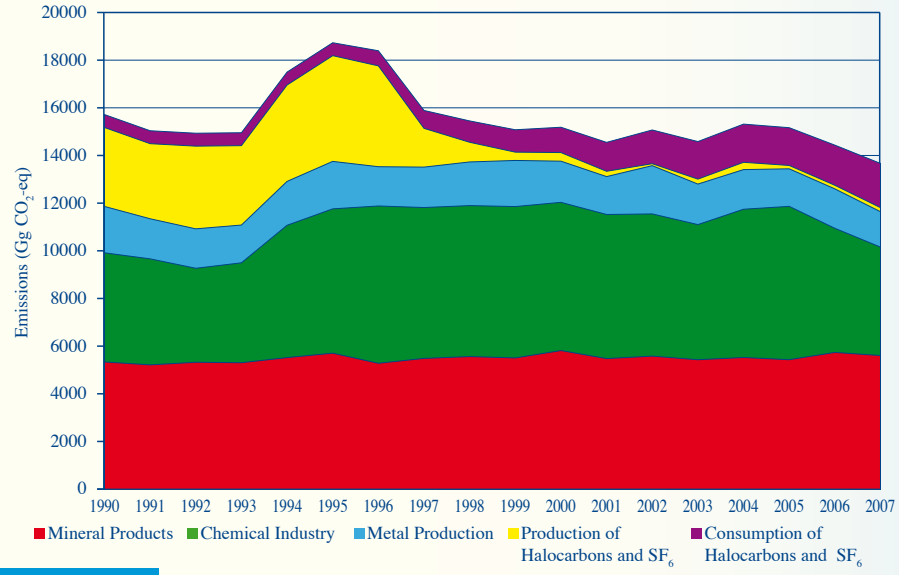


Figure 3.9 Greenhouse gas emissions in the industrial processes sector



Fluorinated gases

Emissions of fluorinated gases accounted for 1.5% of total greenhouse gas emissions in 2007. A distinction is made between 'production emissions', which are fugitive emissions during the production process, and 'consumption emissions', which are those occurring during the use or dismantling of existing equipment and products.

The sharp decrease in emissions from the production of HFC between 1996 and 1999 (Figure 3.9) is due to the installation of a gas incinerator with an HF recovery unit (Fluoride Recuperation Unit) in the most important source identified, which is an electrochemical synthesis unit.

The growing consumption of HFC (Figure 3.9) is directly linked to the implementation of the Montreal Protocol and EU Regulation 2037/2000, which bans the use of ozone-depleting substances, such as CFCs. The CFCs which were formerly used are now replaced by HFCs in most sectors like refrigerating and air conditioning installations, production of isolating foams and some aerosols. The quantities of HFCs are nonetheless lower than those of CFCs because in many cases CFCs have been replaced by non-fluorinated gases, like ammonia in refrigeration, pentane and CO_2 for isolating foams, etc.

SF_6 emissions originating from the production of acoustic double-glazing have been cut through the use of alternate products. However, SF_6 consumption emissions are likely to increase in the coming years due to the dismantling of existing equipment.

3.2.6. Residential and commercial

In the residential sector, fuel consumption increased between 1990 and 2003, mainly due to the growing number of houses, but has since decreased. Annual fluctuations are of course climate-related with degree days[7], one of the key parameters used to analyse the sector energy consumption. This is particularly clear for 1996, a cold year with a marked peak of emissions from heating, and for 2006 and 2007, two years with exceptionally mild winters, which caused a sharp drop in consumption. The increase in energy prices and improvement of the buildings becoming increasingly efficiency energy have probably also helped to reduce consumption.

On the other hand, since 1990 gaseous fuels consumption has increased from 34 to 46% of total energy consumption, together with a decrease in solid and liquid fuels, although the latter still account for 49%. One explanation could be that the gas distribution network does not cover sparsely populated areas, thus hampering the switch from liquid to gaseous fuels, which is observed in other sectors.

In the commercial sector, fuel consumption has increased by 38% since 1990. One reason is the rising number of employees, which rose by 30% during the 1990-2007 period and in 2007 accounted for 77% of total salaried employment.[8] In the meantime, electricity consumption also increased, mainly due to the development of information technologies and the increased use of refrigerated areas and air conditioning.

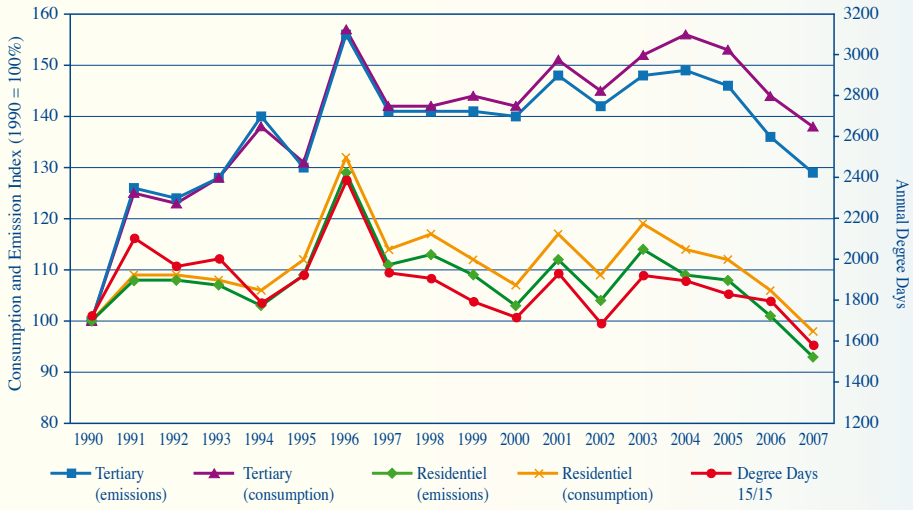
These increases have been partially counterbalanced by the replacement of fuel oil by natural gas observed since 1995. Natural gas accounts for close to 72% of the commercial sector's energy consumption and explains the relative drop in emissions compared to energy consumed (figure 3.10).

For both sectors, other fuels and biomass remain negligible for the time being. In the commercial sector, a slow increase has been observed since 1999, but biomass represents only 1.6% of the sector's energy consumption.

[7] Degree day: the difference expressed in degrees centigrade between the average daytime temperature and a base temperature (15°C for the 15/15 base and 16.5°C for the 16.5/16.5 base). Average temperatures that are higher than the base temperature are not included. The total number of degree days over a given period (month or year, for example) are added together. Degree days enable heating requirements to be assessed.

[8] Belgostat – National socio-economic database http://www.belgostat.be/belgostat/startSDW.do

Figure 3.10 Residential and commercial sector greenhouse gas emissions



3.2.7. Transport

Transport emissions accounted for 14% of total GHG emissions in 1990 and 20% in 2007. This increasing level is due to road transport, which represents 97% of total emissions by the sector.

Emissions from domestic navigation are fairly stable and represent 2% of total emissions. Emissions from railways seem to have decreased since 1990 but in fact this reflects the switch from diesel to electrical engines, as electrical consumption emissions were classed in the electricity generation sector.

In the road transport sector, most indicators are increasing: the number of cars has increased by 38% since 1990, together with traffic (vehicle km) which has risen in the meantime by 41% [3].

There is a marked switch from gasoline engines to diesel. The number of diesel engines has more than doubled since 1990 (+130%), while the number of gazoline engines has decreased slightly (- 8%) for the same period. This is reflected in their respective emissions (Figure 3.11). Diesel emits 7% more CO_2 than gasoline to produce the same quantity of energy, but as the average consumption of a diesel engine is about 12 % less, a diesel car emits on the whole less GHG by km than a gasoline car.

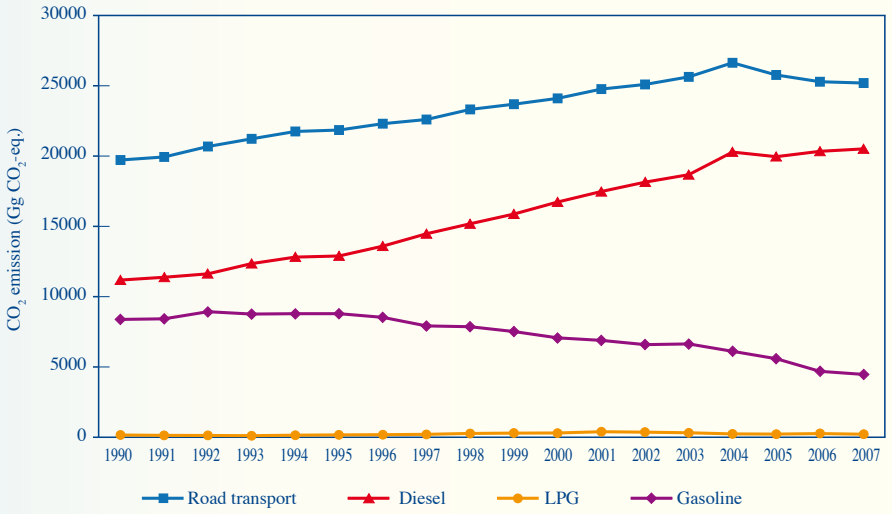
Average engine capacity has also increased since 1995, reflecting the switch to diesel on the one hand and the growing success of SUV vehicles, which increased two-fold from 2000 – 2006, on the other [4]. Average vehicle age has increased (improved rust protection and overall resistance), as has the average distance travelled.

The number of cars using LPG has increased by 17% since 1990 and represents 1% of private cars compared to 0.8% in 1990 [3]. This relative progress is very limited, however, in regard to the price of this fuel.

N_2O emissions from transport rose by 138% between 1990 and 2007. This is partly due to the introduction of catalytic converters (the use of catalytic converters on all petrol-engine cars was made compulsory in Belgium in 1993) but also to the ageing of the first converters, which leads to an increase in their N_2O emissions. Finally, it should be noted that N_2O emissions represent only 3% of total GHG emissions from road transport.

Road transport is the leading source of greenhouse gas emissions in Belgium, in terms of level and trend analysis. The 28% increase in road transport GHG between 1990 and 2007 is the highest among all the sources (+5446 Gg CO_2 equivalents).

Figure 3.11 Road transport emissions and traffic figures



International air and maritime transport

In accordance with the UNFCCC guidelines, emissions from international air and maritime transport are not included in national emissions. In 2007, these emissions accounted for 27% of national emissions, with maritime transport representing the most important source (89% of this category). Emissions from international aviation have increased by 22% since 1990, while emissions from maritime transport have risen by 128%.

3.2.8. Agriculture

GHG emissions from agriculture accounted in 2007 for 9% of total emissions in Belgium. Overall, they have decreased by 15% since 1990.

37% are CH_4 emissions from enteric fermentation, with cattle accounting for 95% of these emissions. These emissions have dropped by 14% since 1990, mainly due to a general reduction in livestock but also to the shift from dairy cattle to brood cattle (a general EU trend linked to the Common Agricultural Policy), the latter causing a lower level of emissions.

16% of emissions are CH_4 emissions from manure management, 80% of which come from pigs. These emissions are driven by livestock levels: swine livestock rose from 1990 until 1999 and then decreased.

38% of emissions from agriculture are N_2O emissions from agricultural soil.

These have decreased by 19%, due to the smaller quantities of nitrogen from mineral fertiliser applied on the one hand and to livestock reduction (nitrogen excreted on pasture) on the other. Both reductions have also had an impact on indirect emissions.

3.2.9. Land-use change and forestry

The methodology used to estimate carbon emissions and removals by LULUCF activities is explained in the NIR.

For the 1990-2000 simulation of the evolution of biomass carbon stock in trees, a working hypothesis of a linear trend in forest areas and overall biomass increase was used. A distinction was made between main deciduous and coniferous species for estimating annual wood growth.

The annual wood harvest is estimated through a comparison of the estimated annual increase in carbon stock (based on annual wood growth) with the effective annual carbon stock variation observed in the inventories (fig. 3.13).

For the 2000-2007 period, a dynamic model simulating the evolution of the forest biomass was used [5].

The difference between biomass growth and harvest gives the net removal of CO_2, presented in fig 3.13.

The change in activity data sources and methodology mentioned above explains the gap between 2000 and 2001. The trend for the year 2000 also reflects a practice of conservation of the mature stands observed recently in private forests (half of the total forest area). Due to the model, this trend appears more abrupt than it actually was. The other annual fluctuations reflect changes in C stocks due to external factors such as commercial wood demand, pests, etc.

Net CO_2 removal in 2007 represented 1.3% of total CO_2 emissions. Due to the accounting rules of the Kyoto Protocol, however, the net sink which could potentially be accounted for during the commitment period 2008-2012 is smaller. Studies are underway to refine the methodology, estimate carbon stocks in forest soils and the impact of forest and grassland conversion.

Figure 3.12 Emissions trends in the agricultural sector

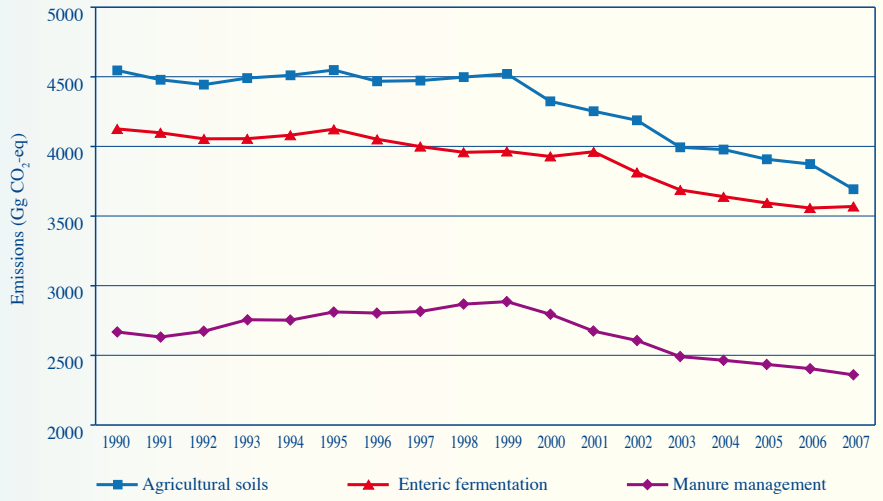
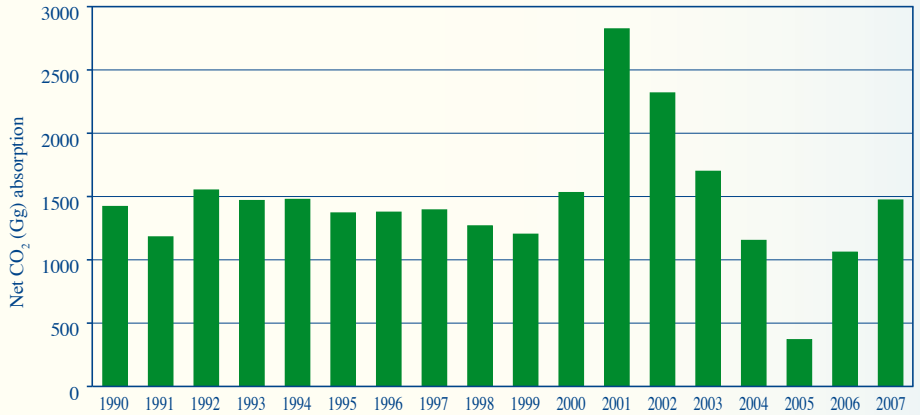


Figure 3.13 Net CO_2 removals from LULUCF in Belgium (Gg CO_2)



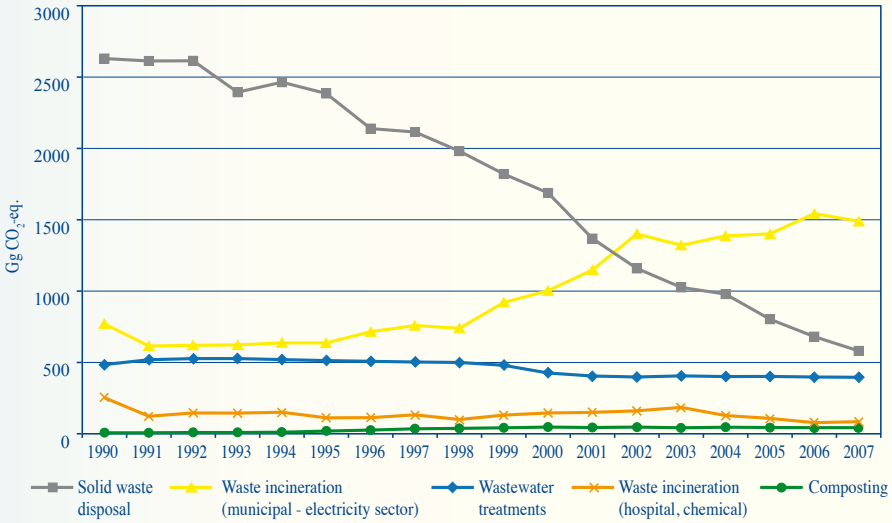
3.2.10. Waste

GHG emissions from waste[9] accounted for 0.8% of national emissions in 2007, compared to 2.4% in 1990. This decrease is due to CH_4 emissions from solid waste disposal on land, which represented 52% of total emissions for the sector. Biogas recovery in landfills by flaring or for energy purposes according to its richness has been developed on a wide scale since 1990 and is the main driver of the trend in this sector. Emissions in this sector have dropped by 78% since 1990.

The remaining 48% of GHG emissions stems in similar quantities from three sources: waste incineration, wastewater treatment and composting. CH_4 emissions from composting are a key source in Belgium, reflecting in fact the increasing use of sorting and recovery practices. Emissions from waste incineration are increasing at the same time as the amount of waste put in landfill sites is decreasing.

Figure 3.14 Emissions in the waste sector

Emissions from household waste incinerators have been included under electricity generation in accordance with the IPCC guidelines but are presented here in order to give a complete overview of waste-policy related emissions.



3.3. National inventory system

3.3.1. Overall responsibility for the Belgian national inventory

The agency designated as the "single national entity with overall responsibility for the national inventory" (national compiler) is the interregional cell IRCEL/CELINE, established by the Cooperation agreement of 18 May 1994 (modified by the decision of 21 May 1995) about the monitoring of emissions in the atmosphere and the structuring of data. It is constituted by members of the three regions.

3.3.2. Legal arrangements and regional agencies

Legal arrangements

The Inter-ministerial Conference for the Environment[10] took a series of decisions that clarify the role and responsibilities of different entities, as regards the preparation of the national GHG inventory. An overview of these decisions, and relevant extracts, are listed below:

(a) Decision of the Inter-ministerial Conference for the Environment (ICE), 7 October 1999

– [..] future inventories of GHG emissions shall be established on the basis of the data delivered by the regions, and completed, if required, by complementary information.

(b) Decision of the Inter-ministerial Conference for the Environment, 6 March 2002

– [..] The ICE confirms that the Regions shall deliver annually their most recent data on greenhouse gas emissions for the purpose of international reporting and for the assessment of the domestic climate change policy. The ICE decides that emission data shall be collected in accordance with procedures as defined in UNFCCC guidelines, concerning the national inventory of greenhouse gas emissions. Regions commit themselves to deliver their data on greenhouse gas emissions for the previous year as from 31-12-2004.
– [..] The Interregional Cell for the Environment (CELINE-IRCEL) is in charge

[9] In accordance with IPCC guidelines, emissions from electricity producing waste incinerators (all incinerators in 2007) were included in the electricity generation sector in this report. However, emissions from household waste incinerators are discussed here in order to give a complete overview of waste-policy related emissions.

[10] The Interministerial Conference for the Environment (ICE) is a specialised committee devoted to matters for which intergovernmental co-operation is required for implementing environmental policies.

of the annual compilation of data of the national greenhouse gas inventory, under the Common Reporting Format as described in the UNFCCC guidelines, based on data delivered annually by the regions. The ICE decides that the human resources within CELINE-IRCEL must be consolidated so as to ensure compliance with international reporting obligations as regards greenhouse gas inventories.

– [..] The ICE gives mandate to the Working group on Emissions of the Coordination Committee for international environmental policy (CCIEP) and CELINE-IRCEL, in collaboration with the coordination group "greenhouse effect" of CCIEP, [..] to elaborate a procedure of quality control of the national greenhouse gas inventory and to notify this procedure to the ICE.

In 2002 the "Cooperation agreement between the Federal State and the Regions for the implementation and the follow-up of a National Climate Plan, and the reporting in the context of the UNFCCC and KP, 14 November 2002" was signed:

[the National Climate Commission shall:]

– undertake the reporting obligations in the context of decision 280/2004/EC (EU mechanism for monitoring GHG emissions) and the UNFCCC, in collaboration with the relevant departments and the Coordination Committee for international environmental policy (CCIEP);
– make sure that methodologies, procedures, data analysis, projections used by the Parties to the agreement are compatible and, if possible, harmonised.

The regions are committed to deliver yearly to the National Climate Commission a report containing the relevant information allowing the federal government to report data in accordance with the UNFCCC guidelines and with decision 280/2004/EC.

Institutions and procedures

Entities responsible for the performance of the main functions of the Belgian Inventory System, as well as main institutional bodies in relation with the decision process as regards this system, are presented in Figure 3.15 and listed hereafter.

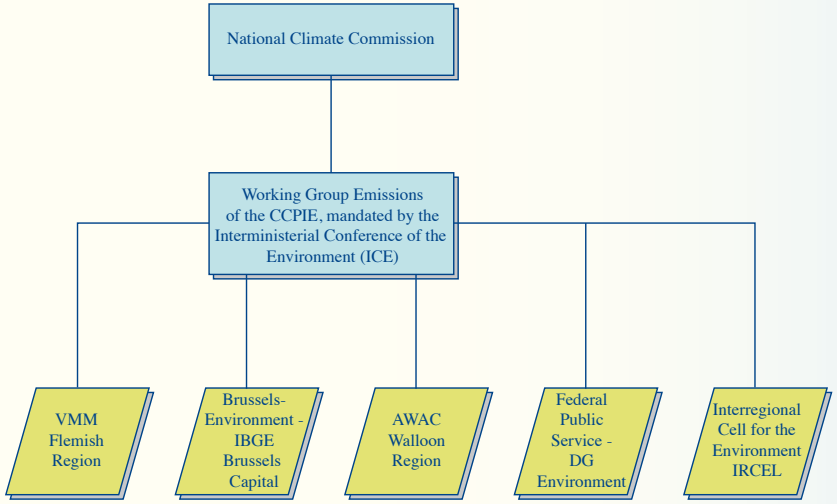
As decided by the legal arrangements, the **3 regions** are responsible for delivering their greenhouse gas inventories, which are later compiled to produce the Belgian GHG inventory. The main regional institutions involved are:

– The Department Air, Environment and Communication of the **Flemish Environment Agency (VMM)** in the Flemish Region;
– The **Walloon Agency for Air and Climate (AWAC)** in the Walloon Region**;**
– The **Brussels Institute for the Management of the Environment (Brussels Environment - IBGE)** in the Brussels Capital Region.

At the federal level, The Directorate General Energy of the Federal Public Service Economy, SMEs, Self-employed and Energy (FPS - DG Energy) is responsible for the top-down estimation of energy-related CO_2 emissions using the IPCC "reference approach", on the basis of the national energy balance. The Directorate General Environment of the Federal Public Service for Health, Food Chain Safety and the Environment (FPS - DG Environment) is also involved in the national inventory system in its capacity of UNFCCC National Focal Point of Belgium.

The Working group on Emissions of the Coordination Committee for International Environmental Policy (CCIEP) (referred to below as "CCIEP-WG Emissions") plays a central role in the coordination of the national GHG inventory. The CCIEP is the principal organ for coordinating international environmental policy. Its Working group on Emissions is a regular body of exchange of information between the regions, IRCEL-CELINE and the UNFCCC National Focal Point. All technical aspects of the GHG inventory (methodological choices, emission factors, uncertainty

Figure 3.15 Main institutions and organisations involved in the preparation of the national greenhouse gas inventory



analysis, QA/QC, etc.), as well as organizational aspects of the preparation process, are coordinated via the CCIEP-WG Emissions. Beside the CRF-submissions, other reporting requirements such as the National Inventory Report and responses to the review processes are prepared within this group. The CCIEP-WG Emissions is also the forum for the process of improvement of the national inventory system.

The Interregional Cell for the Environment (IRCEL-CELINE) is the single national entity with overall responsibility for the preparation of the Belgian GHG inventory. IRCEL-CELINE operates as national compiler of greenhouse gas emissions in Belgium. It is responsible for collecting the regional estimates of GHG emissions / removals and for compiling the three sets of regional data into one national inventory.

The National Climate Commission, has the general responsibility for the establishment, execution and monitoring of the National Climate Plan and for fulfilling the reporting obligations under the United Framework Convention on Climate Change and the Kyoto Protocol. In this respect, this Commission is in charge of the approval of the inventory reports.

3.3.3. Process for the development of emission estimates

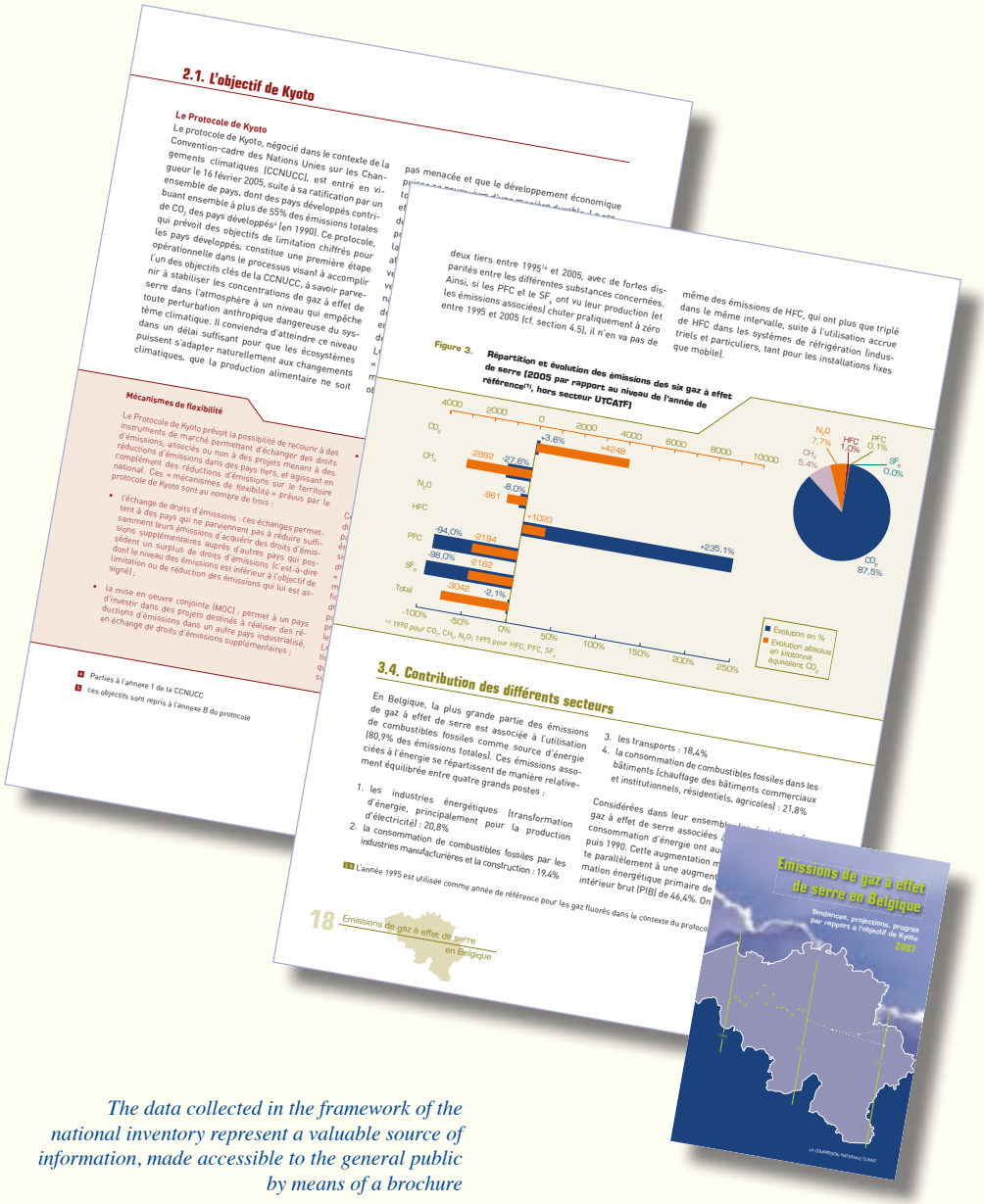
A general and detailed description of the methodologies can be found in the National Inventory Report Submitted each year to the UNFCCC.

By following intensively regional, national and international workshops about estimating emissions and sinks of GHG, the responsible organizations for setting up the emission inventory in Belgium keep in touch with all possible developments on that subject and try to optimise the emission inventory as efficient as possible.

3.3.4. Key source identification

Key source categories are identified according to the Tier 1 methodology described in the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. Both a level assessment (contribution of each source category to the total national estimate) and a trend assessment (contribution of each source category's trend to the total trend) are conducted during this submission. A level assessment is performed for the years 1990, 2006 and 2007 and trend analysis is carried out for the years 1990-2006 and 1990-2007.

The key source analysis is realised on the basis of the set of sub-categories, at the level of detail of the sectoral report tables. The LUCF-data are included in this analysis since the 2008 submission. This procedure leads to the determination of a set of 36 source categories during the level assessment 2007 covering 99.6% of the total aggregated emissions The key source analysis is performed by using CO_2-equivalent emissions calculated by means of the global warming potentials (GWPs) speci-



The data collected in the framework of the national inventory represent a valuable source of information, made accessible to the general public by means of a brochure

fied in the UNFCCC reporting guidelines on annual inventories.

3.3.5. Recalculation

Recalculations of the emissions of GHG in Belgium, in accordance with the IPCC Good Practice Guidance and relevant decisions of the COP and/or COP/MOP, are carried out in the regional and national emission inventory. All recalculations done of previous submitted estimates of GHG emissions by sources and removals by sinks are yearly described in the National Inventory Report (sections 3 to 9), which can be downloaded on www.unfccc.int.

3.3.6. Quality assurance and quality control plan

Belgium did submit a full QA/QC plan of the Belgian national system for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol on the 20th of October 2008 to the UNFCCC-experts as a demand of the UNFCCC-centralised review carried out from the 1st to the 6th of September 2008. In the final Annual Review Report of UNFCCC (Report of the individual review of greenhouse gas inventories of Belgium submitted in 2007 and 2008) the ERT (expert review team) concluded that the QA/QC plan has been prepared and implemented in accordance with the IPCC good practice guidance.

Belgium is a Federal State organised in communities and regions. The three regions (Flemish Region, Walloon Region, Brussels-Capital Region) are responsible for the GHG inventory of their own territory. Consequently every year, 3 inventories are compiled and aggregated into a national greenhouse gas inventory, which is managed by the national inventory agency (IRCEL/CELINE interregional cell).

The bodies who take responsibility for the preparation of inventories in the three regions are:

- AWAC : Walloon Agency for Air and Climate;
- VMM: the Flemish Environmental Agency;
- Brussels Environment (IBGE/BIM)

The activities of these bodies, as regards the preparation of the national greenhouse gas inventory and the implementation and development of the QA/QC plan, are coordinated via the "Working group on Emissions of the Coordination Committee for International Environmental Policy (CCIEP)" (referred to below as "CCIEP-WG Emissions"). This group plays a central role in the coordination of the national GHG inventory. It is a permanent platform for the exchange of information between the regions, IRCEL-CELINE, the National Climate Commission (see below) and the Belgian UNFCCC National Focal Point. All methodological aspects of the GHG inventory (methodological choices, emission factors, uncertainty analysis, etc.), as well as the implementation and improvement of the national system, including the QA/QC plan, are coordinated via the CCIEP-WG Emissions. This working group is meeting together on a regular basis and is responsible for coordinating all emission inventory tasks in Belgium.

More information on the various actors can be found in the Belgian National Inventory System which was updated during the 2009 submission to the UNFCCC-secretariat.

3.3.7. Procedures for the official approval of the inventory

After compilation of the national inventory, under the CRF format, the Belgian CRF-submission is first approved by the CCIEP-WG Emissions. Then it is transmitted to the National Climate Commission. All the mandatory reports in the framework of the UNFCCC, the Kyoto protocol and the EU Decision 280/2004/EC concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol are subject to approval by the National Climate Commission. The final drafts of these mandatory reports are communicated to the National Climate Commission two weeks before the due date for those submissions, for approval. These draft reports may be amended at the request of the National Climate Commission. At least 1 week before the due date for the submission, the National Climate Commission gives its approval on the documents, which are then submitted to the UNFCCC Secretariat through the UNFCCC National Focal Point or to the EU Commission via the Permanent Representation of Belgium to the European Union.

The timeline for the approval and submission of inventory data and other information related to GHG inventories is summarised below:

- 01/01/200X+1: submission of inventory data and supplementary information to the CNC for approval (submission to the European Commission: 15/01)
- 01/03/200X+1: submission of the final versions of the national inventory data, the NIR and supplementary information to the National Climate Commission (submission to the European Commission: 15/03);
- 31/03/200X+1: submission of the final versions of the national inventory data, the NIR and supplementary information to the National Climate Commission (submission to the UNFCCC: 15/04).

3.4. National registry

(a) The name and contact information of the registry administrator designated by the Party to maintain the national registry:

Federal Public Service of Public Health, Food Chain Safety and Environment
DG Environment - Climate Change Section
Mark LOOMAN - authorised representative of the registry administrator
Eurostation Building, Victor Hortaplein 40 - bus 17, 1060 Brussels
tel: +32 (0)2 524 95 32
mobile: +32 (0)473 333 968
e-mail: Mark.Looman@health.fgov.be

(b) The names of the other Parties with which the Party cooperates by maintaining their national registries in a consolidated system;

– Belgium manages the technical side of the registry of Luxemburg: the hosting, development, testing and maintenance. The Luxemburg registry is hosted on the same servers but operates independently from the Belgian registry, so it is not sure this can be called a consolidated system.

(c) A description of the database structure and capacity of the national registry;

– The software used for the BE registry is an adapted version of the European Community Registry software (the CR software is originally developed by Trasys, the adapted version is developed by Dr. Lippke & Dr. Wagner GmbH). Transactions are executed within seconds even under heavy load.

(d) A description of how the national registry conforms to the DES between registry systems for the purpose of ensuring the accurate, transparent and efficient exchange of data between national registries, the clean development mechanism registry and the transaction log (decision 19/CP.7, para 1);

– The Belgian Registry fully conforms to the DES standards. The adapted CR software was both accredited by the ITL administrator (in October 2007) and the CITL administrator (in June 2008) to operate under the European and Kyoto rules. The SEF reporting was accredited in January 2009.

(e) A description of the procedures employed in the national registry to minimize discrepancies in the issuance, transfer, acquisition, cancellation and retirement of emission reduction units (ERUs), certified emission reductions (CERs), temporary certified emissions reductions (tCERs), long-term certified emission reductions (lCERs), assigned amount units (AAUs) and/or removal units (RMUs), and replacement of tCERS and lCERs, and of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transactions;

– In case of discrepancies, the incident/problem management procedures of the UNFCCC are followed. These procedures are referred to in our own incident/problem management procedures which are written down within the framework of the ISO 9001:2000 quality system that is being implemented. Yearly the SEF report checks if there are no discrepancies between the records of Kyoto units in the Belgian, UN and EU registry systems. The January 2009 Belgian SEF report over 2008 was judged complete by the UNFCCC and showed no discrepancies.

(f) An overview of security measures employed in the national registry to prevent unauthorised manipulations and to prevent operator error and of how these measures are kept up to date;

– The software has been improved so as to deter or forbid certain unwanted transactions such as performing a transfer instead of a surrendering, by inserting confirmation steps with informative warning messages.
– In order to increase the security level in a customer friendly manner, access to the register will be secured with the electronic identity card (eID). This was

implemented in 2009 for the register administrators, in order to test the concept thoroughly in practice. Furthermore, a feasibility study will be conducted prior to the roll-out in 2010 to all users of the National Register (approximately 750, from 300 companies). The procedures for the opening of credit accounts, requests for amendment of data, etc. are currently conducted via signed paper documents and registered mail. The eID project will examine whether this process can become completely electronic, with digital signatures. This would result in a significant administrative simplification – with the elimination of errors by manual data transfer – and would significantly speed up the procedures for users.

– All procedures are being documented and maintained in an ISO 9001:2008 quality system.

(g) A list of the information publicly accessible by means of the user interface to the national registry;

Public reports are available at:

– http://www.climateregistry.be/NL/REP/report.htm (Dutch version) and http://www.climateregistry.be/FR/REP/report.htm (French version).
– Detailed reports on accounts, operators,… will be fully implemented with the next Belgian CR software release of September 2009. In the mean time, this information is provided according to Annex XVI of the Commission Regulation 2216/2004 changed by Regulation 916/2007, and in accordance with 13/CMP.1 Annex II paragraph 45 and 46, at:
– https://www.climateregistry.be/crweb/report/public/publicReportList.do (in Dutch, French, English and German)
– http://www.climateregistry.be/NL/REP/publicreports.htm (Dutch) and http://www.climateregistry.be/FR/REP/publicreports.htm (French)

No Article 6 projects have been approved.

A summary report with total quantities for each calendar year will be implemented with the next Belgian CR software release of September 2009. However, the European Directive 2003/87 requires confidentiality of all transaction data during 5 year. This prohibits the Belgian registry from disclosing any transaction information.

The following mention has been added to the list of holding accounts: "The account holder of each account is the legal entity authorised by Belgium to hold ERUs, CERs, AAUs and/or RMUs under its responsibility. The list of holding accounts constitutes the list of legal entities."

(h) The Internet address of the interface to its national registry;

– General registry website for the public: http://www.climateregistry.be;
– Secured direct access to the Registry: https://www.climateregistry.be

Table 3.3 Scheduled and unscheduled downtime of the Belgian registry in 2008 (in minutes per month)

Month 2008	Scheduled downtime [minutes]	Unscheduled downtime [minutes]
January	0	893
February	0	2 923
March	5044	0
April	697	1 394
May	0	0
June	0	0
July	0	179
August	480	0
September	5314	259
October	26 640 (ITL Go-Live)	0
November	3060	180
December	0	0

– The secured site also contains a public part with reports and online account opening forms.

(i) A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster;

– Adequate backup procedures are in place. Backups are safely stored.
– Every day of the year the registry is manually tested on some 15 checkpoints to ensure a.o. that the reconciliations and transactions ran without error and that there is no abnormal change in the number of accounts, users, failed logins etc.
– The Belgian registry has a very detailed Disaster Recovery procedure that was tested and proved in the production environment in June 2008 (before the ITL Go-Live) and on 4-5 June 2009 with the full ITL/CITL connection.
– This means that, in case of a catastrophic failure of the hosting site, the Belgian registry will be back up and running on the Disaster Recovery site within hours.

(j) The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the technical standards for data exchange between registry systems.

– The Belgian registry was tested according the ITL administrator accreditation test plan (in October 2007) and the CITL administrator accreditation test plan (in June 2008) to operate under the European and Kyoto rules.
– Apart from this legally required testing, the registry software is extensively tested by the registry team. Very detailed and partially automated testing scenarios are run before every new release of a registry upgrade.
– Any found inconsistencies or bugs are fed into the bug-tracking system Bugzilla, and consistently classified, labelled and solved. Every solved bug is again tested by the registry team before release.
– Constant monitoring of hard- and software parameters is in place. Monitoring is done in several ways:
  – COLT internal monitoring of solution components (Agent-based)
  – COLT external monitoring of solution components (Probe-based, e.g. ping and port probes)
  – Transactional monitoring of the solution (automated monitoring with "dummy end user")
  – Out-of-band script monitoring with "dummy end user" performing basic actions with the registry
  – Cumulated monthly reporting done by the Service Manager

COLT monitors the COLT Data Centre infrastructure, network elements and managed service components 24x7x365. COLT uses a mix of agent based and agent-less tools to monitor all managed devices. Systems are tested every five minutes and the Customer is notified if any degradation of service occurs.

The table 3.3 indicates how many minutes for each month of the reporting period the Belgian registry was unavailable to its users (a) due to scheduled downtime, and (b) due to unforeseen problems. ■

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4. Policies and measures

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4.1. Policy-making process

4.1.1. Description of the overall policy context

Belgium is firmly committed to combating global warming. This commitment was first put into practice with the signature (1992) and ratification (1996) of the United Nations Framework Convention on Climate Change, followed by ratification of the Kyoto Protocol (2002). Bound to its European Union partners by the agreement on joint fulfilment of the Kyoto commitments (1998), Belgium intends to implement all measures necessary to ensure that it achieves its commitments under the Kyoto Protocol.

The internal burden sharing agreement (2004) between the federal and regional governments constituted an important step forward, establishing differentiated targets and a clear framework for the responsibilities of the different federated entities. Belgium's total GHG emissions (without LUCF) in 2007 were 9.9% below base year emissions, being thus below its Kyoto commitment of a -7.5% reduction. At the time of the last IDR, GHG emissions in Belgium were slightly above base year levels. Belgium's GHG emissions path has thus strongly changed since 2003, which is a positive movement. Given this shift, Belgium is now on track to meet its Kyoto commitment.

Belgium moved further down the road to meeting its Kyoto target with the development of its National Allocation Plan in accordance with the European Emission Allowance Trading Directive (2003/87/EC). It constitutes a key instrument that will be used to help energy-intensive sectors improve their energy efficiency while optimising costs. Belgium has developed its second National Allocation Plan (2008-2012), which was adopted by the European Commission on 10 October 2008.

The climate policies implemented by the regional and federal authorities evolved appreciably in recent years. The structures necessary for the use of the Kyoto project-based mechanisms were put into place. The Federal State and the three regions sat their objectives in the National Allocation Plans and initiated and financed Clean Development Mechanism and Joint Implementation projects. With these projects, complementing a range of policies and measures implemented by the regional and federal authorities, Belgium entered confidently into the first commitment period of the Kyoto Protocol.

In perspective of the European burden sharing agreement, with regard to the fulfilment of the Kyoto Protocol, the Belgian reduction objective for the emissions of greenhouse gases was set at 7.5 % below

the emissions of 1990. This reduction objective must be complied with in the period 2008-2012. This means that Belgium has an average yearly Kyoto target of 134.799 Mt CO_2-eq in the period 2008-2012.

In the Consultation Committee between the community and regional governments of 8 March 2004, a burden sharing agreement was reached between the Federal Government and the Regions on this reduction objective. Table 4.1 shows the amount of allowances which must be submitted on average every year during the first commitment period.

With this national burden sharing agreement, more allowances are assigned to the three Regions than Belgium is assigned under the Kyoto Protocol. In order to compensate for the deficit (2.442 Mton CO_2-eq. per year for the period 2008-2012), it was agreed that the Federal Government shall obtain additional allowances as a result of the use of flexible mechanisms under the Kyoto Protocol.

Pursuant to this agreement, the federal Government will also take internal federal policy measures to support the reduction efforts of the Regions. The Council of Ministers of 19-20 March 2004 approved a set of measures to reduce greenhouse gas emissions. As a whole, this set of measures should guarantee a reduction in national greenhouse gas emissions of 4,8 Mt CO_2 eq. per year for the period 2008-2012, which will benefit the Regions. Within the National Climate Commission there will be each year an evaluation whether the implementation of the measures from the federal government are in accordance with the ex ante estimation. A first evaluation has been made. The agreement also provides that the Regions can determine the extent to which and the way in which they introduce flexible mechanisms in order to obtain additional allowances.

In the Belgian federal system, policies and measures to reduce greenhouse gas emissions are mapped out at different levels of responsibility based on the division of powers between the federal government and the regions. Each level of power establishes its own priorities for environment and climate policy. Coordination bodies have been set up to harmonise and create synergy between the policies implemented by the federal government and the three regions, the National Climate Commission being the most important. The general context for the preparation of climate change policies and measures is thus determined by the plans established by the federal and regional authorities setting out policy objectives and strategies. Federal and regional governments are implementing various policies and measures to achieve the national goals. A National Climate Plan for the period 2009-2012 has finally been been adopted in April 2009. In this respect, major progress has been made since the 4th National Communication. The plan provides a good overview of the current situation and the measures decided at different levels of power and competences.

Table 4.1 The national burden sharing agreement

(Mton CO_2-eq.)	1990 emissions	2008-2012 annual average quantity of allowances	corresponds to x% compared to CO_2-eq. emissions in 1990
Flemish Region	86.987	82.463	-5.2 %
Walloon Region	54.725	50.621	-7.5 %
Brussels Capital Region	4.017	4.157	+3.475 %
Federal government	-	-2.442	-
Total BELGIUM	**145.729**	**134.799**	**-7.5 %**

Flemish Region

On 20 April 2001 the Flemish Government decided to establish the Taskforce Climate Policy Flanders, whose primary task was to draft a Flemish Climate Policy Plan (see chapter 2.1.3).

The Flemish Climate Conference was started in 2005 as a precursor to the Flemish Climate Policy 2006 – 2012. The Flemish Climate Conference is the forum where organisations from small and medium businesses, companies, scientists, citizens and authorities use an intense negotiation process to build a basis for the Flemish Climate Policy Plan.

September 2007 saw the start of the second leg of the Flemish Climate Conference. The aim of this second leg was to prepare for the first biannual Progress Report in 2008 of the Flemish Climate Policy Plan 2006 – 2012. The Flemish Climate Conference also forms part of the social economic plan “Flanders in action” of the Flemish Government.

Walloon Region

A Walloon government civil servant was recruited to monitor the Air Quality Plan which was finally adopted on 15 March 2008. An administrative task force bringing together the director generals of the administration and the public interest bodies affected by the plan (ISSeP, FOREM, SOFICO, SRWT, SWCS, SWL, FLW and the Wallonia Air and Climate Agency) was

also set up. A steering group is managing the plan and driving it forward. The group meets on a monthly basis and sets priorities for the administrative task force.

Brussels-Capital Region

An inter-cabinet task force has been given responsibility by the region's government for identifying possible policies and measures as a follow-up to the first 2002-2010 regional climate plan (see chapter 2.1.3). The task force has identified 101 measures in various sectors covered by the region so that a 2020 climate plan can be produced. The second half of 2009 will be devoted to negotiating the measures resulting from this work with a view to drafting the second Climate Plan for the Brussels-Capital Region.

4.1.2. System for monitoring and evaluation of policies and measures

Belgian entities (Regions and Federal) appear to periodically evaluate the impact of their policies and measures, both ex-ante and ex-post, based on a number of methodologies. Above all, the methodology to evaluate polices and measure should be harmonised, in order to ensure comparability and the ability to identify the most efficient measures. In this context, it is encouraging that such coordination already occurs in the context of federal and regional emission projections, based on standardised modelling assumptions. Also, work is ongoing to harmonise statistics. A working group has been set up by the end of 2008, in order to develop a single database that would allow a harmonised and co-ordinated monitoring of the policies and measures. The measures would be classified by different entries (sector targeted, GHG affected, type of instrument …) and associated with the relevant indicators (status of implementation, expected and/or observed CO_2 reduction,…), with multiple relationships (some measures could be associated to more than one indicator and inversely) The development of this database will start in 2009. Full compatibility with the national database developed by the National Climate Commission will be ensured.

Federal

The National Climate Commission has the competency to evaluate annually whether the implementation of measures from the federal government is in accordance with the ex-ante estimation. The first results from the federal study have been collected and are presented in this communication, although the information still needs to be validated.

The objective of the study was to obtain the following results:

1. A table with, for each federal PAM, avoided CO_2-eq emissions for each year in the 5 year period 2008-2012, with a minimum and maximum scenario.
2. A description, for each PAM, of the hypotheses in the calculation of the avoided emission.

All federal PAMs are to be evaluated. The basis is the final National Climate Plan (NCP) adopted in April 2009, to situate the different federal PAMs in relation to the 'national' measures, according to the structure of the NCP.

In the structure of the NCP, each national measure can consist of 1 or more regional measures and/or a federal measure. It is important for each federal measure considered in this project to know whether or not there exist 1 or more linked regional measures. This can influence the CO_2-reduction allocated to the federal measure separately. For example the fiscal deduction for an investment in renewable energy at federal level overlaps with subsidies given at regional level.

In some cases, the impact of several measures can be estimated more precisely globally than individually. This is the case for example for the measures stimulating the development of offshore wind energy, where the impact is best measured from the installed capacity that is planned for the years 2008-2012, based on actual projects. In such cases, the relevant measures will be clustered. It should be noted that in such cases, the possible contribution of regional policies will have to be estimated and subtracted. Hence a cluster is a set of PAMs of which the impact will be evaluated jointly and which in some cases might include regional PAMs.

The end result of this task will be a list of federal PAMs, with a clear definition and linked to relevant national and regional measures or clusters of PAMs to be considered together.

Flemish Region

The Flemish Climate Policy Plan 2006-2012 is a strategic policy plan which serves as a guide for the period 2006-2012 for achieving the Flemish Kyoto objective, viz. the reduction of greenhouse gas emissions by an average of 5.2% compared to the emissions in 1990 for the period 2008-2012. In absolute terms this means that the average emissions during the period 2008-2012 can amount to a maximum of 82.463 Mton CO_2 -eq per year.

The plan contains actions from all the relevant Flemish areas of competence. A more in-depth evaluation report ("Progress Report 2008") has been approved by the Flemish Government on 15th May 2009. This report indicates the progress with regard to the execution of the plan, so as to allow the Flemish Government to respond timely with necessary adjustments or new measures if necessary. All necessary information on climate policies and measures has been collected in a database which can be consulted online. This includes a description of the measures, their status of implementation and information regarding indicators and costs. The database is compatible with the national database developed by the National Climate Commission.

Walloon Region

In Wallonia, the policies and measures regarding CO_2 emissions are part of different plans, namely the Air-Climate Plan, the Energy Efficiency Action Plan, the Renewable Energy Plan and the Plan for a Sustainable Energy Mastery. These measures are currently monitored by the respective administrations in charge.

The monitoring mainly addresses the implementation of the measures, but still lacks a quantification of the emission reductions. This quantification is under development. Provisional figures are available for many policies and measures, such as voluntary agreements, rational use of energy and renewable energy sources in the public sector, financial support for "green" vehicles or public lighting. However the methodologies applied to quantify those emissions reductions have not been officially approved yet, so these figures cannot be reported for the time being.

Brussels Capital Region

In Brussels, the policies and measures regarding CO_2 emissions are part of different plans, namely the Air-Climate Plan, the Energy Efficiency Action Plan. These measures are currently monitored by Brussels Environment.

The monitoring mainly addresses the implementation of the measures. The database (see above) will be soon implemented and quantification of the emission reductions will be supplied according to decision n°280/2004/EC. This quantification is under development for some measures (energy subsidies). However the methodologies applied to quantify those emissions reductions have not been officially approved yet.

In the context of the national coordination of the energy policy (the "CONCERE-ENOVER" group), a specific subgroup has been created to elaborate a common evaluation methodology of the National Energy Efficacy Action Plan (NEEAP) in the context of the energy services directive (2006/32/EC). Not all the measures shall be evaluated, only the most relevant ones.

4.2. Domestic and regional programmes; legislative arrangements, enforcement and administrative procedures

4.2.1. Description of domestic legislative arrangement to meet the KP commitments

According to the Kyoto Protocol reporting guidelines (para 37), Belgium shall report a description of any domestic and regional legislative arrangements and enforcement and administrative procedures it has in place to meet its commitments under the Kyoto Protocol, including the legal authority for such programmes, how they are implemented, and procedures for addressing cases of non-compliance under domestic law.

The National Climate Plan 2009-2012 approved by the National Climate Commission answers to this obligation.

The legal basis for the obligation to evaluate the federal policies and measures (PAMs), is the cooperation agreement of 14/11/2002 between the Federal State, the Flemish Region, the Walloon Region and the Brussels-Capital Region, in which it is stated that a National Climate Plan will be drawn up, executed, evaluated and reported to the UNFCCC under the Kyoto protocol. The agreement also results from the decision 280/2004/EC concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol with the ultimate goal of reducing emissions of CO_2 and other greenhouse gas emissions.

4.2.2. Public accessibility

Federal government

Public access to environmental information in Belgium, including legislative instruments, policies and measures developed under the Kyoto protocol, is regulated at federal level with the law of 05/08/2006 on public access to environmental information. This law transposes the 2003/4/EC directive on public access to environmental information (based on the first pillar of the Aarhus convention on access to environmental information, public participation and access to justice in environmental matters).

The law aims at both active and passive publicity in relation to the environment.

Passive publicity:

In this case, the public is the actor, i.e. the public requests specific information from a public authority. The latter is required to provide the information at the latest within one month (with the possibility of an extension if the request is complex and/or contains large volumes).

Active publicity:

In this case, the authority spontaneously makes the information available to the public, in the form of easily accessible paper publications or a website.

Article 12 of the law provides that a list of federal environmental information should be made actively available for the public, i.e.:

- texts of international treaties, conventions or agreements relating to the environment
- legal texts relating to the environment
- Governmental statements and other kind of documents referring to the politics developed by the government
- federal plans and programs relating to the environment
- progress reports on the state of development of environmental policies
- reports on the state of the environment
- environmental measures and data
- authorizations and permits with a significant impact on the environment
- impact environmental assessments, risks evaluations and security reports

Flemish Region

In order to meet the obligations set in the Convention of Aarhus and to meet the European regulation that was modified according to the treaty, the Flemish legislation was amended on a number of points.

The new decree concerning Freedom of Information legislation came into force on 1 July 2004. This decree translates the first pillar of the Convention, access for citizens to environmental information, into Flemish legislation.

A decision by the Flemish Government on 28 October 2005 further expands on the decree and dictates the active spread of environmental information by the government. This decision was published in the Belgian State Gazette on 30 November 2005 and came into force on 1 January 2006.

The decree and the decision completely implement the European directive concerning access for citizens to environmental information.

The pillar on participation of the Convention was converted by a change in Vlarem I and Vlarem II.

- Decision by the Flemish Government on 3 June 2005 to change the decision of the Flemish Government from 6 February 1991 concerning the Flemish regulation on environmental permits, concerning the regulations on participation,
- Decision by the Flemish Government on 12 May 2006 to change the decision of the Flemish Government from 6 February 1991 concerning the Flemish regulation on environmental permits and the decision by the Flemish Government on 1 June 1995 concerning general and sectoral regulations on environmental health, to implement corrections of errata and other changes in EC legislation,
- The third pillar of the Convention concerns both federal authority (access to the courts) and a regional authority (administrative appeal). In Flanders, the right of environmental groups to appeal against environmental permit applications was extended by a modification of art. 24, § 1, of the decree on environmental permits.

Walloon Region

The Walloon Region has worked within its remit to produce a draft regional convention implementation report which has been submitted for public consultation in accordance with the convention's prescriptions (http://environnement.wallonie.be/convention_aarhus/rapport_Aarhus_RW_2007.pdf)

The region's various websites (see links in Chapter 9) provide the public with a lot of data about the implementation of the Kyoto Protocol and compulsory UNFCCC reporting.

Brussels-Capital Region

The 18 March 2004 decree on access to environmental information in the Brussels-Capital Region guarantees the right to access environmental information held by the public authorities. In practice, questions can be put to a public authority (municipality, regional government or minister, for example) by any individual without needing to provide justification. A response should be provided within a reasonable timeframe (generally one month) providing that the information exists and can be divulged. In concrete terms, the regional environment department (Bruxelles Environnement – IBGE) actively publicises environmental information and provides the public with an environmental information service, a website and a large number of environmental publications (including *L'Etat de l'environnement à Bruxelles*).

4.2.3. Mechanism participation

Appointment DNA/DFP

In Belgium, the division of authority concerning the approval of project activities is set in a cooperation agreement between the Federal Government, the Walloon Region, the Flemish Region and the Brussels Capital Region concerning the implementation of some directives of the Kyoto protocol, agreed in Brussels, on 19 February 2007.

For Belgium, the National Climate Committee was appointed as designated focal point (DFP) and the designated national authority (DNA). In this function the committee is bound by the decisions of an administrative and technical nature, for which the authorised regional and federal authorities approve the project activities.

According to article 1 section 27 of the cooperation agreement (and in accordance with the Marrakech agreements), project approval also constitutes written authorisation enabling one or more people to participate in a project activity.

Distribution of authority for approval of project activities

Article 5 of the cooperation agreement defines the situations in which the project activities will be approved by the regions or by the Federal Government. The project activities that do not form part of this agreement will, as stated in article 7, be approved by the National Climate Commission.

A region will approve the following project activities:

- each project activity that is completely or partially financed by that region, or by a province or municipality in their territory;
- each project activity from which the region wishes to obtain Kyoto units;
- each CDM or JI project activity for which a request for approval has been submitted by a natural person residing in the relevant region or by a legal person with a business address in that region;
- each project activity that will be executed on that region's territory.

The federal government approves all project activities from which it gains Kyoto units.

If a project activity, according to the abovementioned criteria, simultaneously falls under the authority of several regions or of one or several regions and the Federal Government, then it will be dealt with by the authority where the application was submitted for approval, following consultation with the other authorities that are involved. If the project activity is set to take place on the territory of a region, the request for approval will still be submitted to and dealt with by the region in question.

Each project activity that does not fall under the authority of a region or the Federal Government in accordance with article 5 will fall under the authority of the National Climate Commission.

Approval procedures

The regions, the federal government and the National Climate Commission have approved their procedure and approval criteria, which are listed on their respective websites.

4.2.4. Information on article 3.3. and 3.4.

The information on article 3.3 is under preparation, with a view to report it in 2010, so no official figure can be delivered for the time being.

Belgium did not elect any activity under Article 3.4.

4.2.5. International transports

International aviation

On 13 January 2009 Directive 2008/101/EC to include aviation into the European Union Emissions Trading Scheme (ETS) was published in the Official Journal of the Community.

The directive introduces an emissions trading system for aircraft operators. It requires the surrender of emission allowances for all CO_2 emitted during the calendar year (starting from 2012) by flights covered by the directive. The emissions must be determined using a monitoring system, which is developed in accordance with the monitoring and reporting guidelines (MRG). Emissions must be reported after each calendar year (before 1 April of the following year) and the number of emission allowances corresponding with the reported emitted quantity of CO_2 must be surrendered before 1 May.

The total amount of emission allowances accounts for 97% of the yearly average historic emissions in the period 2004-2006 for the year 2012, and for 95% for the years 2013-2020. 85% of allowances will be distributes free of charge until 2020. In principle all flights that depart from or arrive at airports in the territory of a Member State fall under the scope of ETS, but some activities have been exempted from the EU ETS. The Directive provides for one Member State to be responsible for administering each aircraft operator participating in the EU ETS. Belgium is administering member state for 59 aircraft operators.

International shipping

In the event that no international agreement which includes international maritime emissions in its reduction targets through the International Maritime Organisation has been approved by the member states of the European Union, or no such agreement through UNFCCC has been approved by the Community by 31 December 2011, the Commission is urged by the European Parliament and the Council to make a proposal to include international maritime emissions in the Community reduction commitment, with the aim of the proposed act entering into force by 2013.

4.3. Policies and measures and their effects

4.3.1. National Climate Plan

The National Climate Plan provides a summary of all the measures already agreed by the different levels of power in Belgium in order to fulfil the Kyoto Protocol requirements. The plan also lays the foundations for a post-2012 strategy. The National Climate Plan is not set in stone: formal provision has been made for annual results-based adaptation based on monitoring the impact of these policies.

The first objective of the plan is to formalise the major strategic priority measures that Belgium is implementing in order to rise to the challenge of the Kyoto Protocol. The aim is to optimise the impact of policies and measures rolled out by the various competent authorities by developing synergies and complementary approaches, while taking into consideration the respective competences of these bodies. Eleven strategic areas have therefore been identified.

A set of concrete policies and measures has been produced for each strategic area. The National Climate Plan establishes priority strategic area undertakings for the reduction of GHG emissions (CO_2 equivalent) in relation to the base year.

Six sectoral strategic areas:

1. Optimise energy production.
2. Use energy rationally in the buildings.
3. Influence industrial processes.
4. Develop sustainable modes of transport.
5. Encourage the sustainable management of agricultural and forest ecosystems.
6. Boost waste management efforts.

The plan contains five additional broader-based strategic areas:

7. Step up research on climate change.
8. Raise the awareness of all Belgian stakeholders about tackling climate change.
9. Increase the direct involvement of the public authorities in reducing GHG emissions.
10. Implement flexible mechanisms.
11. Incorporate climate issues into the development aid policy.

The second objective of the plan is to set up a coordinated monitoring system in order to monitor, evaluate and adapt policies and measures. The plan is assessed every year with the body responsible for this assessment, the National Climate Commission, having two evaluation instruments at its disposal: GHG projection models enabling a "rough" estimation to be made of the impact of policies and measures and a database containing policy and measure impact indicators with regular updating from 2007 onwards by the Permanent Secretariat of the National Climate Commission.

The plan's third objective is to draw up a national climate change adaptation strategy. All sectors need to be prepared for the inevitable consequences of a rise in temperatures. This version of the plan only raises a few issues, as the national adaptation strategy will be established gradually over the next few years. It may also draw on the information contained in chapter six of this paper.

Finally, the fourth objective of the National Climate Plan is to prepare a long-term strategy to tackle climate change, which will fall under the scope of the results of the ongoing UN negotiations. Belgium is currently preparing for the post-Kyoto period by actively taking part in international negotiations and by carrying out forward-looking studies on the short and medium-term evolution of GHG emissions. The country's strategy also falls within the scope of the energy-climate package adopted in December by the European Union.

4.3.2. Review of the main PAMs

The National Climate Plan contains around 100 measures but only the main ones are reviewed here. Research, training / education and development aid measures are covered in the other chapters of this 5th National Communication. Table 4.2 provides an overview of the measures and the first quantifications that are available at this time. It should be noted that each of the measures has been given a **reference** (e.g. EP-A01) which can be referred to and which enables potential interaction and reinforcement to be highlighted. The references are also included in the text to provide greater clarity. The structure of the main areas contained in the NCP has been slightly altered in this paper in order to highlight the most striking facts. Accordingly, measures linked to the public authorities leading by example have been allocated to the different corresponding areas. For each set of measures a distinction is made between the main measures (normal text) and additional measures (in italics). For more information, please refer directly to the plan, which is available in French[11] and Dutch[12]. The *Report by Belgium for the assessment of projected progress* dated 15/05/09 for the European Commission and the associated template (30/09/09) can also be used for reference purposes[13].

[11] NCP (French version): http://www.climat.be/IMG/pdf/PNC_2009-2012-2.pdf
[12] NCP (Dutch version): http://www.klimaat.be/IMG/pdf/NKP_2009-2012-2.pdf

Optimise energy production

The energy production section explains that Belgian policy aims to cut greenhouse gas emissions from electricity and heat generation (power stations, coking plants and refineries together). The transport biofuels strategy is also part of sustainable energy supply but is described in the "sustainable transport" and "sustainable agriculture and forestry" sections.

The strategy on improving energy recovery in waste treatment facilities is described in the "waste" section. The RUE strategy for the buildings is described in the "rational use of energy in the buildings" section and small-scale renewable energy production, such as solar panels on homes and individual heating systems, is not covered in this section but instead appears in the following section under energy saving in the buildings.

Green certificates and CHP certificates (=EP-A01) system

Belgium is putting the stress for energy production on promoting the use of renewable energy sources, in particular for electricity generation, and CHP. The green certificates and CHP certificates system is at the heart of this strategy. The green certificates mechanism (and CHP certificates) has been developed to support the production of green electricity (i.e. produced using renewable energy sources, such as wind energy, hydraulic energy, solar energy and biomass) and combined heat and electricity production (CHP). Green electricity producers and producers of co-generated electricity are issued with certificates with suppliers being required to purchase a minimum quota of certificates, with the quota being calculated based on their total electricity sales. Suppliers must pay a fine if they do not meet this production requirement.

This "certificates market" creates the conditions needed for making the cost of producing green electricity (or of CHP) competitive compared with other non-renewable sources. It operates within each Belgian entity (federal and regional level) although the federal mechanism is based on minimum guaranteed prices rather than mandatory quotas for suppliers. The green certificates mechanism is supplemented in certain entities by mechanisms aiming to guarantee a minimum income for green electricity producers either via funding for production or a minimum guaranteed price for green certificates. The green certificates for renewable energy sources mechanism is also applicable to the generation of electricity by CHP in the three regions.

Facilitators, whose remit is to inform and advise investors and help to raise the awareness of target groups such as industry, project developers, the local authorities and educational institutions (see EP-A04), help support this measure.

Belgium also takes part in the European trading scheme for companies that are heavy energy consumers. Belgium has developed its own allocation plan based on three regional allocation plans in order to ensure that CO_2 emissions cuts are made in the most cost-effective manner possible, i.e. the companies should not exceed the allocated threshold either by implementing internal reduction measures or by purchasing emissions allowances (see EP-B01 and IP-A01).

In the Flemish Region, a Decision on "energy planning" further reinforces the system forcing facilities that are heavy energy consumers to take energy efficiency into consideration in their operations (see EP-B02).

The Walloon Region is supporting the development of the agricultural biomethanisation industry through a range of initiatives seeking to simplify administrative procedures and checks. The region is also putting in place measures aiming to make this type of procedure more economically attractive (AG-D03).

Funding and logistics support for environmentally friendly electricity generation (EP-A02)

Apart from the green certificates scheme, the Belgian authorities have implemented a number of measures aiming to develop the production of energy from sustainable sources. Green electricity producers therefore benefit from priority network access in each entity.

The federal government has also taken a number of additional measures aiming to cut the relative cost of electricity generation from renewable sources. These measures involve special excise duties or levies on the consumption of heavy fuels, coal, etc (also see EP-A03 regarding the withdrawal of excise duty exemptions on coal products and heavy fuel).

Flemish Region aid encourages industry to invest in renewable energies, co-generation units and energy efficiency. This support measure is described in the "industry" section (IP-A06) and can be tailored and added to other support mechanisms, namely green certificates and the federal deduction for increased investment.

In the Walloon Region, the UREBA decree, which came into force on 10 June 2003, seeks to award subsidies to public law corporations and non-commercial bodies to carry out studies and work aiming to improve the energy efficiency of their buildings.

In Brussels-Capital Region, the tertiary sector and industry are offered incentives for using renewable energy and cogeneration. They can be added to economic development aids and to the increased investment deduction.

Complementary measures are also in place and draw on action plans for using biomass (via an undertaking and code of conduct), the promotion of off-shore wind energy (funding the undersea network connection cable, support measures in the

[13] http://cdr.eionet.europa.eu/be/eu/ghgpro/envshuwa

event of an output gap, guaranteed initial investment, a simplified procedure for awarding offshore concessions etc) and onshore wind energy (town and country planning and network connection options) and the promotion of cogeneration (by adapting base yields for which producers receive supplementary cogeneration certificates, by bringing emissions standards into line with those on fossil fuels, by supporting manure, agricultural products and organic waste co-fermentation projects in biogas facilities etc) (EP-A05).

Rational use of energy in the buildings

Rational use of energy and renewable energy sources in the buildings only refers in this section to the residential, tertiary and industrial sectors. The section solely describes policy on energy consumption in buildings using fuel. Rational use of energy via electricity measures are described in the energy production section.

Financial incentives encouraging rational use of energy and use of renewable energy sources (EC-B01)

Financial incentives are the most effective way of encouraging users to rationally use energy and to use renewable energy sources. Incentives usually come in the form of tax measures or premiums. The amounts are updated on a yearly basis and cover the replacement of old boilers, the installation of double or triple glazing, improving heat insulation and carrying out an energy audit, for example. The applicable tax reduction and maximum deductible amounts have been progressively increased. The general law passed at the end of 2006 increased two-fold the tax break for energy efficient investments in housing from 1,000 EUR to 2,000 EUR. This tax break can be added to the incentives offered by the regions and/or network operators as part of their public service rational use of energy obligations (see also EC-A01). Since 2008 the Flemish Region has provided people who do not, or only partially, benefit from the federal personal tax benefit with an allowance for energy-saving investments.

Incentives are offered at regional level. Roof, wall and floor insulation, the replacement of single glazing by double glazing, heat insulation of a single-family new build, the construction of a single-family passive house, the installation of a ventilation system with heat recovery, low temperature gas boilers, condensing boilers and hot air generating boilers, natural gas instant water heaters and condensing hot water generators, unit heaters and hot air generators and radiant appliances – heating, heat pumps and biomass boilers (wood and cereals for example) are covered. Equally, heat regulators (thermostat valves, thermostats etc), energy audits, thermal imaging audits, cogeneration units, electricity consumption analyses (for householders' associations), the installation of an electrical equipment management system (for householders' associations) and the improvement of lighting energy and photometric efficiency (for householders' associations) are also included.

Regional measures also include the energy renovation credit and zero interest rate loans. Since 2008 the Flemish Region has implemented an additional decrease in real estate levy for energy efficient property development.

Specific procedures are implemented at regional level to help the most underprivileged members of society to access incentives and subsidies. The FRCE (global cost of energy reduction fund) was created on 27 December 2005 by the federal government and offers cheap loans for structural energy saving measures to private individuals (EC-B03).

Energy performance of buildings and building certification (EC-A03 / EC-B05 / EC-C02 / EC-C04)

In terms of RUE in buildings, measures fall within the scope of the transposition into Belgian law of European directive 2002/91/EC on the energy performance of buildings. Assessing and improving the energy performance of buildings and obtaining energy certification of buildings are a key policy. The measure is based on regional initiatives imposing energy performance conditions for new builds and authorised renovations. The regions are each developing energy performance evaluation systems which are tailored to the structure of their housing. The CONCERE-ENOVER group is working to harmonise the different methodologies. The regions are creating an energy performance certification system. The energy performance certificate informs owners, potential tenants and buyers and users of a building's energy performance and energy efficiency improvement measures which could be carried out in the short-term.

Energy performance and indoor climate environment requirements are applied in each region to construction work with planning authorisations. Further requirements come into play regarding heat insulation, a mandatory level of energy performance and indoor climate environment requirements (EC-B05) for new builds, major extension or renovation work. Specific energy performance of buildings provisions are also applied to the tertiary sector (EC-C02) and industrial buildings (EC-C04).

The regions have also set up specific energy performance programmes and regulations, which are listed under measure EC-C03, in the medical, social and education sectors.

Protected workshops and social workshops can access special sustainable energy policy subsidies in Flanders (EC-C05).

Energy experts have been given official approval to carry out home energy audits in all three regions, so that quality advice can be provided (EC-A04).

Federal and regional initiatives are endeavouring to achieve rational energy consumption and the promotion of sustainable energy in public buildings (OB-B01). Vari-

ous measures have been taken, including an energy accounting scheme, an energy audits campaign, provision of solar panel infrastructure and purchase of electricity from renewable energy sources, etc.

Measure OB-B03 lists the initiatives taken by the public authorities in this area.

The third party financing in the public sector (EC-C01 / OB-B02)

The Federal Government created FEDESCO, a Belgian energy service company, on 4 March 2005 in order to promote energy efficiency in public buildings and remove obstacles to investment so that energy can be saved. FEDESCO is a public / private funded company and invests in projects with good energy consumption reduction potential but which are too costly for the building's owner or administrator.

Energy bill savings in the first instance are used to reimburse the investment made by ESCO and then subsequently benefit the client. FEDESCO has been operational since September 2005 and at the end of 2007 was also tasked with installing solar photovoltaic panels on the roofs of federal authority buildings.

Influence industrial processes

This strategic area lists industrial process emissions and industrial process energy use measures. Measures relating to electricity use in industrial buildings are described in the "energy production" section. Likewise, measures relating to fuel energy use in industrial buildings are not included and instead appear in the "buildings" section. Industrial transport measures are covered in the "sustainable transport" section.

Belgian National Allocation plan 2008-2012 (IP-A01)

The regions are responsible for the allocation plan for CO_2-allowances for facilities in their geographical areas as part of the implementation of directive 2003/87/EC and thus take part in the emissions allowance trading scheme. The Belgian national allocation plan 2008-2012 comprises three regional plans. The federal authority coordinates the Belgian plan and act as the European Commission contact body. The Belgian plan was finally approved by the consultative committee on 19 June 2008 and was approved by a European Commission ruling on 10 October 2008.

Sector agreements and voluntary agreements (IP-A02)

The regions have concluded sector agreements with the main industrial federations in conjunction with the allocation plan. Sector agreements in Belgium primarily focus on increasing energy efficiency.

In Flanders, a benchmarking agreement is in force for heavy industrial consumers and facilities covered by the scope of the EU ETS. In the voluntary benchmarking agreement, Flanders and the company agree that by 2012 the company will achieve the highest world ranking for energy efficiency in its facilities.

Sector agreements in Wallonia cover over 80% of industrial energy consumption.

The industrial sectors each pledge to achieve an energy efficiency and an improved GHG emissions efficiency objective (solely CO_2 in this case) over a given period (2010 or 2012 depending on the agreement in question). In return, the public regional authorities, working within their remit, pledge not to enforce additional energy and greenhouse gas emissions requirements as covered by the agreement with the contracting companies. They also undertake to defend in front of the national and European authorities the principle of exemption from all energy / CO_2 taxes or at least their effects. Company participation is voluntary.

In Brussels-Capital Region, companies have the option of taking part in the "Eco-dynamic enterprise" label scheme. This environmental management label scheme offers official recognition in the Brussels-Capital Region for companies with good environmental practice. The scheme rewards their environmental dynamism and progress made in waste disposal, rational use of energy and transport management in particular.

Specific financial measures and the ecology premiums (IP-A06)

Companies can benefit from tax breaks just like private individuals when they make energy-saving investments. Indeed, some energy-saving investments entitle the company to a deduction worth 13.5% of the investment (raised to 15.5% for the 2010 tax year). Investment must be linked to a more rational use of energy, improving industrial processes from an energy perspective, industrial energy recovery etc and fit one of the categories listed. The deduction is applied to their earnings or profits.

The regions promote energy efficiency investment in industry through the investment incentive. In this case ecological investments cover environmental investments, energy investments, renewable energy investments and co-generation investments. These measures can be supplemented by other support mechanisms, such as the green certificates and co-generation certificates and the federal deduction for increased investment.

Reducing emissions of fluorinated greenhouse gases (IP-B01 and IP-B02)

Belgium is tackling emissions of fluorinated greenhouse gases (F-gases) in accordance with regulation 842/2006/EC on fluorinated greenhouse gases and in accordance with directives 2006/40/EC and 2000/53/EC. European regulation 842/2006 stipulates that EU member states must establish training programmes and staff and company certification for those who install, maintain and provide an after-sales service for refrigeration facilities.

Directive 2006/40/EC requires temperature regulation appliances to have a certain level of tightness and bans the use of HFC with a global warming potential of over 150 in new vehicles.

Directive 2000/53/EC deals with recovering HFC from end-of-life vehicles. The three regions have recently adopted or will shortly adopt regulations on the use of fixed appliances containing refrigeration gases (refrigeration and air conditioning equipment and heat pumps).

The three regions have already adopted regulations aiming to recognise those in charge for the installation and maintenance of fixed appliances containing refrigeration gases and fire protection systems containing fluorinated gases or ozone layer depleting gases.

The Flemish Region is also preparing to implement training requirements for those involved in recovering refrigeration fluid from vehicle air conditioning systems and for those involved in the maintenance of small domestic refrigeration appliances. A legal framework has been created in the region for the largest pieces of equipment (those containing over 3kg of refrigerant), which lose the largest amounts and have the biggest reduction potential. There is not yet any minimum set training or special procedures for smaller cooling systems (containing less than 3kg of cooling fluid, such as domestic refrigeration appliances). These systems are also covered by the above-mentioned European regulation.

In Flanders, certification is issued to maintenance staff working on SF_6 gas emitting high voltage systems. Minimum training requirements and adequate certification for maintenance staff will be decided upon in consultation with the relevant sector.

Reduction of N_2O emissions in the nitric acid and caprolactam industries (IP-C01 and IP-C02)

The Flemish Region has also concluded an agreement on the reduction of N_2O emissions in the nitric acid production sector. On 18 November 2005, the company reached an agreement with the regional government to reduce N_2O emissions per tonne of nitric acid produced to as low a level as possible by applying the best available emissions reduction techniques in all of its facilities This is also possible because the company has developed a catalyser, which enables nitrous oxide emissions from the production of nitric acid to be cut considerably compared with the current situation.

N_2O emissions from the production of caprolactam in Flanders come from one manufacturer. The company has already undertaken several concrete initiatives to cut nitrous oxide emissions. A study has also been conducted on available emissions reduction technologies. According to the study, the prospects of significant medium-term emissions reductions (via catalysers) are promising. Furthermore, the company has already reduced its emissions compared with the 1990 level by optimising production processes.

Develop sustainable modes of transport

This section primarily comprises domestic transport with international transport being mainly dealt with at international level.

Mobility plan (TR-A01 / OB-C01)

Local mobility plans, either at town or municipality level or in conjunction with companies or public institutions (schools and the administration), are produced by all the federated entities. These local plans aim to optimise the journeys made by passengers and limit the use of fossil fuels.

For passenger transport, mobility plans include policies and measures aiming to improve public transport quality and provision, to encourage people to use alternatives to private cars to travel to work, to promote cycling etc. These measures are based on adapting regulations on developing the road system, signage etc enabling the speed of public transport to be increased and the safety of cyclists to be improved.

Improve and promote public transport (TR-A02)

Belgium's priority for mobility is to encourage intermodal transport through the promotion of public transport. The desire

to diversify passenger and freight transport provision can be seen in additional measures taken at federal and regional level. Major infrastructure projects are underway in conjunction with the various authorities (RER (regional express network) and the Diabolo project (creating a new railway line serving Brussels National Airport) to boost transport capacity and service quality.

At Federal State level, the three public limited companies that form the SNCB group (SNCB Holding, Infrabel and SNCB) have been given a twin-pronged remit. The companies are tasked with promoting rail transport on the Belgian network, thus offering an alternative to other less environmentally friendly modes of transport, and with guaranteeing a service of optimal quality so that rail traffic increases more than the general rise in all forms of transport traffic.

In Flanders, home-workplace journeys are a short-term priority. The Commuter plan (2005) contains information about the initiatives required for home-workplace journeys. For public transport, tram and express bus projects are being developed in urban areas, as stated in the Pegasus and Spartacus plans (2004). Moreover, it is also important that business parks are better served by public transport.

An investment programme was established for 2007 by the transport working group Task Force Circulation and is in application today. Most of the programme focuses on infrastructure measures, ranging from adapting intersections and designating bus lanes to redeveloping road sections and bus stops. Another section of the investment programme includes a red traffic light remote control system for public transport.

A range of public transport promotion measures have been taken in Wallonia. These measures include free travel for children up to the age of 12, a 50% reduction on travel passes for those in education up to the age of 24 and special measures for people giving up their vehicles and returning registration plates to the vehicle registration authority.

Apart from information about the bus service provided, the TEC transport information centres provide information about different transport options in the region, including partnerships with taxi companies, Cambio (promotion of car sharing), cycling, combined TEC-SNCB, TEC-STIB, TEC-De Lijn travel passes, exchanging a vehicle's registration plate etc.

Public transport alone – however efficient it may be – cannot meet all travel requirements. The STIB therefore has an intermodal transport policy in the Brussels-Capital Region which constantly seeks to ensure that public transport and other modes of transport complement each other.

Since 2006, the region has been offering the Bruxell'Air incentive to residents who hand in their registration plates. The incentive is worth 525 EUR and encourages residents to give up their cars and scrap old cars which emit pollutants. The Bruxell'Air incentive comprises a public transport travel pass and / or a bicycle purchase voucher, combined with a Cambio (car-sharing scheme) subscription. "Over the course of a year, over 1,500 Brussels residents will have received the Bruxell'Air incentive."

The cornerstone of these measures is the offer of free home-workplace transport for users (TR-A08) and government employees (OB-C02).

The profile of public transport is also raised by conveying an image of sustainability which is based on using the best available technology (see TR-C05).

Finally, road traffic regulation measures are implemented to give public transport priority in urban centres and therefore make it a more attractive option compared to cars (TR-A05).

Promotion of cycling (TR-A03)

Cycling and walking are particularly recommended for short journeys (under 5km) as a replacement for car travel.

The federal government has been encouraging cycling through a tax incentives scheme since 1 January 1998. The allowance paid by employers to employees for home-workplace bike journeys is now tax and social security contribution exempt and can be worth a maximum of 0.15 EUR per km.

A particular focus was put on promoting cycling in the new SNCB Holding, Infrabel and SNCB management contracts (and in the business plans). SNCB Holding accordingly pledged to increase the number of cycle spaces (from the current figure of 59,000 to 78,000 by 2012) and to optimise surveillance of cycle shelters. SNCB Holding is supporting the development of "cycle hubs" in railway stations and social economy companies are also offering bike hire, bike repair and other bike related services.

The three regions have implemented a range of measures to promote cycling:

- The investment programme for the building of cycling tracks along regional roads.
- Bicycles being allowed to travel both directions in one way streets.
- Setting up appropriate facilities (dedicated cycle spaces, cycle hire points and small repairs centres) particularly at the main stops and public transport stations.
- The construction of a network of itineraries reserved for pedestrians, cyclists, persons with reduced mobility and horse riders.

In the Brussels-Capital Region, a bike hire system with street hire points throughout the historic centre was set up in 2006 to encourage occasional bike journeys. The system's efficiency will be enhanced once it is expanded to cover the entire Brussels Region and a larger number of bikes are

provided with these improvements being planned for 2009. The region also supports initiatives such cycle training and school bike buses.

In Wallonia and the federal administration, government employees are given a mileage allowance for home-to-work cycle journeys (OB-C03).

Promotion of teleworking (TR-B03)

Teleworking helps to reduce road traffic at peak times (congestion) as the worker stays at home and is more effective than a worker who lives a long way from his or her workplace.

Each of the federated entities has set up pilot programmes which are undergoing assessment (OB-C04).

Eco-driving (TR-B05)

In application of directive 2003/59/EC, this measure aims to bring about a behavioural change in the driving style of drivers, including professional drivers. The principles of eco-driving (appropriate speed, suitable gear changes, sensible use of accessories, correct tyre pressure etc) should become automatic and should be applied on a daily basis by the driver. Initiatives are planned targeting the general public (e.g. adding an eco-driving module to driving school lessons), specific groups (such as sales representatives) and the public authorities (e.g. training for council workers). Eco-driving will soon form part of the knowledge required to obtain a driving licence.

In Flanders, the authorities, driving schools, test centres and the environmental movement have signed a partnership agreement via which the schools and centres undertake to make eco-friendly driving part of their activity.

In Wallonia, Le Forem logistics and transport training centres in partnership with Le Forem HGV and bus-coach training centres are proposing to roll out eco-driving training modules.

In Brussels-Capital Region, STIB drivers receive eco-driving training.

The public authorities are stakeholders in the eco-driving training process (OB-C05).

Evaluation of vehicle environmental impact (Ecoscore) and reform of vehicle tax and vehicle registration tax (TR-C03)

The promotion of more environmentally friendly vehicles in all aspects (CO_2 and other pollutants) reinforces these measures at regional level. This evaluation is carried out in particular through the Ecoscore system, which classifies vehicles based on their potential environmental impact. The various harmful effects of a vehicle (greenhouse effect, noise pollution, air quality, impact on health and ecosystems) are factors used to determine its Ecoscore.

An Ecoscore consultation was carried out between the regions and the federal authorities and aimed to expand the basis for using Ecoscore as a criterion for judging the eco-friendliness of a vehicle.

The main measure being considered is the planned reform of vehicle tax and vehicle registration tax. The new vehicle taxes will accordingly give more impetus to the use of eco-friendly vehicles than the current taxes (TR-A07).

Wallonia has also been involved in the development of the Ecoscore system, which it recognises as a classification criterion for vehicles based on their environmental impact and has planned to use the results of this method to inform the public.

The Brussels Capital region is currently examining the proposal to reform vehicle tax and vehicle registration tax based on Ecoscore, which evaluates the environmental performance of vehicles. The reform is to be carried out as part of a cooperation agreement with the two other regions and is scheduled for 2009.

Biofuel tax exemption (TR-D01)

Belgium has transposed the European directive aiming to promote the use of biofuel in transport. The federal government holds the remit for this. The implementation of the directive should make a minimum quantity of biofuels available on the market as of 2007 (5.75% in 2010). The federal government has decided that an evaluation of current policies aiming to achieve this objective should be carried out with the evaluation covering first generation biofuels. The conclusions and corrective measures to be taken will be discussed in a consultation with the regions in conjunction with the projects developed by government scientific research.

The federal government has also authorised some quantities of bioethanol and biodiesel to be made tax exempt so that they can be mixed with fossil fuels. The production of biofuels is subject to specifications laid out in the 10 June 2006 law on biofuels, which in particular sets environmental (the best possible greenhouse gas results, improved energy efficiency across the sector), agronomic (lowest doses of pesticides and fertilisers) and distance criteria (shortest distance between the biomass production area and production unit).

In turn, the regions are also promoting the cultivation of dedicated energy crops (AG-D02):

Flanders is encouraging the production of energy crops and the use of them for renewable energy. The objective is to achieve production of 18 kilotonnes of pure vegetable oil, 107 kilotonnes of bioethanol and 25 kilotonnes of biodiesel from Flemish energy crops in 2010 and the planting of 1km^2 of short rotation wood by 2010.

In Wallonia, in accordance with the new CAP reform, annual aid for energy crops is 4.5 EUR/m^2 of area sown with approved energy crops.

Purchase of new energy efficient vehicles (TR-C01 / TR-C02 / OB-A01 / OB-C07)

As part of the revision of the European directive (1999/94/EC), the federal government is taking all the necessary measures to correctly apply the royal decree of

5/9/01 aiming to reinforce and check the legal provisions regarding wording, advertising, fuel consumption and CO_2 emissions in order to achieve the planned cut in CO_2 emissions. The annual publication of the *Guide CO_2 de la voiture - Roulez économe…un plus pour vous et la nature* (CO_2 car guide – energy efficient driving – good for you and for the environment) enables citizens wishing to purchase a new vehicle to obtain objective and comparative information on the different models available on the Belgian market.

Measures are mainly taken by the federal government in this area. Since 1 January 2005, the solidarity payment is calculated based on the CO_2 content of company cars' emissions. Indeed, employers pay a monthly "solidarity" contribution when a company car is provided. Since the 2006 tax year, a tax break has been applied to the purchase of eco-friendly vehicles. Owners of vehicles with emissions of under 115g of CO_2 per km can benefit from a tax deduction of 3% of the purchase price. For vehicles with emissions under 105g of CO_2 per km, the threshold is raised to 15% up to a maximum amount of 3,280 EUR (to be indexed).

Since the 2007 tax year, a tax break of 150 EUR (not indexed) can also be obtained when buying a new diesel vehicle with a particle filter and whose emissions do not exceed 130g of CO_2 and 0.005g/km maximum of soot (PM). The indexed amount for 2007 was 200 EUR.

In Wallonia, an eco-tax incentive has been applied to the purchase of a vehicle by any private individual since 1 January 2008, although company cars are not covered by the measure. A bonus is awarded in the event of a cut in CO_2 emissions and a penalty is applied in the case of excessive CO_2 emissions based on a set standard, with the threshold being up to 1,000 EUR per vehicle.

The purchase of environmentally friendly vehicles is an intrinsic part of the example being set by the public authorities (OB-C07) and is included in the terms of sustainable contracts (OB-A01).

Promoting multimodal systems for goods (TR-A04)

The development of multimodal platforms is a key measure for freight and is also contingent upon improving water and rail transport.

In this respect, the federal government supports the European Commission's NAIADES programme promoting inland waterway transport specifically through tax exemptions on the capital gains made on boats used for commercial transport. The measure contains environmental conditions and therefore also helps to improve the ecological performance of inland waterway transport. The Federal State also supports combined transport in Belgium via an aid mechanism for combined freight transport operators using railways for distances under 300 km.

In Flanders, initiatives that are already underway, such as the modernisation of the main waterways network, investment in PPP for the construction of wharves and the development of business parks linked to waterways, have continued over the past few years. Different initiatives aiming to develop new transport concepts via innovative projects or the transporting of certain types of freight by the inland waterway system are currently being carried out.

In Wallonia, on 15 March 2007 the government decided to review legislation on economic aid for inland waterway transport in order to encourage this mode of transport. As part of the Marshall Plan, the region set up a logistics and transport hub to provide assistance to companies wishing to switch to multimodal logistics using more environmentally friendly modes of transport (rail and waterway). Moreover, the Walloon Region has planned major investment (60 million EUR) for the 2007-2010 period in order to develop several multimodal platforms (inland waterway, rail and road) in Liège, Sambreville, Charleroi and Garocentre (La Louvière) and network development and adaptation work.

In Brussels-Capital Region, the region is seeking to promote the inland waterways for freight transport. The Port of Brussels is aiming to take charge of 27% of the region's freight transport via the introduction of its management plan approved in April 2006. The region will encourage rail-waterway combinations, will further strengthen links with the major European ports without transfers and will increase the waste transport role of inland waterways in order to achieve this objective.

Measures to improve the efficiency of freight transport (cutting traffic jams and loading / unloading problems, dedicated parking areas, logistics centres etc) are also reinforcing these provisions (see TR-B04).

Prioritise sustainable management of agricultural and forest ecosystems

This section comprises the fight against emission of greenhouse gases in the whole agricultural sector in Belgium and measures directed at increasing or maintaining the role of carbon sinkholes of the forest ecosystems or to encourage their adaptation to climate change.

Rational use of energy for greenhouse crops (AG-A01)

In the Flemish Region, measures have been taken to reduce CO_2 emissions in the agricultural and horticultural sectors. They concern principally crops grown in greenhouses, which are very important in the North of the country. The Flemish Region is encouraging conversion to natural gas and other sustainable energy sources (residual heat, biomass, solar energy, etc.) in greenhouse horticulture. Meanwhile, natural gas is not the only thing to be supported by the authorities. Recourse to other sources of energy which are respectful of the environment (biomass, solar energy, etc.)

and sustainable energy technologies (co-generation, heat exchanges, heat pumps, heat storage, etc.) is also promoted. Concrete investigation is made to see whether a large part of energy consumption can be met by recourse to residual heat/CO_2 coming from industry (chemical sector, etc.).

The Flemish Region also has financial instruments to promote technologies tending to save energy. More specifically, the deduction for unique accrued investment (13.5 %) also applies in the sector of greenhouse horticulture (see AG-A02).

As most of the greenhouses are located in the North of the country, in 2006 the Walloon Region was only responsible for 13% of Belgian CO_2 emissions relating to energy consumption in the agricultural sector. This sector therefore has low priority, but nonetheless there is a specific Walloon assistance available (subsidy for installation of greenhouses with high energy efficiency).

Wood-Energy Plan (AG-D01)

In the Walloon Region, ever since 2001 there has been a Wood-Energy Plan. It aims at setting up in the Walloon territory a dozen projects for automatic heating systems using wood, gas generators or other technologies modified to make use of the energy value of wood. This plan affects essentially municipalities and local government with or without connection to the heating network.

Limitation of GHG from fertilisers and manure (AG-B01)

The PDRs (Plans for Rural Development) are supplemented at the regional scale by specific measures on rational use of mineral and organic nitrogen fertilisers. These policies which were put into operation initially to protect the surface and subterranean water from excess nitrates also have a significant direct effect on reducing N_2O emissions and their precursors, as well as CH_4 linked to management of manure.

In the Flemish Region and in the Walloon Region, we also expect the total livestock will continue to decline, and this will certainly further reduce the burden on climate. Aside from the PDRs and the directive on nitrates mentioned above, farmers (both Flemish and Walloon) must also satisfy the conditions in annex (cross compliance). This involves in particular the prohibition on turning over any pasture lands, that the farmer must analyse the carbon content and degree of acidity of these parcels of land at regular intervals and measures must be taken to combat erosion if these parcels are very susceptible to it.

Restricting deforestation and encouraging reforestation (AG-C01)

In the Walloon Region, the new Forestry Code (Decree of 15 July 2008) introduced a number of positive constraints on conservation of the forests and on storage of ligneous materials and carbon, especially:

- elimination of the rights of succession on the value of materiel on the ground, which encourages more ecological forestry choices (maintaining materiel, increased possibility of choosing species with long cycles and continuous processing, etc.) ;
- restriction on stripping;
- obligation to plant species suited to the location, which contributes to limiting the risks of windfall and of withering and improves the resistance to climate change;
- the creation of entire reserves;
- limitation on drainage (which encourages keeping organic matter);
- incentives for production of high quality wood and thus use of wood in long term applications with gains in CO_2 linked to substitution by other materials.

The designation of 1,500 km^2 of forests in Natura 2000 under special fixed rules of management. This will also contribute to these various objectives.

The Flemish Region has an active policy of expanding forests. The Flemish government has set out a strict regulation that should conserve and protect the Flemish forest (Forest Decree of 13/06/1990 and Decree of 18/05/1999 concerning the organisation of spatial planning and Decision of the Flemish Government on 16/02/2001 to clarify the rules concerning compensation and deforestation and exemption from the ban on deforestation). As a general rule, deforestation is banned. There are a number of exceptions, but a permit is required in each case and this permit will only be granted if forest compensation is implemented. The obligation for compensation consists of the planting of an equal size or larger forest at another location.

The compensation can also be financial in the form of a forest maintenance contribution to the Forests Compensation Fund. In addition, the Flemish government has created instruments to ensure the biodiversity and sustainable use of natural resources. In various cases, planting of forests is subject to acquiring a nature permit in the case of protected (open) vegetations (Decree of 21/10/1997 concerning nature conservation and the natural environment; Decision by the Flemish Government on 23/07/1998 to set further rules for the implementation of the Nature Decree) or the planting of forests in agricultural areas (Rural Act of 07/10/1886).

Preservation of the ecological stability of the forests (AG-C02)

Measures are being taken to preserve the ecological stability of the forests by reinforcing the notion of sustainable management of the forests in forestry practices. The application of the European directive on the preservation of habitats (Natura 2000) goes in the same direction, namely preservation of the forest.

This can be expressed, for example, by promotion of systems of forest certification.

On 18 November 2005, the Federal Government reached agreement relating to a circular on sustainable wood (see also OB-A01). This circular required that beginning in March 2006 in the framework of their procurement policy, the federal authorities may only buy certified wood coming from forests under sustainable management. For this purpose, the circular sets criteria which must be satisfied under the wood certification systems. A number of actions have been taken by the Federal Government to prevent the importation and the marketing of wood felled illegally and to strengthen the controls and penalties imposed on this trade.

The Walloon Region is committed to PEFC certification of sustainable forest management. Certification is a tool to permanently improve management at the regional level and the practices on the ground. It makes it possible for the interested actors from near or far to meet and form a consensus on forest management: owners, industrialists, scientists, environmentalists and users. Certification also makes it possible to provide a guarantee to the consumer that use of the wood goes hand in hand with good management of the forest. Presently more than 80% of the owners of public forests managed by the Division of Nature and Forests are PEFC certified.

In the Brussels-Capital Region, the Forêt de Soignes is FSC certified. Its management aims to ensure ecological stability. In addition, ensuring the ability to regenerate, biological diversity and ecological and social aspects are taken into account.

The Flemish government has developed various instruments to ensure biodiversity and sustainable use of natural resources (protection of vegetations and landscapes). A group certification under the FSC system has been active in Flanders since, which is open to all forest owners who have an extensive forest management plan according to the criteria set by the Flemish Government for sustainable forest management. As of 01/06/2009 a total of 106.36 km^2 of forest in Flanders has been FSC certified under this group certificate (7.3 % of the total forest area in Flanders). 68 % of these forests are managed by the Agency for Nature and Forest, 31 % is owned by public authorities other than the Flemish government and 1 % is private forest.

To continue efforts in managing waste

The section 'Continuing efforts in managing waste' covers the measures to reduce greenhouse gas emissions during all stages of waste management, from prevention of the quantities of matter thrown away till final elimination at the landfills.

Minimise quantity of waste into landfill (WA-A01)

At the level of the Federal Government, a policy aimed at reducing the volume of non-recycled waste with support from a system of ecotaxes is being applied. Its principle is to discourage use of throw-away packaging by introducing a difference in price, by a system of differentiated taxes between reusable packaging and throw-away packaging. Less waste results to be incinerated or put in landfill. For this purpose, a withholding was introduced beginning on 1 July 2007 on certain packaging (plastic bags, all plastic films, aluminium foil as well as on throw-away table utensils). The various rates to apply are determined in accordance with the ecological burden of the material from which the product is made.

In the Executive Plan on Household Waste 2003-2007 and 2008-2015 of the Flemish Region, some actions have been undertaken with a view to preventing waste; for example via centres of recovery (with initiatives in recovery work allowing certain products to benefit from a longer service life), projects relating to restriction on free publications and/or printed advertising (junk mail) and this also implies less waste to be processed afterwards, the promotion of reusables, etc. In addition, plans for prevention have been established by the Flemish Region for packaging materials in the context of an agreement on interregional collaboration relating to packaging dated 30 May 1996.

In the Walloon Region, the directive 1999/31 was adapted by the decree of the Walloon Government dated 27 February 2003 setting industrial sector conditions for operating technical landfill centres and the decree of the Walloon Government dated 18 March 2004 prohibiting bringing certain waste to centres of technical landfill (CET). The Walloon Plan for Waste up to 2010 also provides for measures for placing in CET. The recovery of biogas – which, according to its methane content is either burned off or used to fuel gas engines – has been widely developed since 1990.

The Brussels-Capital Region has for the third consecutive time a five-year plan describing the policy foreseen by the Region in terms of preventing and managing waste. Priority is given to prevention of waste at the source: promotion of the alternatives to throw-away bags at the cash register, the fight against junk mail (stickers for mailboxes), promotion of composting at home, installing certain taps in the schools, etc.

The landfills presently operating in the Flemish Region are all equipped with energy engines which run on gas generated in the dump. The oldest and inactive dumps in the Flemish Region are equipped with a flare. In the Walloon Region, all the main technical landfill centres are equipped with systems for recovery and productive use of biogas (WA-C).

Optimisation of incinerators (WA-B01)

In the Flemish Region, energy recovery at the level of waste treatment is encouraged by improved energy efficiency of the new incinerator installations as well as in existing installations, and by the use of incentives for maximum energy recovery, such as green certificates and financial support for treatment technologies which pro-

vide, in addition to a finished product of high quality, a positive net energy balance (both in terms of electricity and heat).

In the Walloon Region, the 4 incinerators recover the heat produced in the form of steam, setting in motion an alternator. In 2006, the incineration of 573,400 tonnes of waste made it possible to produce 294.9 GWh of gross electricity (247.2 GWh of net electricity). The Walloon Region represents 27 % of Belgian electricity produced from incinerators burning household waste.

In the Brussels-Capital Region, the plan for waste provides that after prevention, reuse and recycling of material, the remaining waste must be put to use as a source of energy (incineration with energy production). Incineration without energy use is the last solution sought, before removal to the landfill. There is no centre for technical landfill in the Brussels-Capital Region. The Region has an incinerator for 500,000 tonnes of waste. The steam produced by the incineration of waste is sold to the electricity generating station of a neighbouring private company.

Reduction of fluorined gas emissions (WA-E)

The three Regions are presently preparing in a concerted manner decrees intended to implement Regulation (EC) n° 307/2008 dated 2 April 2008 establishing, in accordance with Regulation (EC) n° 842/2006, minimal prescriptions for training programmes as well as the conditions for mutual recognition of certificates of training intended for employees in the matter of air conditioning systems used in certain motor vehicles containing the F-gases (recovery during maintenance of vehicles and during anti-pollution measures on vehicles not being used any more). This involves setting up a mechanism which can assure suitable training of personnel charged with recovery of F-gases contained in the air conditioning systems of motor vehicles.

Implementing flexibility mechanisms

Belgium will use the mechanisms of Kyoto to fulfill its commitments with respect to reducing emissions. The agreement on cooperation dated 19 February 2007 between the Federal State and the three Regions promoted the National Climate Commission to the rank of designated national authority and focal point.The same accord of cooperation applies the directive 2004/101/EC.

The objective of the Federal Government is to buy emission rights at the level of 12.2 millions equivalent tonnes of CO_2 for the period 2008-2012. Financing this will be provided by the 'Kyoto Fund' which is allocated around 25 million EUR per year. During the selection of projects, a constructive collaboration has been established with other federal public services (FPS Foreign Affairs, External Commerce and Cooperation for Development, FPS Economy, SMEs, Self-employed and Energy and FPS Budget and Management Control).

In May 2005, the Federal Government launched its first call for JI/CDM projects, with a view to purchasing emission reductions generated by JI projects (Joint Implementation) and CDM projects (Clean Development Mechanism), with an initial budget of 9.3 million EUR. Aside from price and secure delivery, the use of sustainability criteria to evaluate the impact of a project on sustainable development is a matter of great attention. These criteria are based on Gold Standard criteria which are recognised on the international scene.

They consist of three pillars:

(1) environmental aspects, including biodiversity,

(2) social sustainability and development including quality of employment and life, and

(3) economic and technological aspects, including hiring and technological autonomy

This call for projects ended in the signing of four contracts dealing with the following projects: a geothermal electricity generating station in Salvador, the construction of two wind farms in Cyprus and a project for cogeneration using biomass in India.

On 24 February 2006, the Federal Government approved an additional budget of 50 million EUR in light of new investments in a second call for offers and in one or several carbon funds in order to purchase emission reductions via JI or CDM projects. On 16 February 2007, the Federal Government approved a second submission to purchase emission rights for a total amount of at least 22 million EUR. An initial contract was concluded concerning a project for biogas recovery in Peru.

On the basis of a comparative study of carbon funds, an accord was concluded with the German bank KfW Carbon Fund for the purchase of 1,333,000 emission rights in an investment totaling 25 million EUR. At the start of 2008, a study of evaluation in support of the policy prompted the development of a procurement strategy. On 9 May 2008, this strategy was approved by the Federal Government. Besides the commitment to an evaluation of the federal procurement policy at six-month intervals, it provided the possibility to identify adjacent purchase options.

In this context, the Federal Government also opened the door to other procurement options worth exploring including the Green Investment Schemes in order to look after the needs of remaining credits. They are investment programmes based on the principle of international exchange of emission quotas when the sale of emission rights (AAU) is associated with an investment in projects making it possible for reductions to see the light of day in a recipient country. In 2008, a purchase contract for 2 million emission rights (AAU) was signed via the Hungarian programme. In this context, the resources will be used to encourage investments generating energy savings in houses and in public buildings, to contribute to the use of renewable energy

and to facilitate the construction of energy efficient houses and passive houses. On 21 November 2008, the Federal Government decided that partnerships with Chinese provinces can be negotiated to develop CDM projects and purchase of CER for an initial sum of 10 million EUR.

In addition, on 19 December 2008 the Federal Government approved the launch of a third public market for a total sum of 50 million EUR over the purchase of additional CER and ERU via the primary and secondary markets.

The Federal Government has thus committed up to mid-2008 a total of 140 million EUR for various procurement initiatives. Up to October 2008, some 34% of the total federal purchase commitment of emission rights during the period 2005-2013 has been contracted for, including 28% with delivery guarantee. Depending on new prospects, and also in terms of personnel, additional funds will be invested for supplemental procurement options for the sake of carrying out the federal commitment in the context of the accord of the Committee of Dialogue dated 8 March 2004.

In the Progress Report 2008 of the Flemish Climate Plan 2006-2012, a new estimate was made of the Flemish emission credit requirement. The estimated requirement for the period 2008-2012 currently stands at 8.9 Mton CO_2-eq.

By mid 2008 the Flemish Government had already invested 55.4 million EUR, or 57 % of the total emission credit requirement for the period 2008-2012, assuming that the current prognoses are correct and assuming an average purchase price of 10 EUR per tonne. Depending on these remaining efforts at reduction, some additional funds may be needed for the necessary financing.

The Flemish Governmental agreement for 2004-2009 contained a selection of purchase channels which may be used to purchase outside Kyoto units. The procurement rules and the purchasing policy of these Kyoto units starting with flexibiilty mechanisms are anchored in the 7 December 2007 decision of the Flemish Government.

An initial pilot call was launched amidst enterprises in 2004 in order that they introduce JI and CDM project proposals. The objective of this pilot call was above all to acquire experience and expertise from within the Flemish authorities and from the world of Flemish enterprises as regards the mechanism of flexibility linked to the projects. The Flemish Region purchases Kyoto units in the context of the CDM project which fully satisfy the reference terms of the call.

A second channel to which the Flemish Region may have recourse to acquire Kyoto units is climate funds. On the basis of a comparative study in 2005 looking at carbon funds still open at the time carried out by PricewaterhouseCoopers, the Flemish Region decided to go into a certain number of carbon funds. Via the Flemish Participation Company (PMV), it joined the Multilateral Carbon Credit Fund (MCCF) for an amount of 22 million EUR in a joint initiative of the European Bank for Reconstruction (EBRD) and the European Investment Bank (EIB).

This fund looks specifically at countries with what may be called economies of transition (essentially in Eastern Europe and in Central Asia). The Flemish Region is also participating in the Carbon Fund for Europe (of the World Bank and the European Investment Bank) for some 10 million EUR. Furthermore, via the Participatiemaatschappij Vlaanderen (Flanders Holding Company), it joined the Asian Pacific Carbon Fund (APCF) of the Asian Bank for Development, putting up 20 million EUR. This last fund is concentrated on projects in Asia and on Pacific Ocean islands. Two of the countries presenting the greatest potential for the CDM (China and India) are in the domain of action of this fund.

The Flemish Region is looking for project opportunities in the domain of afforestation, reforestation and forest management. The supplemental financial resources coming from the carbon market can thus provide an additional contribution to achieving the objectives of UN Conventions in the matter of biological diversity and the fight against desertification. Some considerable advantages at the economic, ecological and social level can be created simultaneously for the local communities in developing countries compared to their present situation. In July 2007, the Flemish Government decided to make an initial investment in this type of project by contracting for emission credits coming from small scale reforestation projects in Bolivia.

New possibilities are being explored to look after the needs of remaining credits. This action is proceeding in conformity with the procurement rules set out by the Flemish Government in its deicision dated 7 December 2007. Thus the possibility of taking part in the 'Green Investment Schemes' has been examined.

Meanwhile, in 2008, a research assignment commenced looking into the additional purchase of CER and ERU via the secondary market.

In the Walloon Region, the legal basis of these mechanisms is the Walloon decree of 10 November 2004 establishing a regional plan for allocating emission quotas of greenhouse gases. This decree provides for the creation of a Walloon Kyoto Fund which may serve to implement the Kyoto mechanisms of flexibility. Moreover, on 23 December 2004, the Walloon Government approved its participation in the 'Carbon Fund' of Community Development (CDCF) of the World Bank in the amount of 5,125 million dollars. In 2007, the Region invested 2 million EUR for purchase of CERs in the secondary market (future 2009). Actually, the Walloon Region will not continue to buy via the Kyoto mecha-

nisms due to a better internal mitigation of GHG than expected in the past.

In November 2004, the Brussels-Capital Region decided to invest 9.5 million dollars in the course of the period 2005-2014 in the CDCF of the World Bank. This investment should provide the region with approximately 97.5 kt of equivalent CO_2 in CER (certified emission reduction) per year for the initial period of commitment. The Brussels Region undertakes to use the mechanisms of flexibility for only 50% of its effort at reduction.

4.3.3. Summary table

The National Climate Plan of Belgium consists of numerous measures some of which are mutually reinforcing and so cannot be evaluated individually. The table 4.2 sets out an inventory of these measures and their principal characteristics. The effects of measures to raise awareness and training are included in the measures which they support and thus do not appear in a separate evaluation.

For the years 1995 and 2000, a significant number of PAMs set out here still have not been put in place. Otherwise, the numerous PAMs implemented have been strongly reinforced and often differ from the ones which are presently in place and which figure in the National Climate Plan. This is why the evaluation is concentrated on the effect of the present PAMs.

4.4. Policies and measures no longer in place

None of the federal or regional measures has expired since the 4th National Communication.

4.5. Minimise adverse effects of response measures

To minimize the potential adverse effects of response measures, Belgium has implemented PAMs in all sectors and for all gases, thus ensuring a balanced distribution of the efforts and limiting the potential impact of a single specific measure.

CDM programmes also contribute to promote a sustainable development and to reduce GHG emissions and is used by Belgium (see 4.3.2 and table 4.2). Sustainability criteria included in the tenders launched by Belgium also promote the use of environmentally sound and safe technologies. The promotion of renewable energies has also a positive impact by reducing the dependence on fossils fuels and meeting rural electricity needs for Parties which are highly dependent on the consumption of fossil fuels.

Furthermore Belgium supports least-developed countries through cooperation on adaptation (6.4), technology transfer and capacity building (7.3), scientific research (8.2), and financial resources (7.2). These actions are in line with paragraph 8 of decision 31/CMP1.

Table 4.2. Summary of policies and mesures

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
EP-A01	Green certificates and CHP certificates	promotion of RUE - guaranteed minimum income for suppliers of green energy Flemish Region: 1) The share of electricity supplies from renewable energy sources increases to 6% in 2010; 2) The share of electricity supplies from CHP increases to 19% in 2010.	Energy - Supply	CO_2	Economic Fiscal Regulatory	implemented	**FED** : FPS Economy, SMEs, Self-Employed and Energy - DG Energy (E2) **FR**: VEA, VREG **WR** **BCR**: IBGE, Brugel	196	759	1.276	2.111
EP-A02	Financial support for electricity generation from RES		Energy - Supply	CO_2	Economic Fiscal Voluntary/ negociated agreement Regulatory	implemented	**FED** : FPS Economy, SMEs, Self-Employed and Energy - DG Energy (E2) **FR**: VEA, VREG **WR**: DG energy **BCR**: IBGE, Sibelga	294	2.081	2.279	2.515
EP-A03	Stopping the exemption from excise & establishment of an excise duty on energy for coal and heavy fuel oil products		Energy - Supply	CO_2	Fiscal	implemented	**FED** : FPS Finance	Included in EP-A02			
EP-A04	Facilitators to promote RES and CHP		Energy - Supply	CO_2	Information Education	implemented	**FR**: VEA **BCR**: IBGE	Included in EP-A01 / EP-A02 and other RES measures			
EP-A05	Action Plan for renewable energy and CHP	biomass/off-shore/ CHP	Energy - Supply	CO_2	Economic Fiscal Regulatory Information Education Planning	implemented	**FED** : FPS Economy, SMEs, Self-Employed and Energy - DG Energy (E2) **FR**: VEA, OVAM, LV **WR**: DG energy	Included in EP-A01			
EP-B01	Specific improvement for allocation of emission quotas to power producers		Energy - Supply	CO_2	Regulatory	implemented	**FED**: FPS Health, Food Chain Safety and Environment - DG Environment (register) **FR**: VEA, LNE **BCR**: IBGE	Included in EP-A01			

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
EP-B02	Preparation of energy plans by electricity producers		Energy - Supply	CO_2	Regulatory	implemented	**FR**: VEA	Included in EP-B01			
EC-A01	RUE as public service obligations	Flemish Region: since 2008 the (yearly) primary energy saving targets for the electricity grid managers have been increased to 2% for households and 1,5% for non-households	Energy - Supply	CO_2	Economic Fiscal Regulatory Education Other	implemented	**FR**: VEA **BCR**: IBGE, Sibelga	Included in EC-A05, EC-B01, EC-B03			
EC-A02	Mobilization of the resources of the natural gas fund	energy saving + RUE	Energy - Other (residential, commercial, agricultural)	CO_2	Economic Fiscal	implemented	**FR**: VEA **BCR**: Sibelga	Included in EC-B01			
EC-A03	Energy performance and certification of buildings	investment + assistance to individuals	Energy - Other (residential, commercial, agricultural)	CO_2	Regulatory Education Planning	implemented adopted	**FR**: VEA **WR**: DG energy **BCR**: IBGE	Included in EC-B05			
EC-A04	Appointment of energy experts	reduction of energy consumption of buildings; improving insulation of buildings	Energy - Other (residential, commercial, agricultural)	CO_2	Regulatory Education Other	implemented	**FR**: VEA **BCR**: IBGE	Included in EC-B01			
EC-A05	Promotion of energy efficiency of electric appliances		Energy - Other (residential, commercial, agricultural)	CO_2	Economic Information	implemented	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment + FPS Economy, SMEs, Self-Employed and Energy - DG Energy (E2) **BCR**: IBGE, Sibelga	Not estimated			
EC-B01	Financial incentives for the rational use of energy (RUE) and RES	encourage the use of energy-efficient electric appliances	Energy - Other (residential, commercial, agricultural)	CO_2	Economic Fiscal	implemented	**FED** : FPS Finance **FR**: VEA **WR**: DG energy **BCR**: IBGE, Sibelga	153	1.776	2.814	4.177

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
EC-B02	Specific constraints on boilers		Energy - Other (residential, commercial, agricultural)	CO_2	Regulatory Education	planned implemented	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment **FR**: LNE	Not estimated			
EC-B03	Specific RUE aid for unprivileged people		Energy - Other (residential, commercial, agricultural)	CO_2	Economic Education	implemented	**FED** : FRCE/FRGE (limited company under private law) **FR**: VEA, VMSW, WSE **BCR**: IBGE, AATL	Included in EC-B01			
EC-B04	Improve the information available to the consumer on the environmental impact of products		Energy - Other (residential, commercial, agricultural)	CO_2	Voluntary/ negociated agreement Education	planned	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment + FPS Economy, SMEs, Self-Employed and Energy - DG Energy (E2)	Not estimated			
EC-B05	Imposition of energy and indoor requirements (Energy Performance Decree standard) to homes and apartments	Flemish Region: - Since 2007 the energy performance regulation requires an overall energy performance level of 100 and an insulation level of K45 in new buildings. Maximum U values apply to renovations which require an urban development licence. - From 01/01/2010 the overall energy performance level will be decreased from 100 to 80.	Energy - Other (residential, commercial, agricultural)	CO_2	Regulatory Planning	implemented	**FR**: VEA **WR** **BCR**: IBGE		81,34		

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
EC-B06	Optimizing planning requirements in the context of energy efficient building and renovation		Energy - Other (residential, commercial, agricultural)	CO_2	Planning	planned implemented	**FR**: LNE, RWO	Not estimated			
EC-C01	Using a third party financing in the public sector	adaptation of planning rules	Energy - Other (residential, commercial, agricultural)	CO_2	Economic Fiscal	implemented	**FED** : FEDESCO (Federal Energy Services Company) (limited company under private law)		19,60		
EC-C02	Imposition of energy and indoor requirements (Energy Performance Decree standard) to tertiary buildings	Flemish Region: Since 2007 the energy performance regulation requires an overall energy performance level of 100 and an insulation level of K45 in new offices and schools. An insulation level of K45 and maximum U values apply to other new tertiary buildings. Maximum U values apply to renovations which require an urban development licence.	Energy - Other (residential, commercial, agricultural)	CO_2	Regulatory	implemented	**FR**: VEA **WR** **BCR**: IBGE	Included in EC-B05			
EC-C03	Measures in medical, social and education sector		Energy - Other (residential, commercial, agricultural)	CO_2	Economic Regulatory Planning	implemented	**FR**: VIPA, AGION **WR** **BCR**: IBGE	Not estimated			

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
EC-C04	Imposition of energy and indoor requirements (Energy Performance Decree standard) to industrial buildings	Flemish Region: An insulation level of K45 and maximum U values apply to new industrial buildings. Maximum U values apply to renovations which require an urban development licence.	Energy -Industry/ Construction	CO_2	Regulatory Planning	implemented	**FR**: VEA **BCR**: IBGE		51		
EC-C05	Subsidies for a sustainable energy policy in social and sheltered workshops		Energy - Other (residential, commercial, agricultural)	CO_2	Economic Information Planning	implemented	**FR**: WSE	Not estimated			
IP-A01	Belgian National Allocation Plan 2008-2012		Energy -Industry/ Construction	CO_2	Regulatory	implemented	**FR**: LNE **WR** **BCR**: IBGE		3.122	Covered by EU ETS cap	
IP-A02	Benchmarking en voluntary agreements		Energy -Industry/ Construction	CO_2	Voluntary/ negociated agreement	implemented	**FR**: VEA **WR**: DG energie **BCR**: IBGE		116	Measure will be evaluated before possible extension post-2012	
IP-A03	Drafting of energy plans by industry		Energy -Industry/ Construction	CO_2	Regulatory	implemented		Included in EP-B02			
IP-A04	Reference Center		Industrial Processes	CO_2	Information Education	implemented	**FR**: - **WR**: DGARNE **BCR**: IBGE	Not estimated			
IP-A05	Promoting sustainable industrial sites		Industrial Processes	CO_2	Economic Regulatory	implement adopted	**FR**: EWI **BCR**: IBGE, AATL	Not estimated			
IP-A06	Specific financial measures and ecology premiums		Industrial Processes	CO_2	Economic	implemented	**FED** : Finance FPS **BCR**: AEE	Included in IP-A01			

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
IP-B01	Reducing the use of fluorinated greenhouse gases : HFCs, PFCs	Flemish Region: A reduction of F-gases by at least 78% in 2010 compared to 1990	Industrial Processes	HFC PFC	Regulatory Information Education	implemented	**FED** : FPS Mobility and Transport + FPS Health, Food Chain Safety and Environment - DG Environment **FR**: LNE **BCR**: IBGE	10	498	853	1.122
IP-B02	Reducing the use of fluorinated greenhouse gases: SF_6		Industrial Processes	SF_6	Regulatory Information Education	implemented	**FR**: LNE	Included in IP-B01			
IP-C01	Covenant to reduce N_2O emissions from nitric acid production	Flemish Region: A reduction of N_2O emissions from the production of nitric acid and caprolactam by at least 60% in 2010 compared to 1990	Industrial Processes	N_2O	Voluntary/ negociated agreement	implemented	**FR**: LNE		2.462	2.462	2.462
IP-C02	N_2O emissions reduction from caprolactam industry		Industrial Processes	N_2O	Research	implemented	**FR**: LNE				
TR-A01	Mobility plans at local level		Transport	CO_2	Voluntary/ negociated agreement Planning	implemented	**FED** : FPS Mobility and Transport **BCR**: IBGE, AED, communes	Included in TR-A02 and TR-A03			
TR-A02	Improve and promote public transport	Flemish Region: An increase of the share of transport alternatives in the modal split. The target figure for public transport in 2010 amounts to 19%.	Transport	CO_2	Voluntary/ negociated agreement Regulatory Information	implemented	**FED** : FPS Mobility and Transport **FR**: MOW, De Lijn **BCR**: IBGE, AED, STIB		237	300	300
TR-A03	Promoting the bicycle use	Flemish Region: An increase of the share of transport alternatives in the modal split. The target figure for bicycles in 2010 amounts to 19%.	Transport	CO_2	Economic Fiscal Information Planning Other	implemented	**FED** : FPS Finance + FPS Mobility and Transport **FR**: MOW **BCR**: AED, IBGE		113,52		

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
TR-A04	Promoting multimodal systems for goods	Flemish Region: An increase of the share of transport alternatives in the modal split. The target figure in 2010 amounts to 31% (inland shipping = 17% and railways = 14%).	Transport	CO_2	Economic Planning	implemented	**FED** : FPS Mobility and Transport **FR**: MOW **WR** **BCR**: Port de Bruxelles		30,75		
TR-A05	Improvement of the transport efficiency (congestion/traffic jam management and trafic regulation)		Transport	CO_2	Planning Other	implemented	**FR**: MOW **WR** **BCR**: AED		118,00		
TR-A06	Urban constraints on parking	Reducing travel by car	Transport	CO_2	Planning	implemented	**BCR**: IBGE, AED, AATL, municipalities		3,83		
TR-A07	Taxation on road transport		Transport	CO_2	Fiscal	planned	**FR**: LNE **BCR**: AFB, AED, IBGE	Included in TR-C03			
TR-A08	Free public transport for commuters		Transport	CO_2	Economic Voluntary/ negociated agreement	planned	**FED** : FPS Mobility and Transport	Included in TR-A02 and TR-A03			
TR-B01	Promotion of car-pooling	Flemish Region: An increase of the seat occupancy in commuter traffic from 1,2 to 1,3 (average seat occupancy target of 1,4)	Transport	CO_2	Fiscal Regulatory Education	implemented	**FED** : FPS Finance + FPS Mobility and Transport **FR**: MOW	Not estimated			
TR-B02	Promotion of car-sharing		Transport	CO_2	Regulatory Education Other	implemented	**FR**: MOW, De Lijn **BCR**: IBGE	Not estimated			
TR-B03	Promotion of teleworking		Transport	CO_2	Regulatory Other	implemented planned	**FED** : FPS Personnel and Organisation **FR**: MOW **WR**		44,00		

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
TR-B04	Improving freight transport efficiency	Flemish Region: Limit the increase of truck km to 17% (in 2010 compared to 1998)	Transport	CO_2	Regulatory Planning	implemented	**FR**: MOW **BCR**: Port de Bruxelles	Not estimated			
TR-B05	Eco-driving		Transport	CO_2	Voluntary/ negociated agreement Education	implemented	**FED** : FPS Mobility and Transport **FR**: LNE, MOW **RW** **BCR**: STIB		17,00		
TR-C01	Tax deduction on the purchase of clean vehicles		Transport	CO_2	Fiscal	implemented	**FED** : FPS Finance + FPS Mobility and Transport + FPS Health, Food Chain Safety and Environment - DG Environment		52,80		
TR-C02	Promoting the purchase of clean vehicles		Transport	CO_2	Fiscal Information	implemented	**FED** : FPS Mobility and Transport **WR**	Included in TR-C01			
TR-C03	Environmental Impact Assessment vehicles and reform of the road fund tax and the tax on entry into service (Ecoscore)		Transport	CO_2	Fiscal Information Planning Other	implemented	**FR**: LNE **WR** **BCR**: IBGE		265,94		
TR-C04	Specific support for the construction of clean vehicles		Transport	CO_2	Research	implemented	WR	Not estimated			
TR-C05	BAT in public transport		Transport	CO_2	Voluntary/ negociated agreement Research Other	implemented	**FR**: De Lijn **WR**	Included in TR-D01			
TR-D01	Tax exemption of biofuels	Reach 5.75% biofuels in 2010	Transport	CO_2	Fiscal	implemented	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment + FPS Economy, SMEs, Self-Employed and Energy - DG Energy (E2)		752	1.023	1.043

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
AG-A01	Rational use of energy for glasshouse cultivation	Flemish Region: An increase in the share of natural gas and other more sustainable energy sources in the energy uses by greenhouse horticulture up to 50% in 2010 and 75% by 2013.	Agriculture	CO_2	Economic Regulatory	implemented	**FR**: LV		90,00	366,00	403,00
AG-A02	Financial instruments		Agriculture	CO_2	Economic Fiscal	implemented	**FR**: LV	Included in AG-A01			
AG-B01	Limiting emissions of GHG from fertilizers and manure		Agriculture	CH_4 N_2O	Economic Regulatory Planning Other	implemented	**FR**: LV, VLM		0,00		
AG-C01	Limiting deforestation and encouraging reforestation		LULUCF	CO_2	Economic Fiscal Voluntary/ negociated agreement Regulatory Information Planning	implemented	**FR**: ANB **BCR**: IBGE	Not estimated			
AG-C02	Preservation of the ecological stability of forests	Certification FSC & PEFC	LULUCF	CO_2	Economic Voluntary/ negociated agreement Regulatory Information Research	implemented planned	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment **BCR**: IBGE	Not estimated			
AG-D01	The Wood Energy Plan		Energy - Supply	CO_2	Information Research	implemented			0,97		

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
AG-D02	Promotion of (dedicated) energy crops	Flemish Region: The objective is the production of 18 kT of pure vegetable oil, 107 kT of bio-ethanol and 25 kT of biodiesel and the planting of 1 km^2 of short rotation wood in 2010.	Agriculture	CO_2	Economic Information Research Other	implemented	**FR**: LV	Included in TR-D01			
AG-D03	Specific measures to promote the sector of biomethanisation		Energy - Supply	CO_2 CH_4	Economic Regulatory Other	implemented	**WR**: DG energy - DGARNE	Included in EP-A01			
AG-D04	Quality standard of solid biofuels Monitoring of biomass		Energy - Supply	CO_2 N_2O	Regulatory Information	planned	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment + FPS Economy, SME, Self-Employed and Energy - DG Energy (E2) + FPS Finance	Not estimated			
WA-A01	Minimise quantity of waste into landfill		Waste	CO_2 CH_4	Fiscal Information Other	implemented	**FED** : FPS Finance + FPS Health, Food Chain Safety and Environment - DG Environment + FPS Economy, SME, Self-Employed and Energy - DG Energy (E2) **FR**: OVAM **BCR**: IBGE	Not estimated			
WA-B01	Optimization of new waste incineration (incinerators)		Waste	CO_2	Other	implemented	**FR**: OVAM **BCR**: ABP	Included in EP-A02			
WA-C	Flaring of landfill gases		Waste	CH_4	Regulatory Other	implemented	**FR**: LNE	Included in EP-A02			
WA-D	Biomass content flows		Waste	CH_4	Other	implemented	**FR**: OVAM **BCR**: IBGE, ABP				
WA-E	Reducing F-gas emissions		Waste	HFC PFC	Regulatory Education	implemented	**FR**: LNE **BCR**: IBGE	Included in IP-B01			

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
SE-A01	Climate change awareness		Cross-cutting	CO_2 CH_4 N_2O HFC PFC SF_6	Information Education	implemented	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment **BCR**: IBGE	Reductions of SE-measures are included in sectoral reductions defined above			
SE-A02	REG and promotion of renewable energy applications (or: communication tools and CO_2 calculator)		Cross-cutting	CO_2	Information Education	implemented	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment **FR**: LNE, VEA **BCR**: IBGE				
SE-A03	Environmental Care at School		Cross-cutting	CO_2	Information Education	implemented	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment **FR**: LNE **BCR**: IBGE				
SE-A04	Ecocampus		Cross-cutting	CO_2	Information Education	implemented	**FR**: LNE				
SE-A05	Provision of project grants for energy consultants to inter-professional organizations		Cross-cutting	CO_2	Information Education	implemented	**FR**: VEA **BCR**: IBGE				
SE-A06	Training of energy / Vocational-Technical		Cross-cutting	CO_2	Education	implemented	**BCR**: IBGE				
SE-A07	Action to support local initiatives		Cross-cutting	CO_2	Information Education	implemented	**FED** : FPS Economy, SMEs, Self-Employed and Energy - DG Energy (E2) **FR**: LNE **BCR**: IBGE				
SE-A08	Urban Policy		Cross-cutting	CO_2 CH_4 N_2O	Planning	implemented	**FED** : PPS Social Integration, Fight against Poverty and Social Economy - Federal Service for Urban policy				
SE-B01	Support to (natural and) renewable cooling		Cross-cutting	CO_2	Research	implemented	**FR**: VEA **BCR**: IBGE				

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
SE-B02	Escorting residents of disadvantaged groups for rational use of energy to meet rational deal with energy		Cross-cutting	CO_2	Economic Information	implemented	**BCR**: IBGE	Reductions of SE-measures are included in sectoral reductions defined above			
SE-B03	Evaluating sustainable energy measures through pilot and demonstration projects in social housing		Cross-cutting	CO_2	Research	adopted implemented	**FR**: VMSW **BCR**: IBGE				
SE-B04	Awareness Campaign business offices		Cross-cutting	CO_2	Information	implemented	**FR**: LNE **BCR**: IBGE, ABE				
SE-B05	JeROM project (Youth, Space and Environment)		Cross-cutting	CO_2	Information	implemented	**FR**: LNE				
SE-B06	Environmental education for adults (associations)		Cross-cutting	CO_2	Information Education	implemented	**FR**: LNE				
SE-B07	Proposed energy audits on individuals		Cross-cutting	CO_2	Information	implemented	**BCR**: ABEA				
SE-B08	Availability of energy advisors		Cross-cutting	CO_2	Economic Information Education	implemented	**BCR**: ABEA				
SE-B09	Ecobuild		Cross-cutting	CO_2	Information Other	implemented	**BCR**: IBGE				
SE-C01	Training of professionals		Cross-cutting	CO_2	Education	implemented	**BCR**: IBGE				
SE-C02	Eco-efficiency scan program		Cross-cutting	CO_2	Information	implemented	**FR**: OVAM				
SE-C03	Increase specific awareness to cool sector		Cross-cutting	HFC PFC	Information	implemented	**FR**: LNE				

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
SE-C04	Social responsibility of enterprises		Cross-cutting	CO_2	Voluntary/ negociated agreement	implemented		Reductions of SE-measures are included in sectoral reductions defined above			
SE-C05	The eco-dynamic enterprise label		Cross-cutting	CO_2	Voluntary/ negociated agreement	implemented	**BCR**: IBGE				
SE-D01	Promoting the purchase of clean vehicles		Cross-cutting	CO_2	Information	implemented	**FR**: LNE **BCR**: IBGE				
SE-D02	Sensitization campaign on eco-driving		Cross-cutting	CO_2	Information Education	implemented	**FR**: LNE, MOW **BCR**: IBGE				
SE-D03	Raise awareness of citizens to their mobility needs in a sustainable way to fill		Cross-cutting	CO_2	Information	implemented	**FR**: MOW **BCR**: IBGE				
SE-E01	Establishment and supporting of an energy center for agriculture and horticulture		Cross-cutting	CO_2	Information Research	implemented	**FR**: LV				
SE-E02	Encourage the efficient use of environmental accounting/ reporting		Cross-cutting	CO_2 CH_4 N_2O	Information	implemented	**FR**: LV				
OB-A01	Sustainable public procurement		Cross-cutting	CO_2	Regulatory	implemented	**FED** : pilot : PPS Sustainable Development (Federal Public Planning Services) --> all the federal services should implement this action **FR**: DAR **BCR**: Public bodies	Included in EP, AG-C02 and OB-C07			
OB-A02	Optimization of catering on the basis of sustainability criteria		Cross-cutting	CO_2	Regulatory	planned	**FED** : PPS Sustainable Development (Federal Public Planning Services)	Not estimated			

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
OB-A03	Establishment of an environmental management system		Cross-cutting	CO_2 N_2O	Voluntary/ negociated agreement	implemented planned	**FED** : coordinator : PPS Sustainable Development (Federal Public Planning Services) --> all the federal services should implement the system **BCR**: Public bodies		1,60		
OB-B01	RUE in public buildings, strictly speaking		Energy - Other (residential, commercial, agricultural)	CO_2	Information Planning Other	implemented planned adopted	**FED** : Public building (régie des bâtiments) ; FEDESCO (Federal Energy Services Company) (limited company under private law) ; SNCB-Holding (public enterprise) for station building **FR**: LNE **WR** **BCR**: Public bodies		0,19		
OB-B02	Use of the third part financing		Energy - Other (residential, commercial, agricultural)	CO_2	Economic Fiscal	implemented	**FED** : FEDESCO (Federal Energy Services Company) (limited company under private law)	Included in EC-C01			
OB-B03	Promotion of RUE with the municipalities and communities (local authorities)		Energy - Other (residential, commercial, agricultural)	CO_2	Information Planning Other	implemented planned	**BCR**: Public bodies, communes, hospitals, schools **FR**: LNE	Included in EC-B01 + others			
OB-C01	Mobility plan		Transport	CO_2	Information Planning	implemented	**FR**: LNE **BCR**: Public bodies, companies (>200 employees)	Included in OB-C02			
OB-C02	Stimulating of alternative use in transport		Transport	CO_2	Fiscal Information Planning	implemented	**FED** : FPS Mobility and Transport **FR**: LNE **BCR**: Public bodies, companies (>200 employees)		0,36		
OB-C03	Promotion of bicycle use		Transport	CO_2	Fiscal Information	implemented	**FED** : FPS Finance + FPS Mobility and Transport **BCR**: Public bodies, companies (>200 employees)	Included in TR-A03			
OB-C04	Teleworking		Transport	CO_2	Other	implemented	**FED** : FPS Personnel and Organisation		0,10		

NCP ref.	Name of PAMs	Objective of measure(s)	Sector(s) targeted	GHG affected	Type of instruments	Status	Implementing entity or entities	Estimate of GHG emission reduction effect or sequestration effect in Gg CO_2-eq per year for the year(s) indicated			
								2005	2010	2015	2020
OB-C05	Eco-driving		Transport	CO_2	Education	implemented planned	**FR**: LNE, De Lijn **BCR**: STIB	Included in TR-B05			
OB-C06	Offsetting CO_2 emissions for air transport		Transport	CO_2	Regulatory Other	implemented planned	**FED** : FPS Health, Food Chain Safety and Environment - SE B&CG LOG **BCR**: Public bodies	Not estimated			
OB-C07	Purchase of clean vehicles		Transport	CO_2	Economic Regulatory Other	implemented	**FED** : FPS Personnel and Organisation --> use by all FPSs **FR**: LNE, De Lijn **WR** **BCR**: Public bodies, STIB		0,02		
Flex-mex		**Federal State:** Purchase of emission rights up to 12,2 million tons of CO_2 equivalent during the period 2008-2012 **Flemish Region:** The Flemish acquisition target amounts to 8,9 Mton CO_2-eq in the Kyoto period (2008-2012). **Walloon Region:** An objective of 575 kT of CO2-eq for the 2008-2012 period has been set. **Brussels-Capital Region:** The investment should generate around 97.5 kT of CO2-eq per year in CER for the first period.	Cross-cutting	CO_2 CH_4 N_2O HFC PFC	Other	implemented	**FED** : FPS Health, Food Chain Safety and Environment - DG Environment **FR**: LNE, PMV **WR** **BCR**: IBGE		4.460 (*) * This figure is an average per year for the 2008-2012 period		

5. Projections and the total effect of policies and measures, and supplementarity relating to Kyoto Protocol mechanisms

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5.1. Projections

5.1.1. Introduction

This chapter gives an indication of future trends in greenhouse gas emissions and removals, given current national circumstances and implemented and adopted policies and measures. Projections are presented both on a sectoral and on a gas-by-gas basis. They are presented for five-year intervals from 2010 to 2020 and incorporate inventory data until 2007.

This communication presents a 'with measures' scenario, encompassing currently implemented and adopted policies and measures and a 'with additional measures' scenario, encompassing planned policies and measures. It furthermore reports on sensitivity analyses for the "with measures" scenario.

The national projections reported in this chapter are the sum of bottom-up projections developed by the three regions (Flanders, Wallonia, Brussels-Capital) as part of their respective climate strategies. Assumptions and key parameters such as energy prices, degree days, economic growth, … were harmonised among the regions. Some parameters remain different, to reflect more accurately the activities taking place in each region.

Regional projections were prepared using MARKAL (Flemish Region), EPM (Walloon Regions) and the Environment Brussels Projections Model. Transport emissions were modelled using TREMOVE (Flemish and Brussels Regions) and PRIMES (Walloon Region). The Federal Planning Bureau used HERMES for the period until 2010 and the energy projections described in the WP21-08 (FPB, 2008)[14] for the period 2010-2020 to prepare a projection at country level for the 'with measures' scenario.

5.1.2. Macro-economic context and projection parameters

International and national economic environment

Table 5.1 summarises the main assumptions regarding the *international and national economic environment*. These are based on the Federal Planning Bureau's medium term outlook for Belgium (November 2008) and extended to 2015 and 2020 by using the growth rates from the "European Energy and Transport – Trends to 2030" report from July 2007.

[14] Federal Planning Bureau (2008). Impact of the EU Energy and Climate Package on the Belgian energy system and economy. Working Paper 21-08

The projections presented in this report are based on a detailed bottom-up approach within each Belgian region. This approach starts from the demand side and the energy needs of the different sectors. As such, energy demand relates to an activity forecast for each sector in each region and is not necessarily consistent with the economic assumptions mentioned in Table 5.1.

Assumptions on *demographic evolution* (Table 5.2) are based on the prospects for the period 2007-2060 made by the Federal Planning Bureau and the General Direction of Statistics and Economic Information in May 2008 (Planning Paper 105: Demographic Prospects 2007-2060). The prospects are based on the observations of January, 1st 2007. Prospects for the number of households, the determining variable for the energy use of households, are not included in the Demographic Prospects 2007 - 2060. These data were submitted by the regions.

Assumptions on the *evolution of fuel prices* are presented in Table 5.3 below. These assumptions are those used for in the 'European Energy and Transport – Trends to 2030' report from July 2007. The fuel prices were only explicitly used in the bottom-up projections for determining energy use and mix in the electricity sector (including CHP) and some industrial sectors. The bottom-up approaches for the other sectors do not apply energy prices in their calculation methods.

CO_2 prices are especially relevant for the choice of fuels in the electricity sector and industrial installations covered by the EU-ETS. The projections consider an increase of the CO_2 price from 20 EUR_{2005}/ton in 2010 to 30 EUR_{2005}/ton in 2020 (Table 5.4).

Table 5.1 Main international and national assumptions

	2006	2010	2015	2020	2001-2010	2011-2020
EU GDP growth (% p.a.)	3.1	1.4	2.1	2.1	1.7	2.1
EUR in USD (level x 100)	125.6	124.7	124.7	124.7	120.4	124.7
GDP growth at constant market prices (% p.a.)	2.8	1.5	2.1	2.0	1.6	2.1
GDP level at current market prices (bln of EUR)	318.2	371.3	440.7	523.0	312.6	450.3
GDP deflator	2.0	1.8	1.3	1.6	2.2	1.4

Table 5.2 Demographic assumptions

(Thousands)	Statistics[15]					Prospects		
	1990	1995	2000	2005	2007	2010	2015	2020
Population	9 948	10 131	10 239	10446	10 585	10 807	11 199	11 538
Number of households	3 886	4 069	4 231	4 440	4 523	4 697	4 967	5 219

[15] National Institute for Statistics

Table 5.3 Energy price assumptions

Prices (2005$ / boe)	2010	2015	2020
Oil	54.5	57.9	61.1
Natural gas	41.5	43.4	46.0
Coal	13.7	14.3	14.7

Table 5.4 Assumptions on the price of CO_2 emission allowances

EUR_{2005} / ton CO_2	2010	2015	2020
CO_2 trade price	20	23.7	30

CO_2 emission factors

The emission factors reported in the 'Belgium's Greenhouse Gas Inventory (1990-2007) National Inventory Report' are used for the calculation of the emission projections (Table 5.5). These emission factors remain constant over the projection period. Differences across regions reflect different industrial structures and technologies.

Global Warming Potential

CO_2 equivalent emission projections are calculated using the Global Warming Potential (GWP) values specified in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.

Climate assumptions

Climate conditions have a strong influence on energy use by households and in the services and agricultural (for green houses) sectors. Indeed, in Belgium, a large share (about 85%) of energy use in households and services sector is used for the heating of buildings, while in the agricultural sector, about 60% of energy consumption is for the heating of green houses.

A key parameter in energy projections for these sectors is therefore the number of heating degree days (HDD)[16]. The regional and national top-down energy and CO_2 projections for the residential, tertiary and green house sector were calculated based on the assumption that the number of degree-days for the period 2010-2020 is equal to the average of the period 1993-2003, i.e. 1900 degree-days (reference 15/15). This characterises a mild climate. Emission data for the historic years refer to the actually reported number of degree-days[17].

Table 5.5 Emission factors used for the energy related CO_2 emission projections

	Flanders / Wallonia / Brussels (kton CO_2/PJ)
Hard coal	92.7
Cokes	106.0
Brown coal, lignite	99.2
Other solids (wastes,...)	Variable
Natural gas	55.8
Cokes oven gas	38.0-40.0
Blast furnace gas	250.0-265.0 (Flanders) / 256.8-264.3 (Wallonia)
Refinery gas	55.1-56.5
Heavy fuel oil	76.6
Petroleum cokes	99.8
Light fuel oil, gas oil	73.3
Gasoline	68.6
LPG	62.4
Other fuels	72.6

5.1.3. Scenario description

The 'with measures' scenario indicates the likely evolution of greenhouse gas emissions in Belgium under current policies and measures. This scenario includes all policies and measures adopted at the end of 2008 and described in the National Climate Plan of Belgium for the period 2009 – 2012. This plan integrates all policies and measures of the federal and regional governments aimed at reducing greenhouse gas emissions. Details of this plan are discussed in Chapter 4 of this National Communication.

The energy sector

The energy sector represented nearly 21% of the Belgian greenhouse gas emissions in 2007. Assumptions regarding net electricity import, energy and CO_2-prices (see Tables 5.3 and 5.4), and on the evolution of the electricity production park (see Table 5.6) determine to a large extend the evolution of the emissions over the projection period. Electricity demand is determined bottom-up and follows from the demand of the final demand sectors. It shows an average annual increase of electricity demand in Belgium of 1.1% for the period 2010-2015 and of 0.9 % for the period 2015-2020. Net import of electricity is assumed to remain relatively constant over the period and attains a level of 7 TWh in 2010 and 2015 and of 6 TWh in 2020.

Unlike projections for the other sectors, the projections for the power sector were modelled at national level.

The projections integrate the Belgian Law of January 31, 2003 on the progressive phase-out of nuclear energy (decommissioning of nuclear power plants once they turn 40). The first nuclear power plants will

[16] HDD are defined relative to a base temperature - the outside temperature above which a building needs no heating, 15° in these projections. The HDD are calculated by subtracting the average temperature on any given day from the base temperature. If the value is less than or equal to zero, that day has zero HDD. But if the value is positive, that number represents the number of HDD on that day.

[17] These were 1722 for 1990; 1922 for 1995; 1714 for 2000; 1828 for 2005 and 1578 for 2007.

close in 2015, the last in 2025. The decommissioned nuclear plants are assumed to be mostly replaced by new CCGT-power plants.

The share of renewables in the total gross domestic electricity production is expected to be 6.8 % in 2010 and 9.5 % in 2020 (corresponding to 7.0% and 9.9 % of total electricity supply). The policies and measures to support and promote renewable energy in the three regions are described in Chapter 4.

CHP installations (including CCGT with heat production) are projected to account for 15.9% of total domestic electricity generation in 2010; for 17.5% in 2015 and for 16.8% in 2020.

The industry

Industrial emissions (energy and process related) represented nearly 31% of total Belgian greenhouse gas emissions in 2007. Projections are based on assumptions of activities and energy intensity (amount of energy used per unit of activity) per subsector. These assumptions differ between the regions and reflect the differences in economies. In the Kyoto period, 86.5% of the Belgian industrial CO_2 emissions are covered by the ETS. With the extension of the scope of the EU ETS, this share will increase to 96% for the period 2013 – 2020. Therefore, industrial greenhouse gas emissions are mainly driven by the EU Emission Trading Scheme.

The buildings sector

In 2007 the building sector accounted for nearly 19% of the total Belgian greenhouse gas emissions.

The number of households and climate assumptions (see section 5.1.2) are, along with implemented policies and measures main drivers for projected emissions in the residential sector. As outlined in Chapter 4, policies and measures differ for new and existing dwellings. The policies and measures are projected to reduce fuel consumption of existing houses in 2020 on average by 12% compared to 2000 values. The share of natural gas in fuel consumption increases at the expense of the light fuel share.

In the tertiary sector, projections are based on the expected evolution of activity of the different sub sectors and the implementation of energy saving measures in each of the regions.

The agricultural sector

The share of agricultural emissions in total Belgian greenhouse gas emissions amounted to 9% in 2007. Greenhouse gas emissions in the agricultural sector mainly consist of CH_4 and N_2O emissions originating from animal husbandry and emissions from agricultural soils. Table 5.7 shows the animal numbers used in the projections.

Table 5.6 Structure of electricity generation (share of different fuels)

Shares in total domestic electricity production (%)	2007	2010	2015	2020
Share of gas	30.7	31.5	39.4	42.2
Share of oil	0.9	0.9	1.1	1.5
Share of coal	7.3	6.1	12.5	12.8
Share of nuclear	54.3	53.5	38.6	32.8
Share of renewable, including biomass	5.4	6.8	7.2	9.5
Share of waste (non renewable fraction)	1.4	1.4	1.3	1.2
Total	**100.0**	**100.0**	**100.0**	**100.0**

Table 5.7 Animal numbers used in the projections

	Statistics					Projections		
Animal numbers (thousands)	1990	1995	2000	2005	2007	2010	2015	2020
Dairy Cattle	839	684	609	539	500	488	617	586
Non-dairy Cattle	2 410	2 601	2 431	2 159	2 149	1 949	1 782	1 815
Sheep	192	157	160	152	151	229	229	229
Horses, Mules and Asses, Goat, Other	30	33	48	60	64	63	63	63
Swine	6 700	7 268	7 369	6 318	6 255	6 551	6 810	6 728
Poultry	27 166	33 381	40 327	34 641	32 067	33 959	35 584	36 584

The transport sector

Transport emissions accounted for nearly 20% of Belgium's greenhouse gas emissions in 2007. Projections are based on a bottom-up approach taking into account the expected number of kilometres travelled by different transport modes and on assumptions regarding the distribution of new vehicles. The evolution in travelled kilometres is based on historical trends and on assumptions regarding the effect of policies regarding modal shift. The projections integrate the policies and measures outlined in Chapter 4.

The waste sector

This sector accounted for less than 1% of total greenhouse gas emissions in Belgium in 2007. Chapter 4 describes the policies and measures implemented to reduce these emissions further.

Land use change and forestry

Land use change and forestry is a small sink in Belgium. The average absorption of CO_2 amounts to 1,453 kton per year during the 1990 – 2007 period. No specific projections for this sector were made and the sink capacity is kept at this average level for the projection period. Since policies in place, as outlined in the previous chapter, will rather lead to an increase of this sink, this can be considered to be a conservative estimate.

The international bunker fuels

Greenhouse gas emissions from international aviation have increased since 1990 with 23% and amounted to 3.7 Mton CO_2-eq in 2007 while greenhouse gas emissions from international maritime transport have increased with 129% and amounted to 32.1 Mton CO_2-eq in 2007. The emissions are calculated on the basis of fuels sold. The projections for international aviation are based on the evolutions described in the WP21-08 (FPB, 2008) taking, however, into account the emission figures until 2006 and the decrease in economic activity as forecasted at the beginning of 2009. The projections for international maritime transport are calculated from the evolution of maritime bunkers in the baseline scenario of the WP21-08 (FBP, 2008) and emission factors used in the 2009 emission inventory. This evolution is based on historical data until 2005 and on the economic forecasts as available in 2007.

5.1.4. Models used

This section describes the four models used for the projections. Regional projections were prepared using MARKAL (Flemish Region), EPM (Walloon Region) and the Environment Brussels Projections Model. The Federal Planning Bureau used HERMES for the period until 2010 and the energy projections described in the WP21-08 (FPB, 2008) for the period 2010-2020 to prepare a projection at country level. Transport emissions were modelled using TREMOVE (Flemish Region) and PRIMES (Walloon Region).

MARKAL

MARKAL was developed in a cooperative multinational project over a period of almost two decades by the Energy Technology Systems Analysis Programme (ETSAP) of the International Energy Agency.

The basic components in a MARKAL model are specific types of energy or emission control technology. Each is represented quantitatively by a set of performance and cost characteristics. A menu of both existing and future technologies is input to the model. Both the supply and demand sides are integrated, so that one side responds automatically to changes in the other. The model selects that combination of technologies that minimizes total energy system cost.

Thus, unlike some "bottom-up" technical-economic models, MARKAL does not require – or permit – an a priori ranking of greenhouse gas abatement measures as an input to the model. The model chooses the preferred technologies and provides the ranking as a result. Indeed, the choice of abatement measures often depends upon the degree of future abatement that is required.

Typically, a series of model runs is made examining a range of alternative futures. The model requires as input projections of energy service demands -- room space to be heated or vehicle-miles to be traveled, for example -- and projected resource costs. Then, a reference case is defined in which, for example, no measures are required to reduce carbon dioxide emissions. A series of runs is then made with successive reductions in emissions: emissions stabilised at present levels, for example, then reduced by 10 percent, 20 percent, etc., by some future date before being stabilised.

In each case, the model will find the least expensive combination of technologies to meet that requirement -- up to the limits of feasibility -- but with each further restriction the total energy system cost will increase. Thus, the total future cost of emission reductions is calculated according to how severe such restrictions may become. These can be plotted as continuous abatement cost curves. In addition, the marginal cost of emission reduction in each time period is determined.

This is of special interest in establishing abatement policy because it can be interpreted as the amount of carbon tax that would be needed to achieve this level of abatement.

Some uses of MARKAL:

- to identify least-cost energy systems
- to identify cost-effective responses to restrictions on emissions
- to perform prospective analysis of long-term energy balances under different scenarios
- to evaluate new technologies and priorities for R&D

– to evaluate the effects of regulations, taxes, and subsidies
– to project inventories of greenhouse gas emissions
– to estimate the value of regional cooperation

More information about the MARKAL-model can be found at http://www.etsap.org/Tools/MARKAL.htm

EPM

EPM (Energy/Emissions Projection Model), developed by ECONOTEC, is a projection model for energy demand and atmospheric emissions that covers all relevant emission sectors (energy sector, industry, residential, commercial and transport).

EPM is a simulation model of the 'bottom-up' type, i.e. explaining energy consumption and GHG emissions from activity variables expressed as far as possible in physical units, and containing a detailed representation of emission sources and the main determining factors of the evolution of energy demand and the various types of emissions.

The model, which includes a technico-economic database on energy consumption and emission reduction measures, is used in particular for:
– the construction of a reference scenario (business as usual), representing the expected future evolution in the absence of any new emission reduction policy;
– the economic assessment of emission reduction potentials;
– the construction of emission reduction scenarios, based on reduction measures with a marginal cost below a given ceiling;
– the development of cost curves, providing either marginal or total cost as a function of the level of emission or energy consumption reduction;
– the assessment of the impact of existing or draft legislation on energy consumption;
– emission levels and costs of emission reduction policies.

The model covers energy consumption and atmospheric emissions of CO_2, CH_4, N_2O, SO_2, NO_x and VOCs. The case of fluorinated gases, handled for the Federal Department of the Environment, required a more specific approach.

Environment Brussels Energy Emissions Projections Model

The Brussels Institute for Environmental Management has developed its own projection model for energy demand and atmospheric emissions from stationary sources. As bottom-up type model, changes in consumption of the several energy carriers used in the Brussels Capital Region and their associated emissions are determined by the evolution of parameters that define the consumption of each sector. For example, the residential sector is defined by the following main parameters:
– population and average household size (defines the net requirement for new dwellings),
– climate (in degree-days),
– demolition and renovation rate,
– improvement of energy efficiency expected in case of renovation which depends on the typology of building stock composed of 244 type-dwellings (apartment or house, 4 age range of the building concerned, 7 energy carriers used for heating, central or decentralised heating system, occupation by the owner or tenant).

The model has been calibrated for each sector with the regional annual energy balances from 2000 to 2006.

The modelled energy consumptions have then been converted into atmospheric emissions through emission factors, the ones used to establish the emission inventories which are also required by Decision 280/2004/EC.

The model also takes into account the GHG direct emissions that are not related to energy consumption: fugitive methane emissions of natural gas delivery, the use of N_2O for anaesthesia, the emissions from the decomposition of organic matter (composting plant, water purification plant).

HERMES

HERMES is the macro-sectoral model used by the Belgian Federal Planning Bureau for its national short- and medium-term forecasts and for scenario analysis. The simulation period varies from 1 to 12 years. HERMES fits into the tradition of annual econometric models based on time series analysis. Since disaggregation is a key feature of the model, it is possible to describe shifts among the different sectors or branches; it also reveals the various effects of measures or external shocks on separate branches.

HERMES is a medium-term demand-oriented model in which supply elements play an important role. The activity of the branches is determined mainly through the demand side. Production capacity is also demand determined in the long run, although supply effects are present. Contrary to technological models, HERMES does not explicitly integrate a description of the different production technologies. Adjustment of production to existing capacity plays a role in the explanation of prices, investments and imports. HERMES incorporates fundamental neo-classical mechanisms for the determination of the marginal technical coefficients, the explanation of investment and the computation of capacities. Supply-side effects are also incorporated into export equations. Technological progress is exogenously included in the production functions.

HERMES breaks down the economy into 16 branches and distinguishes five institutional sectors: households, non-profit institutions serving households, corporate enterprises (both non-financial and financial corporate enterprises), public administra-

tions and the rest of the world. Household consumption is broken down into 24 categories. In addition, the energy demand of each economic agent (firms, government, households) is computed and allocated between 8 energy products. HERMES uses emission factors to compute emission of air pollutants and greenhouse gases, based on the energy use of each economic activity. More information about the HERMES model can be found in the Federal Planning Bureau publication "Une nouvelle version du modèle HERMES" of February 2004 (http://www.plan.fgov.be/admin/uploaded/200605091448102.WP0405fr.pdf).

PRIMES

The PRIMES model was developed by the National Technical University of Athens (NTUA) under research projects funded by the European Commission Joule programme. The design was influenced by the previous generation of energy models (EFOM, MIDAS and MEDEE). The PRIMES model was developed to make energy projections, draft scenarios and analyse the impact of energy policy measures.

PRIMES is a modelling system that simulates a market equilibrium solution for energy supply and demand in the European Union (EU) member states. The model determines the equilibrium by finding the prices of each energy form such that the quantity producers find best

Table 5.8 CO_2- emission projections for Belgium

kton CO_2	1990[18]	2000[19]	2005	2007	2010[20]	2015	2020
1 Energy	110 130	114 337	113 337	104 781	108 389	118 246	120 242
1A Fuel combustion	110 044	114 171	113 231	104 690	108 243	118 113	120 122
1A1 Energy industries (including CHP)	29 863	28 151	29 178	26 803	27 330	36 607	39 254
1A2 Manufacturing industries and construction (without CHP)	32 852	32 782	27 822	26 294	25 012	26 224	25 392
1A3 Transport	19 947	24 115	25 730	25 065	24 901	24 741	25 014
1A4 Commercial / residential / agriculture	27 215	28 996	30 371	26 425	30 898	30 439	30 361
1A5 Other	166	127	129	102	102	102	102
1B Fugitive emissions from fuels	85	166	106	91	146	133	120
2 Industrial processes	8 218	9 195	9 988	9 679	10 975	12 469	12 369
3 Solvent and other Product Use	0	0	0	0	0	0	0
4 Agriculture	0	0	0	0	0	0	0
5 Land-Use Change and Forestry	-1 431	-1 532	-370	- 1 473	- 1 473	- 1 473	- 1 473
6 Waste	337	146	108	85	85	85	85
7 Other	0	0	0	0	0	0	0
Total (Without LUCF)	**118 684**	**123 678**	**123 433**	**114 544**	**119 448**	**130 799**	**132 695**
Total (With LUCF)	**117 253**	**122 147**	**123 063**	**113 071**	**117 995**	**129 346**	**131 242**
International bunkers[21] aviation maritime	 3 096 13 303	 4 653 16 051	 3 537 24 956	 3 787 30 427	 4 150 24 879	 4 650 25 830	 4 920 27 170

[18] 1990-emissions as defined in the initial report after review.
[19] Data for 2000, 2005 and 2007 are from the 2009-emission inventory.
[20] This is the average for the Kyoto-period 2008 - 2012.
[21] The projections for international aviation are based on the evolutions described in the WP21-08 (FPB, 2008) taking, however, into account the emission figures until 2006 and the decrease in economic activity as forecasted at the beginning of 2009. The projections for international maritime transport are calculated from the evolution of maritime bunkers in the baseline scenario of the WP21-08 (FBP, 2008) and emission factors used in the 2009 emission inventory. This evolution is based on historical data until 2005 and on the economic forecasts as available in 2007 and should therefore be considered as being indicative only.

to supply match the quantity consumers wish to use. The equilibrium is static (within each time period) but repeated in a time-forward path, under dynamic relationships. The model is behavioural but also represent in an explicit and detailed way the available energy demand and supply technologies and pollution abatement technologies. The system reflects considerations about market economics, industry structure, energy/environmental policies and regulation. These are conceived so as to influence market behaviour of energy system agents. The modular structure of PRIMES reflects a distribution of decision making among agents that decide individually about their supply, demand, combined supply and demand, and prices. Then the market integrating part of PRIMES simulates market clearing. PRIMES is a general purpose model. It is conceived for forecasting, scenario construction and policy impact analysis. It covers a medium to long-term horizon. It is modular and allows either for a unified model use or for partial use of modules to support specific energy studies (NTUA at its website http://www.e3mlab.ntua.gr/). More information about the PRIMES model can be found at this website.

TREMOVE

TREMOVE is a policy assessment model, designed to study the effects of different transport and environment policies on the emissions of the transport sector. The model estimates for policies as road

Table 5.9 CH_4 – emission projections for Belgium

kton CO_2-eq	1990	2000	2005	2007	2010	2015	2020
1 Energy	1 303	806	726	717	628	629	635
1A Fuel combustion	444	345	304	298	244	245	250
1A1 Energy industries (including CHP)	5	11	12	21	15	18	20
1A2 Manufacturing industries and construction (without CHP)	78	68	59	58	57	58	57
1A3 Transport	119	89	61	55	24	22	21
1A4 Commercial / residential / agriculture	241	176	172	164	148	148	152
1A5 Other	0	0	0	0	0	0	0
1B Fugitive emissions from fuels	860	462	422	419	384	384	384
2 Industrial processes	0	2	44	58	58	58	58
3 Solvent and other Product Use	0	0	0	0	0	0	0
4 Agriculture	7 079	5 762	5 176	5 136	4 909	5 144	5 026
5 Land-Use Change and Forestry	0	0	0	0	0	0	0
6 Waste	2 856	1 902	979	747	582	280	227
7 Other	0	0	0	0	0	0	0
Total	**11 239**	**8 472**	**6 925**	**6 658**	**6 177**	**6 111**	**5 947**
International bunkers							
aviation	1	0	0	0	0	0	0
maritime	0	0	1	1	1	1	1

pricing, public transport pricing, emission standards, subsidies for cleaner cars etc., the transport demand, modal shifts, vehicle stock renewal and scrappage decisions as well as the emissions of air pollutants and the welfare level. TREMOVE models both passenger and freight transport, and covers the period 1995-2030. More information about TREMOVE can be found at http://www.tremove.org.

Table 5.10 N_2O-emission projections for Belgium

kton CO_2-eq	1990	2000	2005	2007	2010	2015	2020
1 Energy	798	1 165	1 153	1 173	1 266	1 331	1 383
1A Fuel combustion	798	1 165	1 153	1 173	1 266	1 331	1 383
1A1 Energy industries (including CHP)	212	249	164	144	188	218	231
1A2 Manufacturing industries and construction (without CHP)	57	48	38	85	81	83	84
1A3 Transport	390	727	811	815	840	876	915
1A4 Commercial / residential / agriculture	139	139	138	129	157	155	154
1A5 Other	2	1	1	1	0	0	0
1B Fugitive emissions from fuels	0	0	0	0	0	0	0
2 Industrial processes	3 934	4 564	3 410	1 902	3 032	3 239	3 446
3 Solvent and other Product Use	246	252	247	247	219	219	219
4 Agriculture	5 561	5 285	4 760	4 485	4 333	4 374	4 338
5 Land-Use Change and Forestry	0	0	0	0	0	0	0
6 Waste	293	260	270	273	277	285	291
7 Other	0	0	0	0	0	0	0
Total	**10 831**	**11 525**	**9 840**	**8 079**	**9 126**	**9 447**	**9 676**
International bunkers aviation maritime	 2 727	 3 876	 4 1 358	 6 1655	 13 1 354	 13 1 406	 13 1 479

5.1.5. Projections and total effect of policies and measures in the 'with measures' scenario

The projections are first presented for each greenhouse gas covered by the Kyoto Protocol. Then, total greenhouse gas emissions, including aggregated information for each sector are presented.

CO_2 emission projections

CO_2 is the most important greenhouse gas in Belgium. Its share was 81% of 1990 emissions and is expected to grow to 88% of total emissions (excluding LUCF) in 2020 (Table 5.8). In absolute terms CO_2 emissions are expected to increase by 21 Mton between 2007 and 2020 (+19%). This evolution is explained by:

- an increase of 12.5 Mton CO_2 in the energy sector (+46%) following the decommissioning of nuclear power plants from 2015 onwards and a further increase in electricity consumption. The projections assume a replacement of the nuclear power plants by highly efficient combined-cycle gas power plants (CCGT);
- an increase of nearly 4 Mton CO_2 in the buildings sector (1A4) (+15%). It is worth noting that 2007 was an exceptionally warm year, with only 1578 degree days, while the projections were developed for 1900 degree days (see also 5.1.2). This explains most of the difference between 2007 and 2010. After 2010 climate assumptions remain

constant and despite a population increase, emissions from energy use in these sectors are expected to decline, as a result of improvements in energy performance of buildings;
– an increase of 2.7 Mton CO_2 in industrial process emissions (+28%) evolving from the expected increase in activity in the production of mineral products, the chemical industry and iron and steel industry.

CH_4 emission projections

CH_4 contributed for nearly 8% to the 1990 greenhouse gas emissions in Belgium. Its share is expected to decrease to 4% of total emissions (excluding LUCF) in 2020. The largest reductions took place before 2007 and were realised in the agriculture, waste and natural gas distribution sectors. After 2007 CH_4 emissions are expected to decrease further by 0.7 Mton CO_2-eq until 2020 (-11%) mainly due to further reductions in the waste sector.

N_2O emission projections

N_2O contributed for a little over 7% to the 1990 greenhouse gas emissions in Belgium. Its share is expected to decrease to a little over 6% of total emissions (excluding LUCF) in 2020. The reductions took place before 2007 (-25%) and were realised in the industrial processes (nitric acid and caprolactam) and in agriculture. From 2007 onwards N_2O emissions are expected to increase again by 20%, mainly because of expected expansion of activities in nitric acid production.

F-gas emission projections

Emissions of fluorinated gases (F-gasses) decreased rapidly in the late 90s due to a swift reduction in emissions in the chemical sector. It is expected however that F-gas emissions will increase again by 2020 mainly because of increased refrigeration and other applications.

Aggregated projections

The greenhouse gas emissions in the 'with measures' scenario are expected to increase from 145.7 Mton CO_2-eq in the base year to 150.6 Mton CO_2-eq in 2020 (+3%). Main factors explaining the significant increase after 2010 are the assumed increased electricity demand combined with the nuclear phase out (most of the nuclear capacity phased out is assumed to be replaced by new CCGT-power plants) and increased production in industrial sectors producing process emissions.

For 2010, projections show a gap of 2 Mton with the Kyoto target while 2007 emissions were below the target. It should be mentioned however that 2007 was an exceptionally warm year (see the evolution of heating degree days in figure 3.10) and that emissions in the building sector may therefore not be representative in this year.

Table 5.11 F-gas emission projections for Belgium

kton CO_2-eq	1995 (base year for F-gas)	2000	2005	2007	2010	2015	2020
Refrigeration and air conditioning – installations	55	496	983	1 123	1 065	1 106	1 172
Refrigeration and air conditioning – other	23	105	243	322	412	443	364
Foams	141	265	101	129	178	229	292
Aerosols	35	99	158	179	179	213	247
Fire extinguishers	1	4	11	12	19	26	36
SF_6	2 205	112	84	81	82	111	113
Chemical industry	2 335	362	141	172	239	239	239
Total	**4 795**	**1 443**	**1 721**	**2 018**	**2 173**	**2 367**	**2 465**

Table 5.12 Greenhouse gas emission projections for Belgium in the 'with measures' scenario

Mton CO_2-eq	Base Year[22]	2000	2005	2007	2010	2015	2020
1 Energy	112.2	116.3	115.2	106.7	110.3	120.2	122.3
1A Fuel combustion	111.3	115.7	114.7	106.2	109.8	119.7	121.8
1A1 Energy industries (including CHP)	30.1	28.4	29.4	27.0	27.5	36.8	39.5
1A2 Manufacturing industries and construction (without CHP)	33.0	32.9	27.9	26.4	25.2	26.4	25.5
1A3 Transport	20.5	24.9	26.6	25.9	25.8	25.6	26.0
1A4 Commercial / residential / agriculture	27.6	29.3	30.7	26.7	31.2	30.7	30.7
1A5 Other	0.2	0.1	0.1	0.1	0.1	0.1	0.1
1B Fugitive emissions from fuels	0.9	0.6	0.5	0.5	0.5	0.5	0.5
2 Industrial processes	17.1	15.2	15.2	13.7	16.2	18.1	18.3
3 Solvent and other Product Use	0.2	0.3	0.2	0.2	0.2	0.2	0.2
4 Agriculture	12.6	11.0	9.9	9.6	9.2	9.5	9.4
5 Land-Use Change and Forestry	-1.4	-1.5	-0.4	-1.5	-1.5	-1.5	-1.5
6 Waste	3.5	2.3	1.4	1.1	0.9	0.7	0.6
7 Other	0	0	0	0	0	0	0
Total (without LUCF)	**145.7**	**145.1**	**141.9**	**131.3**	**136.9**	**148.7**	**150.8**
Total (with LUCF)	**144.3**	**143.6**	**141.5**	**129.8**	**135.4**	**147.2**	**149.3**
International bunkers[23] aviation maritime	 3.1 14.0	 4.7 16.9	 3.5 26.3	 3.8 32.1	 4.2 26.2	 4.7 27.2	 4.9 28.7

[22] Base year emissions are the 1990 emissions for CO_2, CH_4 and N_2O and the 1995 emissions for F-gasses.

[23] The projections for international aviation are based on the evolutions described in the WP21-08 (FPB, 2008) taking, however, into account the emission figures until 2006 and the decrease in economic activity as forecasted at the beginning of 2009. The projections for international maritime transport are calculated from the evolution of maritime bunkers in the baseline scenario of the WP21-08 (FBP, 2008) and emission factors used in the 2009 emission inventory. This evolution is based on historical data until 2005 and on the economic forecasts as available in 2007 and should therefore be considered as being indicative.

5.1.6. Comparison with macro-economic top down approach

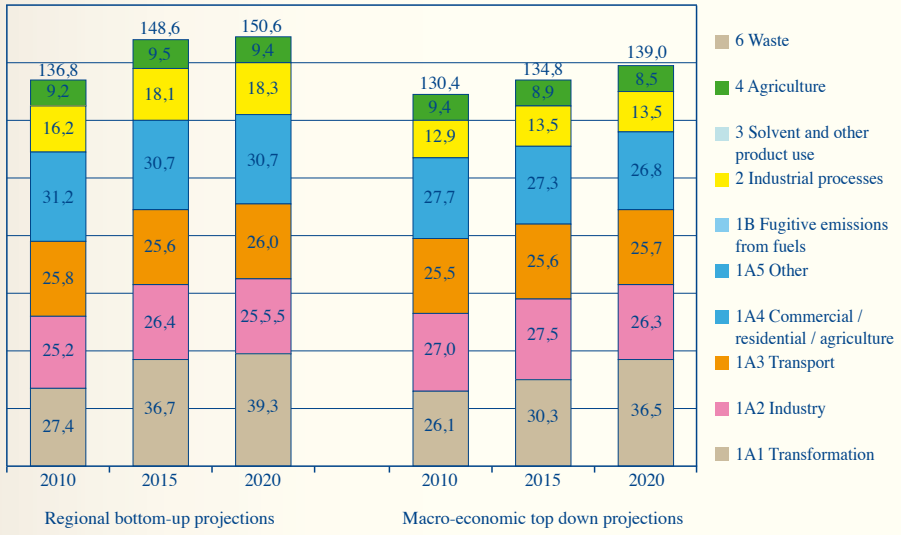
The national projections as described above are the sum of regional projections based on bottom-up approaches without direct link to the macro-economic context as described in 5.1.2. In order to validate this bottom-up approach the sum of the regional projections has been compared with national projections developed by the Federal Planning Bureau (FPB) based on a macro-sectoral top-down econometric model (HERMES) and a recent study commissioned by the Belgian federal and three regional authorities, based notably on the PRIMES energy model (Figure 5.1). The FPB projections are more closely linked to macro-economical assumptions.

Although the end result (i.e. level of greenhouse gas emissions in 2020) of the top-down projections differs significantly from that of the bottom-up projections, both projections show similar tendencies for the period 2010 -2020, i.e.

- increase of emissions after 2010 in the transformation sector and industrial processes;
- transport emissions remain at the 2007-level until 2020;
- emissions from energy consumption in commercial, residential and agriculture sectors remain at the 2010 level until 2020.

The difference between the two projections boils down to different expectations regarding the evolution until 2010. This difference is due to the particular short term economic context (high oil prices in 2008, economic slow down in 2008 and 2009) and the way the different models used respond to these. Macro-economic models such as HERMES are more sensitive to price variations than technical-economic models such as MARKAL and simulation models based on activity levels, such as EPM. The top-down HERMES projections expect emission levels in 2010 would be slightly lower than those in 2007 while the bottom-up projections expect higher emissions in 2010 than in 2007.

Figure 5.1 Comparison of regional bottom-up and macro-economic top down projections, excluding LUCF (Mton CO_2-eq)



5.1.7. Sensitivity analysis of the 'with measures' greenhouse gas emission projections

Forecasting the future is always subject to uncertainties. To assess the robustness of the projections, sensitivity analyses on a number of important parameters were performed.

Number of degree-days

Climate conditions influence energy demand for heating. In the 'with measures' scenario, average climate conditions correspond to 1900 degree-days. In case the future climate would be milder (1714 degree days), CO_2 emissions from the buildings sector would be **2.1 Mton CO_2 lower in 2020**.

Nuclear phase out

The 'with measures' scenario integrates the Belgian Law on the progressive phase-out of nuclear energy of January 31, 2003. It thus takes the decommissioning of nuclear power plants once they turn 40 into account. In this scenario, the decommissioned nuclear plants are mostly replaced by new CCGT-power plants. In case nuclear capacity is kept at its 2010 level, total CO_2 emissions would be about **6.3 Mton CO_2 lower in 2020**.

Economic growth

Economic growth is an important exogenous variable in developing projections. In case the national economic growth between 2011 and 2020 (GDP growth) is 1.5% a year (instead of the assumption of 2% in the 'with measure' scenario), total GHG emissions (essentially energetic CO_2) would decrease by **6.9 to 7.7 Mton CO_2-eq in 2020**, depending on how the economic slowdown is allocated among sectors. The more industry is affected, the more important is the decrease in GHG emissions.

Similarly, in case of a higher economic growth than assumed in the 'with measures' scenario, corresponding increases of the GHG emissions can be expected.

Electricity demand

The bottom up analysis of electricity demand in the with measures scenario shows an average annual increase of electricity demand in Belgium of 1.1% for the period 2010-2015 and of 0.9 % for the period 2015-2020.

In case the average annual increase of electricity demand would be 0.7% for the period 2010 – 2020, CO_2-emissions would drop by **0.9 Mton CO_2** in 2020. The lower electricity consumption leads in the MARKAL analysis to a decreased production of electricity from CCGT plants and renewable sources (off shore wind, photovoltaic).

Electricity import

Liberalisation of the electricity market is likely to lead to an extension of transmission capacity and thus possibly to higher levels of cross-border electricity trading and therefore to higher uncertainties about the level of electricity imports. In a scenario where sufficient additional electricity production capacity is installed on Belgian soil and import and export becomes in balance in 2020 (net import is zero), the total CO_2 emission in 2020 would increase with about **2 Mton.** In the MARKAL model analysis the import is mostly replaced by new CCGT plants and renewable energy production (on shore and off shore wind, photovoltaïc).

In case the net import level is doubled in 2020 compared to the level assumed in the 'with measures' scenario, the total CO_2 emission in 2020 would decrease with about **2 Mton.** The model reduces in this case the electricity production by CCGT-plants and from renewable sources (off shore wind, photovoltaic).

5.1.8. 'With additional measures' greenhouse gas emission projections

The Belgian federal and regional governments are in the process of defining measures to meet the renewable energy and non-ETS objectives for 2020 of the European Energy Climate Package. The scenario 'With additional measures' only integrates additional measures regarding renewable energy production and measures reducing green house gas emissions in the non-ETS sectors (Box 5.1). Emissions related to fossil fuel consumption in the ETS-sector will, from 2013 onwards, be regulated by the harmonised EU ETS cap. It is important however to underline that the impact of the additional measures, as estimated here, is the result of a first analysis that needs to be supplemented with socio-economic feasibility analyses. Also, as for the 'with measures' scenario, uncertainties exist regarding these projections. These were not analysed so far.

The additional measures represent an estimated total additional reduction of 5.6 Mton CO_2-eq in 2015 and of 11.3 Mton CO_2 eq in 2020. The largest part of the additional reductions comprises of CO_2 reductions (86% in 2015 and 95% in 2020).

5.1.9. Conclusion

The total greenhouse gas emissions in the 'with measures' increase up to **150.8 Mton** in 2020, which is largely due to the increased electricity demand, the planned decommissioning of the first nuclear reactors in 2015 and an increase in industrial process emissions due to expansion of activities.

Table 5.13 Total greenhouse gas emission projections for Belgium in the 'with additional measures' scenario

Mton CO_2-eq	2010	2015	2020
1 Energy	110 065	115 324	111 465
1A Fuel combustion	109 535	114 807	110 961
1A1 Energy industries (including CHP)	27 629	35 494	35 687
1A2 Manufacturing industries and construction (without CHP)	25 134	26 298	25 521
1A3 Transport	25 710	24 671	24 142
1A4 Commercial / residential / agriculture	30 959	28 243	25 509
1A5 Other	102	102	102
1B Fugitive emissions from fuels	530	517	504
2 Industrial processes	16 238	17 383	17 838
3 Solvent and other Product Use	219	219	219
4 Agriculture	9 241	9 518	9 364
5 Land-Use Change and Forestry	0	0	0
6 Wastes	943	650	603
7 Other	0	0	0
Total	**136 706**	**143 094**	**139 489**

Box 5.1 Overview of additional policies and measures

Sector	Government	Short description of PAM
Energy	Federal government	Increase in the capacity of off shore wind energy from 1000 MW in 2020 in the 'with measures' scenario to 2000 MW in 2020
	Flemish Region	Increase the share of renewables (excl. off shore wind) in the total domestic electricity demand to 13% in 2020 (compared to 6.8 % in the 'with measures' scenario)
	Walloon Region	By 2020, 2250 GWh of electricity production by on-shore wind, 440 GWh by hydro and 1175 GWh using biomass. High efficiency CHP should produce 3 100 GWh of electricity .
Industry	Walloon Region	Investment in N_2O catalytic abatement technology (SCR) for the 2 nitric acid installations not having specific treatment in place so far, resulting in a further reduction of N_2O-emissions by 0.5 Mton CO_2-eq in 2015 and 2020 compared to 'with measures' scenario.
Buildings	Flemish Region	– Gradual tightening of the energy performance requirements for new dwellings, starting from an E-level of 80 in 2010 and achieving an E-level of 55 in 2020 (compared to E80 in 2020 in the 'with measures' scenario); – Increase the RUE-service obligations imposed on the grid operators to achieve an additional energy saving potential of 20% in 2020 compared to the 'with measures' scenario in existing buildings. This includes a.o. extra subsidies for energy saving investments, free energy scans in dwellings, awareness and information programmes. These measures result in 11 972 GWh of energy saved and/or a reduction of 2.8 Mton CO_2-eq in 2020 compared to the 'with measures' level for that year.
	Walloon Region	– By 2020, all new constructions should be passive or low energy dwellings ; – Realise an overall energy saving of 20% on the existing buildings by 2020 by imposing progressively stricter requirements for the energy performance of new dwellings, by amplifying various financial and fiscal incentives for energy improvements in existing buildings and for new low energy constructions performing better than the standards. Non-technical obstacles are addressed by raising public consciousness, formation sessions for professionals in the buildings sector, incentives to landlords giving their properties for rent, compulsory energy certification for any contract linked to the dwelling, adaptation of urbanisation regulations to facilitate energy saving operations on buildings (modifying the outdoor aspect of houses for instance); – The technical measures are estimated to lead to additional fuel savings of 8 726 GWh, and a reduction of 2 Mt of CO_2 emissions by 2020, compared to the 'with measures' scenario. In addition, some 379 GWh of electricity could also be saved. – New buildings in the tertiary sector should comply with 'low energy standards' for heating and avoid air conditioning by 2020. Energy consumption of existing buildings should be reduced by 20%. Measures comprise of information and education efforts, demonstration projects, regulations and incentives. Expected savings amount to 1 238 GWh on fuels yielding a CO_2 emissions reduction of 0.3 Mt and to 1 038 GWh on electricity.
	Brussels Capital Region	The region is in the process of defining measures to meet the objectives of the "Covenant of Mayors" which commit Brussels city to reduce its CO_2 emissions by 20% by 2020. Measures considered in the building sector to achieve this objective: – strengthen the periodic inspection of boilers and HVAC systems as well as the energy performance requirements; – prompt large companies to audit their energy consumption and to implement an energy management programme, – continue financial support to the constructions and renovations performing better than the required standards; – implement a new integrated service agency to help households designing their renovations based on an audit report, to select the best technical option in terms of energy savings and return on investment; – set up an operator that finances and organizes a system of third-investor adapted to the residential sector. Achieving this objective in the building sector by 2020 represents a reduction in GHG emissions of 585 kton CO_2 eq compared to the 'with measures' scenario (the reduction effect was calculated after having finalized the with additional measures projection and therefore not included in this projection).
Transport	Flemish Region	– Additional measures affecting mobility demand; – Measures to stimulate the use of eco-friendly vehicles and combustions resulting in lower average CO_2 emissions – Measures stimulating a fuel-efficient driving behaviour These measures are expected to lead to an additional emission reduction of 400 kton CO_2-eq in 2015 and of 800 kton CO_2-eq in 2020 compared to the 'with measures' scenario.
	Walloon Region	– improve the performance of vehicles (acting on engines, aerodynamics, tires pressure, but also driving behaviours); – promote modal shift to public transports and soft transports means for people and to railways or waterways for goods; – integrate energy saving concerns in all aspects of societal organisation in order to reduce mobility needs (promote teleworking and videoconferences, optimize the distance between commercial and activity areas and dwellings locations, …). These should lead to an overall fuel saving of 4 648 GWh by 2020 and a CO_2 emissions reduction of 0.87 Mt compared to the 'with measures' scenario.
	Brussels Capital Region	Reduction in road mobility of some 0.6 billion vehicle kilometres compared to 2000 through modal shifts, by reducing the mobility of individual cars only (20% of trips not carried out anymore are replaced by walks, bicycle rides or subway trips; 40% replaced by tramway rides; 40% by busses). Compared to the 'with measures' scenario, these measures are expected to reduce CO_2 emissions by 101 kton CO_2 in 2020.

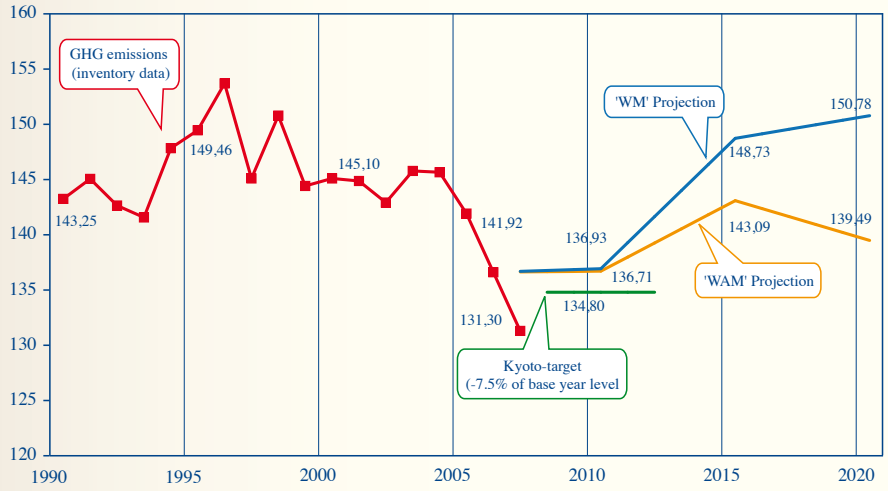
Projections with the macro-economic model suggest a lower emission level in 2020 (**139.0 Mton CO_2-eq**). Both model approaches suggest an increase of emissions after 2010.

Uncertainties regarding exogenous variables such as economic growth, climate conditions, electricity imports exist and their level influences the resulting greenhouse gas emissions, notably in the sectors covered by the EU ETS.

The proposed additional measures show an additional reduction potential of 11.3 Mton in 2020, reducing the total CO_2-eq in the 'with additional measures' scenario to **139.5 Mton CO_2-eq** for that year.

For 2010, projections estimate emission to be above the Kyoto target while 2007 emissions were below the target. It should be mentioned however that 2007 was an exceptionally warm year (see the evolution of heating degree days in figure 3.10) and that emissions in the building sector may therefore not be representative in this year.

Fig. 5.2 Total Belgian GHG emission projection in the WM and WAM scenario (Mton CO_2 eq)



WM = with measures WAM = with additional measures

5.2. Assessment of aggregated effects of policies and measures

According to the UNFCCC reporting guidelines (para 41) the total effect of policies and measures can be calculated as the difference between the 'with measures' and the 'without measures' scenarios, or as an aggregation of the individual effect of each significant policy and measure.

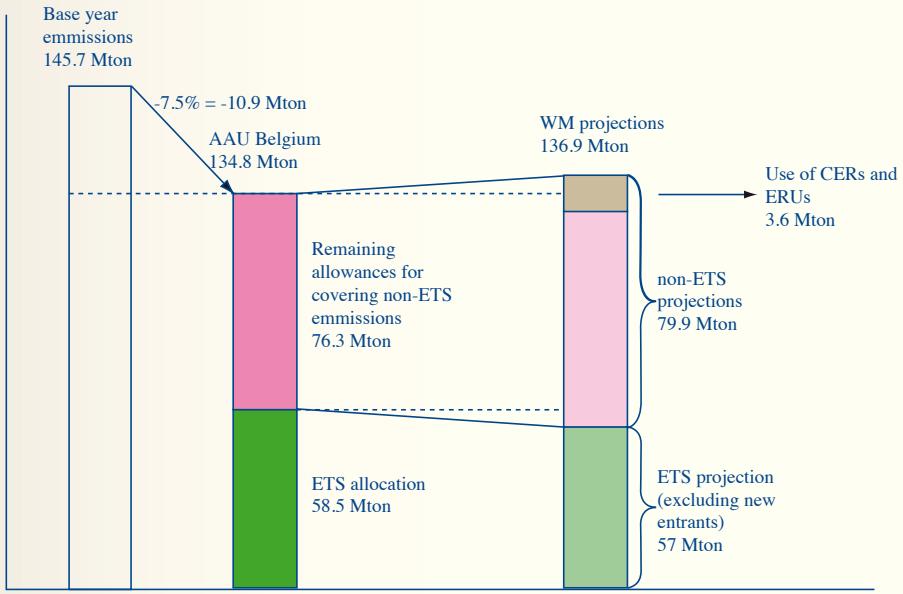
Belgium did not establish a 'without measures' scenario since it has climate policy in place for many years now and it has become difficult to assess the way energy use and greenhouse gas emissions would have evolved without this policy.

Chapter 4 of this communication indicates the reduction effect of (a combination of) some existing policies and measures. This effect was calculated using bottom-up analysis. Although this analysis paid attention to possible interlinkages between the different measures, some double counting and overlap is still possible (e.g. the production of renewable electricity helps in achieving the emission cap set for the electricity sector) and the effect (assumed to be small) of some measures could not be estimated. The aggregated reduction effect should therefore be interpreted with care. It is estimated to be 12.6 Mton CO_2-eq in 2010. For some measures, including important ones such as the ETS, no reduction effect could be estimated after 2010, e.g. because the exact scope of the policy after 2012 is not clear yet or because the implementation changes (e.g. cap at EU-level for ETS). Accordingly, aggregate reductions, that amount to 11.4 Mton CO_2-eq in 2015 and 14.1 Mton CO_2-eq in 2020 (see also Chapter 4 of this communication) should be considered as purely indicative and by no means representative of the expected effect of all policies currently implemented. Moreover, the aggregated reduction effect in 2010 should not be compared to that in 2015 and 2020.

The additional measures represent an estimated total additional reduction of 5.6 Mton CO_2-eq in 2015 and of 11.3 Mton CO_2 eq in 2020. The largest part of the additional reductions comprises of CO_2 reductions (86% in 2015 and 95% in 2020).

5.3. Supplementarity relating to mechanism under Article 6, 12 and 17 of the Kyoto Protocol

Fig. 5.3 Overview of internal reductions and use of CERs and ERUs for the achievement of the Kyoto target



The EU Emissions Trading Scheme is, besides being a very important policy instrument for the energy and industrial sectors, also an important factor in the determination of the amount of flexibility mechanisms to be used by the federal and regional governments. The National Allocation Plan 2008 – 2012 sets the quantity of allowances attributed to these sectors.

The allowances, EUAs being converted AAUs, are allocated to the installations covered by the ETS and are therefore not available anymore to the governments for covering the emissions outside the ETS.

The average annual allocation during the Kyoto Period to the installations covered by the ETS amounts to 58.5 Mton CO_2-eq, irrespective of the actual emissions by these installations during that period. This implies that the annual average quantity of allowances for Belgium in the Kyoto period (134.8 Mton CO_2-eq) is translated into a target for the sectors not covered by the EU ETS. This "non-ETS"-target equals 76.3 Mton CO_2-eq (134.8 Mton CO_2-eq – 58.5 Mton CO_2-eq).

The average non-ETS emission level in the Kyoto period is estimated to be **79.9 Mton CO_2-eq[24] or 3.6 Mton CO_2-eq** above the annual target for these sectors. This difference determines the amount of flexibility mechanisms Belgium will use in the Kyoto period (see figure 5.3). The intended use of flexible mechanisms at government level is estimated at 4.4 Mton CO_2-eq. This amount accounts for uncertainties in the projections and in the effective delivery of contracted projects.

[24] The overall estimated emission level in 2010 is 136.9 Mton of which 57.0 Mton projected emissions estimated to be covered by the EU ETS (scope 08-12). The difference between the two is therefore the emission level not covered by the ETS

6. Vulnerability assessment, climate change impacts and adaptation measures

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6.1. Introduction

Vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change. Vulnerability is a function of climate variation, the degree to which the system responds to this variation, and its adaptive capacity. Accordingly, many factors are involved in its assessment, cumulating uncertainties from several sources. In spite of the complexity of climate change impacts assessment, valuable information is progressively emerging on aspects of regional climate change, the main causes for concern, and possible adaptation measures.

This section presents the available knowledge on the incidence of this phenomenon in all identified areas: biodiversity, agriculture, water availability, risks of flooding, human health, etc. Existing adaptation measures are reported, as well as known planned or potentially useful measures.

Even less data is available for a discussion of economic impacts, which is not included here. We also exclude impacts of climate change policies. Mitigation policies may have complex economic effects, including their cost, possible drawbacks in specific sectors as well as positive side effects, etc. This topic has few direct links with the impacts of climate change itself, and would not contribute to a clear overview of the difficult theme of impacts.

The last part of this chapter summarises the role of Belgian development cooperation on adaptation regarding the improvement of developing countries' adaptive capacity.

European Commission White Paper: Adapting to climate change: towards a European framework for action [1]

This communication follows on from the European Commission Green Paper adopted in 2007 on adapting to climate change in Europe. This paper gave rise to a wide-ranging public and inter-institutional consultation.

The specific objective of the White Paper on adaptation is to identify community political instruments and set a short and medium-term work programme:

- by improving basic knowledge on vulnerability to climate change (effects and adaptive capacity) and on the costs and benefits of the various adaptation options;
- by ensuring the rapid implementation of measures that pay off in short term (no-regret) and beneficial from every point of view (win-win) and by avoiding an ineffective adaptation, by mainstreaming adaptation into EU policies;
- by putting in place a process to better co-ordinate adaptation policies and assess the next stages to be followed, including launching a debate on future funding.

6.2. Assessment of impacts and adaptation measures

6.2.1. Organisation at institutional level

Various groups of experts were formed to implement the adaptation in Belgium. At national level, one group (which belongs to the CCIM/CCPIE) is addressing the issue of domestic adaptation on the one hand (implement adaptation in relation to Belgium and monitor European decisions) and international negotiations on the other (essentially within the UNFCCC framework).

At regional level, an inter-administrative contact group has been set up in the Walloon Region, bringing together representatives of various sectors likely to be affected by the effects of climate change (water, air, agriculture, nature and forests, health, town and country planning, etc.). The role of this contact group is to gather information on current actions being undertaken by the different departments, which in practice constitute climate change adaptation measures, to coordinate an official Walloon Region position within the framework of the national WG and to identify points for consideration on priority goals and other adaptation strategies to be developed or implemented at regional level (Walloon Region Adaptation Plan).

In Flanders, the first steps were made even before the Belgian group was established. In an attempt to make the answers by Flanders as complete as possible to the questions in the European green paper about adaptation to climate change, the various departments were called together. The advisory committee works within the Flemish Climate Conference. This advisory committee has met several times in the interim period. The primary goals are to exchange data from the various studies and to ensure that double work is avoided as far as possible. This group will also have to work on the Flemish Adaptation Plan (in the framework of the Belgian Adaptation Plan).

One aspect of implementing the adaptation strategies is the adoption of a national adaptation strategy. The European Commission White Paper encourages Member States to refine these national strategies with the aim of making them compulsory from 2012. This strategy will be the product of collaboration between the various groups.

6.2.2. Climate change projections

Belgium is a small country on a climate zone scale and most climate models have a resolution between 50 and 300 km. It is thus not easy to provide climate change projections for the country.

However, the publication of a number of climate change simulations has provided valuable information for Belgium.

Changes to mean climate

Due to the limited size of Belgium, it is not easy to provide projections for the country's climate with any certainty; the trend towards a warmer climate in Belgium is however well established. The past two decades have been marked by very high annual temperatures in the country.

Projections for Belgium, which are illustrative of the general trend, predict winter temperature increases ranging between 1.7°C and 4.9°C and summer increases of between 2.4°C and 6.6°C by the end of the 21st century (Marbaix and Van Ypersele, 2004) [2]. Moreover, other evidence showing that climate change is already underway in Belgium can be cited, such as: early migration of some species of birds has been observed and some southern dragonfly species have been identified in our regions, as a result of the changing climate (MIRA, 2005) [3]. Over the last few years, temperatures in Belgium have beaten all records and heat waves have threatened many lives, in particular the heat wave during summer 2003 which had a large number of social, economic and environmental repercussions.

According to a recent report (Vigilance climatique -*Climatic Vigilance*-, published by the Royal Meteorological Institute of Belgium) [4], the data analysed all points to a change in the Belgian climate over the course of the 20th century. In particular, there were very marked and quite severe increases in seasonal and annual temperatures (in the order of 1°C) during two periods, firstly during the first half of the 20th century and then in the 1980s. The frequency of heat waves shows a significant upward trend towards the middle of the 1990s. However, the variability of this parameter is important throughout the 20th century and the characteristics of heat waves in recent years are relatively similar to those observed in the 1940s following the warmer summer temperatures observed during the first part of the 20th century.

Moreover, the frequency of cold spells reduced significantly in the early 1970s. The general increase in minimal temperatures during the 20th century also explains why the longest annual period without frost has increased. In fact, the last day of frost at the end of winter tends to arrive earlier, with the first sign of frost at the onset of winter now being later.

The same report's observations on rainfall show that between 1833, when records began, and the end of the 20th century, the Brussels region has seen an increase of roughly 7% in annual rainfall (highly significant) with rises of around 15% in winter (highly significant) and spring (significant). Moreover, over the past 50 years

in the country, most climatological stations have revealed a trend towards significant or highly significant increases of annual extremes of rainfall extending over several days; this type of extreme precipitation event usually occurs in winter. On the other hand, annual maxima for precipitations over 24 hours (or for even shorter periods) remain stable, except near the coast where, according to a recent study, daily annual maxima are already showing a significant increase. An Uccle analysis of annual maxima since 1898 for precipitations ranging between 1 and several hours does not show any marked changes for these parameters.

On the other hand, in spite of some record values over recent years, Uccle has no detected significant change either in the annual frequency of the number of days where precipitation reached at least 20mm. Finally, we can conclude from all the precipitation data analysed that neither the intensity nor the frequency of violent storms in the Brussels area have shown any marked increase since the start of the 20th century. Using the annual maxima analysis of daily precipitations recorded in the Belgian climatological network, we arrive at a similar conclusion for the whole of the country over the past 50 years, with the exception of the area close to the coast. With regard to drought, the preliminary study undertaken here shows that the longest periods without significant precipitations recorded at Uccle reveal no major change since the early 20th century.

Other research results (CCI-HYDR project - Climate change impact on hydrological extremes along rivers and urban drainage systems in Belgium) [5] suggest that the recent increase in the amount of heavy rainfall leading to floods within the sewer network, is caused by hydrometeorological conditions that are less or as extreme as those observed during the 1960s. Of course, land use has changed significantly in the meantime (for example, urban areas have become larger with large-scale sewer networks constructed). Consequently today's hydrological impacts are very different from those of the 1960s.

As a general rule, since the 1980s a trend towards increased evapotranspiration has been observed in every season; over the past decade, however, the most pronounced changes have been during the winter (as is the case for precipitations). These changes are consistent with current temperature trends which indicate warmer winters than previously observed. Various studies have also indicated that winters are likely to become milder in the future, which would imply that the evapotranspiration rate will increase. This would in part explain the increased precipitations during winter, given the larger quantities of water vapour in the atmosphere. In contrast to the findings on rain, there were no clear indications of cyclical behaviour in the case of evapotranspiration.

In Belgium, projected changes in winter precipitations during the 21st century reveal a moderate increase in precipitations (between 5 and 20%), whereas summer precipitations are expected to decrease, although quantitative findings vary here (ranging from the status quo to a fall of up to 50%). An increased number of very rainy days have already been observed in northern and central Europe. In Belgium, the frequency of significant rain events is also set to rise (ADAPT, 2008) [6].

As a consequence, the hydrology of catchments will be significantly altered due to temperature changes, precipitation and evapotranspiration resulting from climate change. Consequently, in much of Europe, there is likely to be an increased risk of flooding, as well as a risk of flooding in coastal areas. In particular, climate change will lead to increased floods in winter throughout most of Europe (EEA, 2005) [7].

In Belgium, changes in mean river flow are either positive or negative, according to the different climate change scenarios. The result is determined by the balance between increased precipitations and a higher rate of evapotranspiration, which largely depends on the river basin catchments.

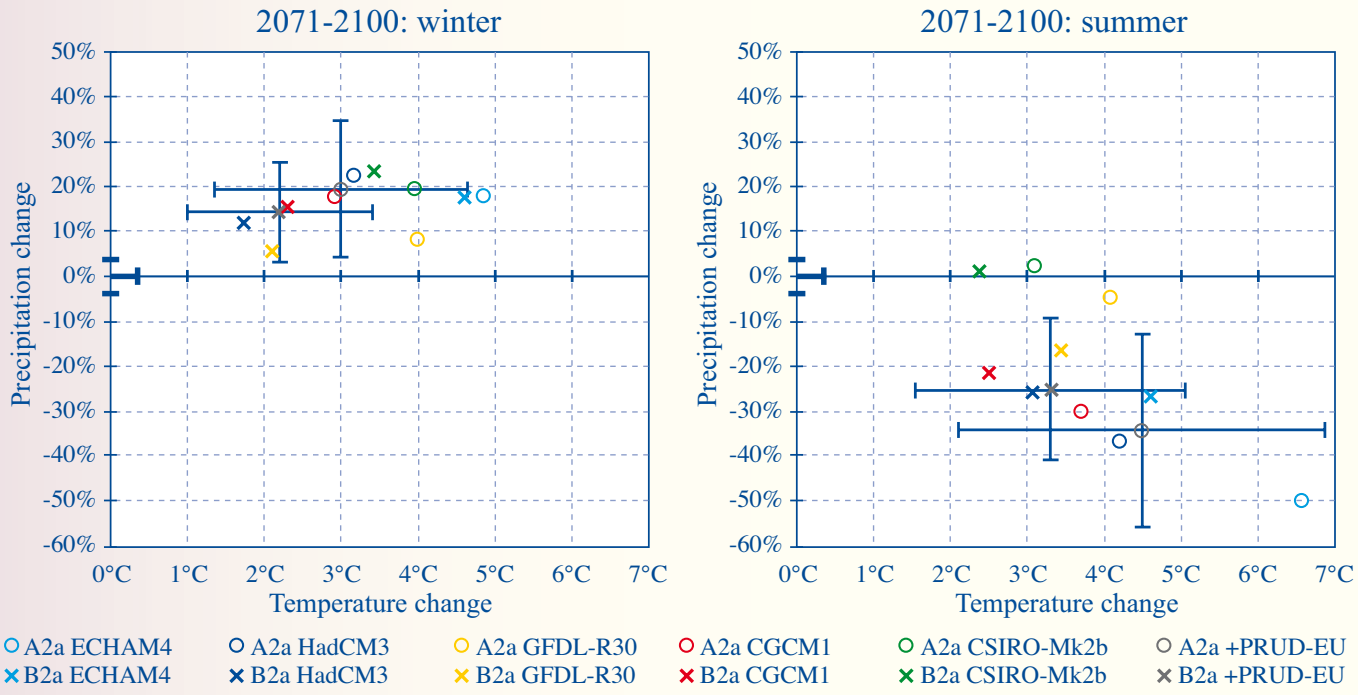
Finally, the "Vigilance Climatique" report reveals that in the case of wind, Uccle recorded a very marked fall in annual mean wind speed during the second part of the 20th century. However, over the years the development of vegetation around the measurement site makes it impossible to attribute with certainty this trend to climate change alone. Elsewhere in the country, in some stations, wind measurements that are probably more reliable for the study of its changing characteristics have been recorded since the 1960s. An analysis of this data indicates a relatively severe reduction in wind speed in the 1980s, with a slight accentuation of this trend since that time. This marked behaviour is also visible on a seasonal scale, with the exception of winter where the wind, which varies significantly from year to year, is more 'stable' over the whole period.

With regard to storms, analyses conducted to date into strong winds, since 1940 in the case of Uccle and since 1985 elsewhere in the country, have revealed no particular trends, either in the intensity of the strongest winds each year or in the frequency of high winds.

Similarly, an analysis of seasonal and annual hours of sunshine recorded at Uccle shows no overall trend for these parameters since records began in 1887, but instead a generally significant variability over a period of years.

Figure 6.1 reports mean temperature and precipitation changes for the period 2071-2100 compared to the period 1961-90, over an area roughly corresponding to Belgium (depending on model resolution). The coloured circles and arrows report results from general circulation models, with a resolution of a few hundred kilometres. The grey circles and arrows are based on the average of several high-resolution (about 25 to 50 km) regional climate simu-

Figure 6.1 Mean climate change over an area approximately equivalent to Belgium, for the period 1961-1990 to 2071-2100
Results are shown for two emissions scenarios (SRES A2, circles and B2, crosses), from 5 general circulation models (data provided by IPCC, coloured symbols), and for a set of regional climate models (based on results from the PRUDENCE project, Fifth EU Framework Programme for Research; the error bars relate solely to uncertainty in regional change, with an estimated 90% probability that the climate change will be in this range).



Source: Catholic university of Louvain (http://www.climate.be/impacts), based on PRUDENCE [8]

lations obtained from the PRUDENCE EU project[25] [8]. The error bars are an indication of the uncertainty at regional scale (global scale uncertainty is not included). All these results clearly show that at the scale of Belgium, the uncertainty is large: results vary widely between models.

However, a number of trends emerge:

- in both scenarios, temperatures rise significantly by 2050 both in summer and in winter [2];
- at the end of the 21st century, the rise in average temperature in relation to the end of the 20th century would vary between 1 and 5°C in winter and between 1.5 and 7°C in summer; the larger changes are reported only for scenario A2, with the higher emissions;
- the projections for the change in precipitation until the end of the 21st century show a rise of 3 to 30% for winter (with few results under 10%) and a change in summer varying between the status quo and a drop of up to about 50%.

It is also important to remember that none of the SRES scenarios explicitly included a climate policy: emission reductions might result in less intense climate change than in this B2 scenario[26] Climate

[25] Results shown here are based on the appendix of the final report (http://prudence.dmi.dk) and global average changes from the IPCC Third Assessment Report.

[26] The B1 family of scenarios includes sustainability options that result in relatively low emissions and may in itself lead to a stabilization of CO_2 concentration at 550 ppm.

change might thus remain limited in Belgium, but only in a very optimistic scenario of world development and/or with effective mitigation polices. Indeed, Figure 6.1 shows that with a moderately optimistic socio-economic scenario (B2) and no specific climate policy, the summer temperature increase will very likely exceed +2°C from pre-industrial conditions.

Climate change may exceed the top of the range shown here if global emissions grow rapidly (as in some SRES scenarios of the A1 family) and/or if the real climate behaves as foreseen in the models that suggest large changes. Some simulations show summer temperatures in Belgium at the end of this century similar to those of Southern Spain at the end of the 20th century, and at least one model produced summer maximum temperatures reaching up to 50°C [9].

At the moment, it is impossible to associate probabilities with socio-economic scenarios (which were all considered equal in the IPCC Third Report) and to predict how effective mitigation policies will be. For impact assessment, we need to consider the full range of climate change discussed.

Others changes

Typical 20th century cold winters will gradually disappear. In recent decades, a reduction in the amplitude of daily temperature changes has been observed (night minimums rise faster than day maximums). Increased cloud cover is a very likely contributor to this change and some models suggest that it will continue to increase in the future.

In relation to the higher temperatures recorded at the start and end of the 20th century, the "Vigilance Climatique" report states that snow precipitations recorded at Uccle have become markedly less frequent. Snow cover is very variable from one year to the next with no marked changes detected in the Brussels region, even though quantities of snow falling in recent years have generally been low. In contrast, on the Ardenne plateaux, in the Saint-Hubert region, maximum annual snow cover has shown a very significant fall since winter warming began in the late 1980s.

Extremes

The probability of severe heat waves is expected to rise significantly. This is both a consequence of higher mean temperatures and increased variability [10]. Projections for the end of the 21st century (A2 scenario) show that roughly every second summer could be as warm or warmer (and as dry or dryer) than the summer of 2003.

With regard to extreme events, the frequency of floods recorded in Belgium has already increased over recent decades. Major floods occurred in 1995, 1998, 2002, 2003 and 2005. Land management is clearly responsible in part for these floods, although variations in winter precipitations and increased frequency of heavy rainfalls have further exacerbated the risk of flooding. Although it remains difficult to quantify potential changes in flood frequency, many analyses have already provided an insight into the most probable evolutions (FLOODsite, 2006) [11]. For instance, a specific study on the river Meuse upstream of Borgharen in Belgium and in France, predicts a slight decrease of average discharge but a clear increase in extreme discharges and variability (5-10%)[6].

The CCI-Hydr study predicts that the amount of precipitation in the winter will be the same or slightly increased, but that showers will be of a greater intensity. There will be a significant decrease in precipitation in the summer. The total annual amount of precipitation will probably decrease as a result. Some general circulation (i.e. global) models suggest an increase in the intensity and/or frequency of the strongest storms over Europe, but there is still some debate on the explanation and generality of this result.

An increase in extreme winds and North Sea storms, with increased risk of storm surge, was found within the framework of the PRUDENCE EU project; this is particularly interesting because it was obtained with several high resolution models, and it is thus probably more reliable. However, in general the latest models no longer predict an increase in wind. On the contrary, it appears that a decrease will occur. However, this offers no information on the power of the storm.

Mean sea level

Changes in sea level will not be the same in all parts of the world, but not much is known about future regional variations. Regional changes stem from variations in thermal expansion, changes in ocean currents, and land movements (in particular postglacial rebound). In Belgium, observations for the period 1937-2003 in Ostend show an increase in mean sea level estimated at 16 cm/century, with no sign of recent acceleration [MIRA 2004] [12].

However, the recent CLIMAR study (conducted by BELSPO) [13] gives a completely different message: in Ostend between 1927 and 2006, an annual increase in sea level of 1.69mm was observed, a value higher than those reported until now. Other regression models show a possible acceleration of the sea level rise during recent decades. Since 1992 an annual increase of 4.41mm has been recorded (as opposed to 1.4mm per year during previous years).

Measurements of significant wave height between 1978 and 2007, and wind speed variables between 1980 and 2007, were analysed at the same time as wind fields, by the Norwegian Meteorological Institute. No clear trend emerged from these temporal series. A slight reduction in significant wave height seems apparent at Westhinder, but the temporal series are too short to be able to provide a definitive response. Similarly wind speed on the Belgian coast has shown a slight reduction, in particular since 1990-1995. This supports

recent research suggesting that there has been a reduction in the frequency of storms in the Southern Bay of the North Sea.

Beyond the 21st century

Part of carbon dioxide emissions remain in the atmosphere for centuries. If concentrations are stabilised due to a large reduction in emissions, the temperature increase will continue. In a moderate scenario (this, however, is being increasingly challenged), we may consider a stabilisation at 550 ppm CO_2[27] (depending on model sensitivity, this may be consistent with the EU target of limiting mean temperature increase to 2°C from pre-industrial to 2100). When adding up the results presented by the IPCC, this leads to a rise in the global mean sea level by the year 3000 between 4 and 8 metres (0.5-1.5m from thermal expansion, 3m from Greenland ice, 0-3m for Antarctic ice, 0.5m for glaciers).

While most climate models predict a slowdown of oceanic circulation in the North Atlantic[28] (part of the planetary thermohaline circulation), current projections do not suggest that it will stop during the 21st century. The probability of this major event is not well known for the next centuries. It is a possibility, particularly following a large-scale and rapid increase in greenhouse gas concentrations. If the circulation changes, and in particular if the Gulf Stream (or more specifically the North-Atlantic drift) stops, projections suggest that in Europe the increase in mean temperature would be smaller but not replaced by cooling (for the annual mean: seasonal changes may be more complex, causing a further disruption of the climate). In addition, a shutdown of the thermohaline circulation would cause a rapid rise in regional sea level along European coasts [14]: some 30 cm in a few years (and close to a metre after many centuries).

In the case of Belgium, as stated earlier, an analysis of historic precipitation and evapotranspiration series has revealed significant recent trends. For winter, in particular, pronounced changes have been highlighted over the past decade with significantly increased precipitations and potential evapotranspiration. Future projections (2071-2100) appear to show a continuation of these same trends, with winters generally becoming rainier and summers drier. Potential evapotranspiration is likely to increase irrespective of season [5].

6.2.3. Ecosystems and biodiversity

Changes in ecosystems are already being observed currently, with species trying to adapt and/or move to the north or to high altitude environments. It is not a simple matter: interactions between species cause complex disruptions to these ecosystems. In Belgium, as elsewhere in the world, biodiversity losses can be explained by air, water and soil pollution, fragmentation and destruction of habitats, intensive agricultural and forestry practices, exotic invasive species etc. Climate is becoming an increasingly important factor, however, and may be the main source of perturbation in the future. According to the IPCC, global impacts on biodiversity are an important cause for concern, even for relatively small increases in temperature (1-2 °C).

In the wake of climate change, some accidentally imported exotic species have been able to establish themselves in our regions.

One climate-related threat involves changes to the phenology[29] of certain species, which at times is causing disruption to existing interactions between species. The desynchronisation between a plant's flowering period and the emergence of its pollinator can endanger both the survival of the plant and that of the pollinator concerned.

It is very important to note that biodiversity and healthy ecosystems help to fight against climate change: ecosystems store a very significant quantity of carbon (forests, wetlands, peat bogs, etc.), but they also help to combat the effects of climate change (floods, droughts, soil leaching, natural water purification, etc.). Protecting and restoring biodiversity and ecosystems is therefore an efficient and cost-effective means of combating and adapting to climate change.

An increasing number of reports, reviews and policy documents emphasise the two-way link between biodiversity and climate change and demonstrate an increasing awareness of the important role of ecosystems in the climate system as well as of the value of protecting biodiversity as a route to moderating climate change. Ecosystem-based approaches represent potential triple-win measures: they contribute to preserve and restore natural ecosystems, mitigate climate change by conserving or enhancing carbon stocks or by reducing emissions caused by ecosystem degradation and loss and provide cost-effective protection against some of the threats that result from climate change. Protection and restoration of biodiversity are "low cost-co benefit" measures to reduce emissions.

Migration of species

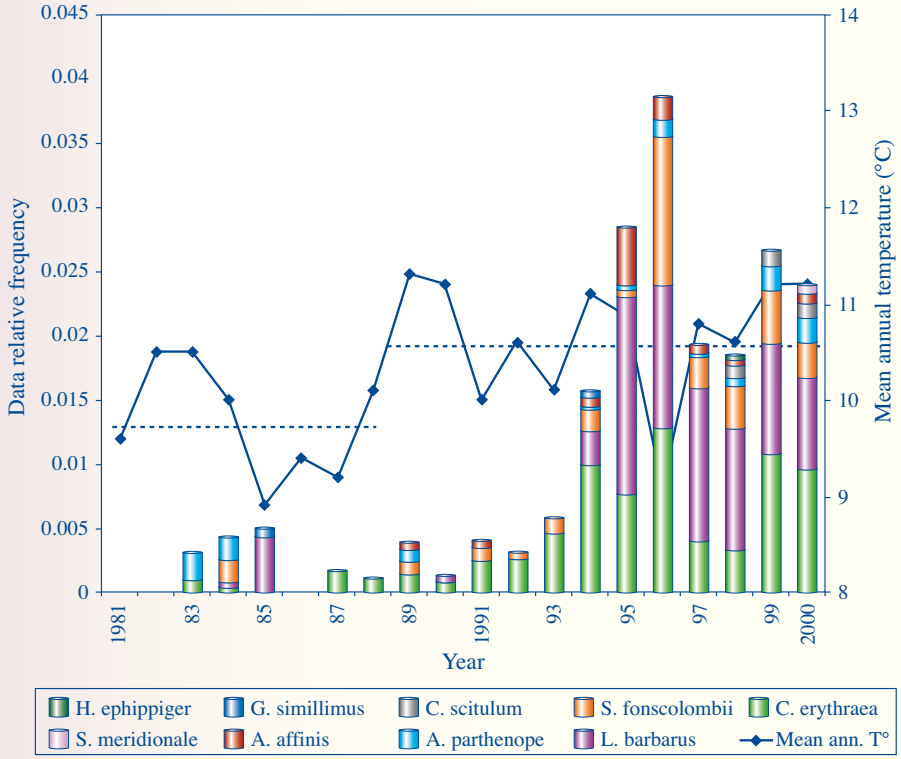
The northward progression of many species from warm regions is noticeable in our country. This change is clearly established among certain animal species (molluscs, dragonflies, butterflies, etc.) and certain plant species (e.g. liverwort; few other data are available specifically for Belgium). At the moment, the regression of species from cold areas is less evident.

[27] Pre-industrial CO_2 concentrations were about 280 ppm, concentrations at the beginning of the 21st century are around 375 ppm

[28] In 2001, a report in the journal Nature indicated that the deep-water current flowing from the Nordic seas of Norway and Greenland into the North Atlantic had reduced by almost 20% since 1950 [15].

[29] Phenology = chronology of seasonal periodic events linked to the vital cycle of living organisms such as flowering, nest building, migration, etc.

Figure 6.2 Frequency of observation of southern dragonfly species in Belgium (fraction of the total number of observations)
The blue dots show mean annual temperatures.



Source: Gomphus Working Group (http://www.gomphus.be)

The case of dragonflies has been studied particularly closely in Belgium (Figure 6.2, Gomphus Working Group). The observation frequency of southern species has considerably increased over the last 10 years. A number of reasons point to climate as the main contributor to this change, in particular the fact that observations of several southern species are increasing in a rather synchronised way while non-southern species are not following these changes. Similar observations have been made for some birds and types of mosquito.

While this may presently be regarded as a successful adaptation, migration of species may have adverse effects, as explained below. In addition, migration will not be possible for all species, particularly those with low mobility, or because landscapes and thus habitats are now highly fragmented. A particular case is that of freshwater fish, of which many species could be threatened, but for which a redistribution seems to be taking place through ship canals connecting river catchments.

Bioclimatic classification of species

A number of initiatives have been undertaken to build a (partial) classification of species found in Belgium in relation to their climate requirements [16]. This work is based on the current geographical distribution of species in Europe, used as an indication of the conditions required for their survival and growth. Species are divided into three categories, corresponding to cold, temperate and warm climates.

This gives a first estimation of the fraction of species adapted to rather cold conditions that may cease to exist in Belgium at some time in the future. These have been mainly located in two areas: Haute-Ardenne and the southern Campine. Contrasting results have been found for certain groups of species. A large fraction of the northern species of bryophytes (mosses, etc.) is found here, as well as freshwater fishes.

In contrast, very few flowering plants are found in the northern climate category, meaning that the threat of climate change is low for these plants. This suggests that many terrestrial habitats could be preserved because these are constituted by such plants, which may favour the survival of associated species.

This classification is merely a first step since other climatic factors need to be taken into account, such as seasonality, snow cover, frosts and water availability. However, as explained in the previous section, the projections for these factors are still relatively uncertain.

Disruption of ecosystems

The arrival of new species adapted to the warmer climate may have adverse effects. Some species will disrupt the structure of existing ecosystems: relations between species are modified, in particular due to competition for food or habitat.

Species that are already present in Belgium but only in warmer areas such

as buildings and/or cities may spread in the natural environment, where the result may be competition with indigenous species. For example, four species of ants are currently found in Belgium only in such warmer places [17]. The South-American Coypu has been present in the country since 1900 but its population has been limited by cold winters. Recently its population increased. Similar findings have been observed for the Californian tortoise.

Phenological changes, or changes in the time of occurrence of biological processes during the seasonal cycle, also contribute to complex disruptions of ecosystems. A frequently documented case [18] concerns certain populations of caterpillars hatching sooner when spring comes early. They do not find enough to eat because the buds of trees have not yet opened and so they are decimated; this is then harmful to their predators, tits in particular.

Another example relates to amphibians such as brown frogs, which reproduce earlier after warm winters and are more exposed to a specific predator, the salamander (this was studied in Great Britain; the situation may be different in Belgium but no data is available). There is little data on phenological changes available for Belgium. Unfortunately, observations by the Royal Institute of Meteorology were stopped in the 80s. Some new monitoring actions began recently, however. Shifts of up to 10 days and more were observed in the arrival date of migrating birds in Flanders, although further research is needed to confirm a link with climate change [19]. In the North Sea, the establishment of warm water species is already being observed, and some may compete with local species (see below).

Sea life and fishery

Identifying impacts of current temperature elevation on sea fauna and flora populations is difficult because natural changes, fishery and eutrophication are also taking place. There are signs, however, that the distribution of some species is moving to the north. It appears that catches of common shrimps in the southern part of the North Sea (in the vicinity of Belgium) has decreased in recent years. This cannot be explained by the pressure of fishing activity, which did not increase. Instead it seems that the lower limit of the range of shrimps is moving to the north [20]. In a recent study for the North-Sea [21], U.K scientists estimated that two thirds of the most common bottom dwelling fishes have moved to cooler waters, going north or to deeper waters. Fishery is currently the most important pressure on commercial species. The researchers concluded, however, that further temperature rises are likely to have profound impacts on commercial fisheries through continued shifts in range and alterations in interactions between species (predation, etc.).

In parallel, southern species such as sardine and anchovy are increasingly being observed in the North Sea. Species which had their northern range limit in the English Channel or extreme south of the North Sea are more regularly found near Belgium. Sea warming has probably contributed to the development of local communities of exotic species brought on by human activities (shipping). An example is the Pacific oyster which is reproducing in Belgian waters, while it was believed that temperatures would be too cold for its larvae. Terrestrial species are competing with local species: pacific oysters are taking the place of mussels.

Future warming is expected to increase biodiversity in the North Sea, mainly because warmer waters tend to suit more species. New species will arrive either as vagrants from more southern European waters or in the form of non-indigenous species from warm marine regions elsewhere in the world. Fishes from warm waters, however, are often commercially less valued than cold water species. Climate change will also add to existing pressures, in particular from fishery, and may have a significant adverse impact on this commercial activity in the future.

According to the CLIMAR research project [13], an analysis of temperature data reveals an annual increase ranging from 0.023°C in the north to 0.053°C in the central and southern parts of the North Sea. Based on the study of literature, data analysis and scenarios developed in neighbouring countries, various scenarios have been produced for Belgium. These range from a moderate scenario, with a 60cm increase in sea level for 2100 to an extreme scenario with a 200cm increase in sea level between now and 2100 and an 8% increase in wind speed. Hydrodynamic, wave and sediment transport models were adapted with a view to assessing the impacts of these various scenarios on, for example, the strongest currents around ports, silting of channels and waves on beaches. Results show that currents can increase by 10% around Nieuwpoort, with a significant increase in waves close to beaches.

Then, a study was undertaken of the secondary impacts of these climate changes both on the North sea ecosystem and on socio-economic activities, such as fishing, tourism, port operations and transport, dredging, offshore wind farms and the risk of flooding. Within the CLIMAR framework, the main focus of research is on flood risks and the fishery sector, but tourism is also examined in detail.

With regard to coastal defence, the most significant primary effects are increased sea level and potentially more intense and/or frequent storms. Possible consequences for the ecosystem include an alteration in water quality and changes to habitat and biodiversity. Damage linked to an increased risk of flooding constitutes the economic impact. Secondary social impacts are safety, job security and changes to the coast's appeal. The erosion of beaches could reduce the appeal of the coast, whereas if this is managed, it could have a positive impact both on biodiversity and attractiveness.

As regards the fishing industry, the most significant primary impact is the changing sea temperature. This can result in a geographic displacement of fish species and lead to changes in the food chain. Variations in the intensity and/or frequency of storms can also have consequences for this sector. More than 50 secondary effects were identified. Economic impacts relate to changes in production, which are closely linked with changes to fish stocks and to the number of fishing days [22].

As far as tourism is concerned, potential secondary impacts are the disappearance of beaches, new forms of ecotourism and the effect of floods. It is estimated that as a result of the rise in sea level, around 17% of beaches in the average scenario and up to 50% in the 'worst case' scenario will disappear.

In the situation as it stands at present, three weaknesses have been identified in relation to the scope of the flooding: Mariakerke, Ostend and Wenduine. The most critical point is Ostend because of a greater concentration of buildings and population. In the event of an extreme storm, damage is assessed at 410 million EUR and the number of victims at 10. In the 'worst case' scenario for 2100, breaches are expected to occur in more than 50% of profiles. Total damage is assessed at 17 billion EUR and could result in up to 6,700 victims.

Different types of adaptation measures can be specified. In the first instance people can take out insurance against losses. Certain impacts can be combated in a more proactive manner. Measures can also be taken at legislative or political level to counter the effects of climate change. Moreover, it is clear that climate change can also bring new opportunities. Finally, additional research and awareness among the population are very important. Various potential adaptation measures aimed at coastal defence have been outlined, such as the creation of artificial islands and reefs, active breakwaters and super-dykes.

Overview

Climate change has already had observable effects in Belgium. The dominant impression is that during the last century biodiversity has been much more threatened by other factors such as destruction of habitats, toxic products and exotic invasive species. However, if climate continues to change in a significant way, this new factor will add to the existing pressures threatening biodiversity. In some groups, a significant proportion of species needs a colder climate, as shown by a preliminary bioclimatic classification. In the future, not all of these will be able to adapt or migrate. Some of the species that may eventually disappear from Belgium may still be found in other countries, but even here they may be threatened. Adaptation measures may help, for example by mitigating the problems of habitat fragmentation. However, climate change has complex and profound impacts on ecosystems, changing the relative abundance of species and the competition between them.

The Hautes Fagnes natural reserve provides an example of the combined impacts of climate change and other factors. Peat bogs have been deteriorating for a long time, for a variety of reasons: drying out, pollution and tourism. If this deterioration continues and climate change increases, the most probable scenario is that the last peat bogs that are still almost intact will disappear within the next 20 to 50 years. In addition, the survival of the small population of black grouse (Lyrurus tetrix) remains compromised in spite of efforts made to manage the situation.

The general principle of adaptation measures for the natural environment is that a healthy ecosystem will be better able to resist and adapt to climate change. Some ecosystems have already severely deteriorated due to a range of pressures from human activities, including habitat fragmentation and the effects of various chemicals. Climate change is a long-term issue, so action must be considered with a long-term view. Measures that enable biodiversity to adapt to climate change can be divided into five groups [17]:

- maintenance of genetic diversity at species level;
- further creation of protected areas. Core areas, buffer zones (with partial protection) and migration corridors must facilitate the migration of species following changes in their habitats. It is important to protect areas taking future configurations of habitats, communities and ecosystems into account. Attention should be paid to areas that are less vulnerable to climate change than others and may become 'climate refuges'.
- reduction of all non-climate stresses. As stated above, healthy ecosystems will be more resistant to climate change. In addition, pollution and climate change have synergic adverse effects (e.g. toxicity of pollutants can increase with temperature; areas which have been drying as a result of exposure to human activities may also face higher stress from climate change). Actions against these factors may quickly have a positive impact on various aspects of the natural environment, in addition to reducing its vulnerability to climate change.
- active and adaptable management. Current knowledge of future climate change impacts is limited. Management needs to be flexible to respond to the real evolution of problems. There is consequently a need for continued monitoring of the effects of climate change. For certain well defined problems which cannot be addressed by general measures, specific measures may be considered. For example, this may involve active displacement of species which cannot migrate, as well as control of parasites, diseases and invasive species.
- an assurance that the measures taken to combat climate change will not adversely affect biodiversity.

In order to preserve biodiversity, Belgium has drawn up a National Biological Diversity Strategy (2006-2016) outlining regional and federal plans to specifically address biological diversity. The Strategy sets out objectives and actions scheduled between the four levels of federal and regional government, while maintaining respect for autonomy and skill sharing. This document also identifies additional areas for action and work to be undertaken jointly in order to safeguard biodiversity.

6.2.4. Agriculture and forestry

Agriculture

If local temperatures do not rise by more than three degrees, climate change will have little impact on agriculture in Belgium, according to all scenarios for the 21st century [2]. A rise in mean temperatures tends to lower the yields of many crops. This is mainly a consequence of faster plant growth, resulting in more rapid maturity and reduced accumulation of organic matter. Up to around 2-3°C, this yield reduction tends to be compensated for by the fertilizing effect of increased CO_2 concentration for most crops. Carbon dioxide also improves the efficiency of water use in plants, and increased temperatures are favourable for some crops such as maize.

More studies are needed to improve our knowledge of the impact of external events, which may be more significant. Heat waves and drought are a particular concern [23]. The warm summer of 2003 did not, however, result in lower yields in Belgium[30], probably because the drought was not severe enough during the growing season to have a significant impact. Nevertheless, the repetition of such events during the early summer and with an increased intensity may adversely affect yields in the future.

A slow but significant reduction in the organic carbon content of most agricultural soils has been observed in Belgium [24]. Although this is mainly a consequence of intense farming, increased temperatures also contribute to the decomposition of the organic matter in soil. This may affect the availability of water to plants and the fertility of soils, thus contributing to a reduction in yields.

Recent progress in agricultural policy promoting the upgrading of organic matter in soils, along with balanced use of mineral fertilizers, are helping to mitigate this problem.

Heavy rains may also damage crops. Another concern is the probable spread of insect pests and diseases from southern countries.

Up to around 3°C, the expected impacts are thus quite limited. Adaptation measures such as changes in crop choices, changes in sowing dates, improved humus content of agricultural land and possibly irrigation, may help reduce the severity of climate change impacts.

Consistent with these results, the EU research project ATEAM[31] [25] concluded that the socio-economic context, including agricultural policy, should remain the key factor driving land use, including cultivation. If global emissions of greenhouse gases are not appropriately mitigated, however, climate projections show that much larger changes are possible. In that case, substantial yield reductions may occur for some crops, but this was not studied in detail.

The Agricultural Sector Investment Programme (ISA) includes a number of initiatives to encourage farmers to take environmental (and climatic) aspects into account in their operational management. Financial support is granted for investments relating to building adaptation, integrated approach to disease control, re-assessment of water and waste water management systems, etc.

The agro-environmental programme includes appropriate voluntary measures to address the consequences of a number of extreme climatic phenomena. Measures targeting, for example, the prevention of erosion of agricultural land are already available to farmers: hedges, fringes, winter land cover, etc.

The programme also puts forward measures designed to maintain and develop biodiversity (specially created strips of land, grassland, meadows with high biological value and preservation of local breeds). The implementation of the Natura 2000 network whose aim is to preserve threatened species and their habitats constitutes a major factor in the preservation of biodiversity. No one can ignore the fact that, agriculture, with its rich array of diversity, will offer within its many facets the greatest adaptive capacity to climate change.

Maintaining the carbon content of agricultural land and preserving the potential to capture and store CO_2 are also among the objectives of the current strategy. Therefore, in Wallonia, the conditionality (of the payment of European subsidies to the agricultural sector) linked to compliance with environmental provisions in force is already encouraging the maintenance of permanent meadows. Moreover, the Programme for the Sustainable Management of Nitrogen in Agriculture (PGDA), transposing the Nitrate Directive in Wallonia incorporates a coherent set of obligations to encourage the maintenance of soil humus content: sustainable management of organic matter via soil binding, winter land cover, etc.

All these provisions will be evaluated and extended, if required, to meet the challenge of adapting agriculture to climate change in the Walloon Region.

A study was undertaken in 2008 by the KUL with the intention of creating an inventory of adaptation opportunities within Flemish agriculture and horticulture and to

[30] National Institute of Statistics.
[31] ATEAM: Advanced Terrestrial Ecosystem Analysis and Modelling www.pik-potsdam.de/ateam

try to estimate their potential. The abstract can be downloaded (in Dutch) at the website from the department agriculture and fisheries: http://lv.vlaanderen.be/nlapps/docs/default.asp?id=841 [32].

The main results say that the financial losses will be moderate between 0.1 % and 4.1 %, depending to which climate Flanders will evolve in the future. If the agriculture adapts itself to this climate changes the losses will decrease from 0 % to 0.4 %. Especially the summer drought will influence negatively the crops with superficial rooting like beetroot.

Luckily the dynamics of the agriculture is still bigger than the dynamics of the climate change.

So with some good policy there will be few losses caused by the changing climate.

Forestry

In 2000, Belgian forests covered 6,930 km^2 or 22.6% of national territory. The majority of these forests (78.6%) are in the Walloon Region. Deciduous and coniferous species covered 51% and 49% respectively of the area. Belgium has the second highest net annual growth increment (after Germany). This large growth of biomass amount is due to good forest management practices and also to the age structure of tree populations. It is expected to continue for 10 to 20 years before reaching a limit.

To anticipate the effects of climate change on Belgian forest ecosystems, various scientific studies have been launched in the course of the past decade [24]. The results show that increasing CO_2 concentration in the atmosphere will accelerate forest growth. In the medium-term, this growth will, however, be limited by soil fertility on the one hand and the relative drought caused by higher temperatures and precipitation changes on the other.

Some conifers, the spruce for example, will be increasingly less suited to the climate because of the milder, rainy winters. In time, a broad-leaved tree such as beech could also become poorly suited to the climate due to periods of drought, which means it would no longer represent the natural vegetation (which is not always the case at present, moreover), but not necessarily that existing trees would disappear. It is obvious that forests will be subjected to changes, at times significant, in species composition.

Although the direct link with climate change has not been demonstrated, beech stands were recently invaded by timber-boring insects, the impact of which was the destruction of more than 10% of standing volume. Climate change may favour the extension of the distribution of pests to the north or higher latitudes. *Xylosandrus germanicus*, a beetle attacking several tree species accidentally introduced into Europe about 50 years ago, has an altitude range limit of 350 m in Belgium. Global warming could allow this species to settle permanently in the whole of the Ardenne area, which until now has been free of it [Henin & Versteirt, 2004] [26].

In recent years, certain exceptional climatic events such as storms or long periods of drought have also had significant impacts on growing stock. The impacts of one-off events are all the more pronounced on weakened stands. In time, the impact of droughts could be alarming.

For approximately the last 15 years, the regional administrations in charge of forest management have encouraged the replacement of conifers such as spruce and Scots pine by other species better adapted to mild and rainy winters, e.g. Douglas fir and broad-leaved trees. Regulatory and financial incentives are used, in particular subsidies for planting in accordance with a guide to species adapted to the present climate. The new Forest Code[33] (approved on 15 July 2008 by the Walloon Parliament) advocates a mixed-species, mixed-age forest, adapted to climate change and able to mitigate certain effects.

Forestry practices must therefore try to favour the species best adapted to (present-day) local conditions, which constitutes a first step towards adaptation to future changes.

Species diversification and conservation of ecosystems that have remained little altered by human activity also help enhance the adaptive capacity of forests to changes [27]. Among the measures outlined within the new Forest Code are the retention of dead or fallen trees, the retention of at least one tree of biological interest per 0.02 km^2 area and the introduction of integrated forest reserves in broad-leaved stands. Moreover, in order to improve the resilience of the forest ecosystem, we should encourage complex forest structures, ensure that soil fertility is maintained, manage water resources optimally (enhance soil and groundwater recharge by maintaining good soil structure and limiting the water consumption of the ecosystem through our choice of species and forestry practices), monitoring the density of game populations and correcting imbalances by means of amendments to situations requiring a response. Such provisions also apply in the Brussels-Capital Region.

In the Walloon Region, a group of experts is studying the impacts of climate change in forest ecosystems. This group has produced a document containing recommendations for policy makers and a good practice guide for forest managers.

[32] The complete document can be ordered at Christine.Lindekens@lv.vlaanderen.be.

[33] Decree of 15 July 2008 relating to the Forest Code (Belgian Official Journal of 12.09.2008), amended by a Walloon Government Decree of 12 December 2008 relating to the date of effect of Article 6 of the Decree of 15 July 2008 concerning the Forest Code and the operations of the Conseil Supérieur Wallon des Forêts et de la Filière Bois (Walloon Higher Council for Forestry and Timber Industry) (Belgian Official Journal of. 13.01.2009), http://environnement.wallonie.be/legis/dnf/forets/foret025.htm

Other indirect effects are also expected, but are still hard to quantify for the moment. Policies and measures to develop biomass energy production will probably have a major impact on both the choice of species (favouring fuelwood, for example) and forestry practices (development of short rotation stands).

6.2.5. Floods

As explained in the 'climate scenario' section, there is some uncertainty over precipitation changes: The country is small, natural variability is quite large and model results differ significantly depending on the scenarios envisaged. All models agree, however, that there will be an increase in winter precipitation. In summer, mean precipitation is expected to decrease, (with forecasts ranging between the *status quo* and a drop of up to 50%) [6]. In contrast, the frequency of intense rainfall is likely to increase.

The frequency of flooding in Belgium has increased in recent decades with significant flooding in 1995, 1998, 2002, 2003 and 2005. It is well known that building practices are a major contributor to this trend due to the reduction of ground surface permeability as well as construction of buildings in flood prone areas. Projected changes in winter precipitation and an increase in extreme events are nonetheless expected to raise the risk level further.

During the winter months, the groundwater recharge is expected to increase. Although this may partly compensate for the summer drying, in specific regions (mining areas in particular) higher aquifers may possibly contribute to flooding [28]. Studies [29] showed increases in the flow of watercourses reaching 4 to 28% in 2100, and a rising risk of flooding for all studied water basin catchments.

In the Walloon Region, a flood prevention plan was approved in 2003 (PLUIES plan[34]). This global plan aims to improve knowledge of the risk of flooding, reduce and decelerate the run-off of water on slopes, improve the management of rivers, decrease vulnerability in zones liable to flooding and improve crisis management. SETHY (Services d'ETudes Hydrologiques) is responsible for real-time monitoring of watercourses, hydrology studies, coordination and flood alert. Its work is based on a network of stations measuring the level of watercourses and amounts of rain. Rules banning the construction of buildings in areas prone to flooding have been imposed[35].

In the Brussels region, the "Plan de prévention des inondations – Plan Pluie[36] " (PLUIE flood prevention plan), which received government approval in late 2008, adopts both a preventive and palliative approach. Preventive measures can help to ensure that the built environment is better adapted to increased precipitation, both in terms of improved soil infiltration and short-term water retention on plots of land. Various measures are being implemented to recover rain water (the installation of rainwater tanks is compulsory for new housing and promoted through regional grants for existing housing) and to increase infiltration and evapotranspiration (limit on built-up areas, choice of permeable materials, plantings and green roofs).

The 'blue network' being implemented since 1999 by the Region is an integrated programme for the purification of Brussels' rivers and water bodies. It aims to restore the continuity of the hydrographic system and benefit from its 'flood buffer' function by recovering clean run-off water. In the Brussels Region, the sewage system is an all-in-one network:

The drawback of this system is that in dry weather or periods of light rainfall, wastewater reaching purification stations is needlessly diluted whereas when rainfall is intense, it becomes engorged and causes flooding of highly polluted water. This programme also contributes to the upgrading of rivers, ponds and wetlands in urban areas.

The principal palliative measure is the construction of a network of storm drains, generally connected to the sewer network. When rainfall is very heavy, these drains enable runoff water to be stored in order to regulate wastewater flow within the sewer system. The Region has more than thirty storm drains, some of which have a capacity of 30,000m^3. They are big enough to absorb floods likely to occur once every 10 years. If the volume of heavy rains increases by 10%, which is a possibility within 50 to 100 years, this level would drop to flooding likely to occur around every six years. Some drains are still at the planning stage.

In Flanders, building plans, as well as any plan that might have consequences on water, are checked for their hydrological consequences (a procedure called "watertoets", within the framework of the Coördinatiecommissie Integraal Waterbeleid[37]). It applies in particular to zones prone to flooding, important for infiltration, or close to a drinking water catchment area. The objective is to avoid negative impacts on the water system, but also to reduce the risk and consequences of flooding. As a consequence, the authorities can demand specific measures if required, such as the use of permeable ground surfaces. In specific situations, the process may lead to the rejection of the building project, even in areas formerly indicated as suitable for building. Maps identifying flood risks have been prepared to facilitate the implementation of these measures.

At the federal level, recent legislative changes introduce cover against flooding and other natural hazards in the form of

[34] http://environnement.wallonie.be

[35] In the SDER (Schéma de Développement de l'Espace régional) and CWATUP (Code wallon de l'aménagement du territoire, de l'urbanisme et du patrimoine).

[36] http://documentation.bruxellesenvironnement.be/documents/Plan_pluie_2008-2011_FR.PDF?langtype=2060

[37] Flemish government decree of 18 July 2003

household fire insurance policies [30]. Unlike the previous situation, the cover against natural disasters will not be provided by state funds, except when the global cost exceeds a threshold linked to the turnover of the insurance companies. While the new laws[38] are not primarily targeted at adaptation to climate change, they may possibly have a dissuasive effect on residential construction in areas where the risk of flooding is higher, in particular if this results in higher insurance premiums. The system is still new, however, and prices are not yet known. In addition, there is a mechanism (price setting board) to limit the premiums for existing constructions in high-risk areas by sharing the cost among all insured parties. There are plans to draw up a map of the high-risk zones in cooperation with the three regions and to exclude any new construction in these zones from the premium limitation mechanism, making such constructions probably uninsurable.

6.2.6. Water resources

Summer demand will increase, in particular if irrigation becomes a widespread agricultural practice. Dry summers, with increased evaporation and possibly reduced precipitation, will probably reduce the groundwater level significantly ([28], [31]). In contrast, increased winter precipitation will contribute to larger groundwater recharge. Changes to aquifer level have consequences on the timescale of a year or more, and should thus partly cancel each other. Due to the high uncertainty over precipitation changes, particularly in summer, it is very difficult to draw any conclusions. Increased evaporation due to temperature change is a fact, and it may be that parts of Belgium will increasingly need to import water from others. In parts of the country, specifically in Flanders, the availability of water per capita is low [32]. Water management is already an important concern in Flanders, which imports a significant fraction of its drinking water from Wallonia. Climate change will represent additional pressure on water resources, especially in summer. During present-day dry years, the availability of water is also reduced in canals, so that groups of ships have to cross the locks together. Reduced water flow in summer may also impact on surface water quality.

From a more qualitative point of view, variations in flow can lead to increased pollution in surface water. In fact, where water levels are markedly low, concentration of pollutants is higher. Moreover, the rise in the water temperature during these same periods (which in the future are likely to be more marked in summer) can lead to a reduction of oxygen saturation rate, which could damage the survival of fish and other aquatic organisms.

Steps have been taken to resolve current water management problems in Flanders which will help to mitigate the shortage of water resources. A large-scale information campaign to promote water savings was launched in 2000 and is still under way. Some of the measures mentioned above within the framework of flood prevention will also contribute to water availability. Current measures to improve surface and groundwater quality (e.g. in connection with nitrates from agricultural fertilizers) will help sustain the availability of affordable drinking water.

In the Walloon Region, research projects have been launched aimed at monitoring changes in the quantity and quality of surface and groundwater, as there remains considerable uncertainty regarding the impacts.

The aim of the cross-border SCALDWIN[40] project (Interreg IV B) is to identify the best measures available, which include an improvement of the ecological status of surface and groundwater, and promotion of biodiversity in the Escaut basin. The project also seeks to implement a monitoring scheme for rivers (migration of fish species, sediment modelling) and groundwater (limits that must not be crossed if good resource management is to be ensured, etc.).

Specific monitoring of groundwater level has been implemented in Wallonia and for the past 2-3 years sources (highly sensitive to level variations) emerging from 2 of the 33 water bodies have also been monitored, which has revealed, for example, that the temperature of springs is reducing each year. The renewal rate of water bodies remains uncertain as yet.

In the Brussels region, the surveillance of aquifer levels has been coupled since 2004 with monitoring of their quality. The region imports 96% of its drinking water from the Walloon Region. A programme for rational water use in urban areas is being developed within the framework of sustainable urban design and eco-construction projects.

6.2.7. Coastal region

Climate change exposes the coastal region to three main types of impact: floods during storms, coastal erosion, and deterioration to or loss of natural ecosystems, including wetlands.

To give an overview of the land area that may need protection by dykes in the future, Figure 6.3 shows the area which is currently below sea level (negligible in Belgium), then the area corresponding to an increase of 1 or 8m in mean sea level. The + 1 m level may be reached in the early 22nd century due to fairly high emissions in the 21st century, while the 8m level may be reached after 1,000 years in a moderate scenario with stabilisation of greenhouse gas concentrations.

It should be noted, however, that new statistics are available, indicating that the speed at which sea levels throughout the world are rising is accelerating (between 0.8 and 1.5m by the end of this century)[41].

[38] Laws of May 21, 2003 and September 17, 2005.
[39] 'Elke druppel telt' project, http://www.waterloketvlaanderen.be/
[40] http://www.scaldis.eu/front-page

The Belgian coast has a length of 65km, half of which is protected by a dyke. Beaches and dunes also have an important role in protection against flooding. Beach erosion is variable: some beaches are stable, a small fraction is growing, but the majority (around a third) has been eroding continuously for a long time (based on annual monitoring and as a net result of all movements, being the longitudinal transport by currents and the perpendicular transport by wave action, winter cycle encroachment by storms and summer cycle alluviation of sand on the foreshore on the beach). Moreover, the rising sea level will also influence the swell and the impact that this will have.

Until the '70-'80s hard sea wall measures were mainly used, such as the building of sea dykes. At that time people realised that these hard structures eroded the beach even further as a result of wave action. Since the '90s Belgium has mainly used beach suppletion, so that the beach causes the waves to break further away from the dyke and on the beach (as a result of the shallower water depth). When a wave breaks, its energy is dissipated and the wave effects on the dyke beyond the beach are decreased, which also results in a decrease in the number of waves crashing over the dyke.

An operation of this type took place in Ostend, where the level of the beach was raised to temporarily decrease the risk of flooding in the town. It is currently considered that compensating for erosion by adding sand when needed will continue to be possible.

Furthermore, sand accumulation or suppletion (at the foot of the dune on the beach or on the foreshore) does not disrupt the dynamic and natural interaction between the foreshore, the beach and the dunes, which is the case when hard sea barriers are erected. This can be considered as an ecological advantage. These sea deflection measures are also much more flexible with respect to rising sea levels (in terms of expansion and speed of implementation). Nevertheless, the dykes still have a function as part of the sea barrier and therefore they are maintained.

Where dykes need to be built, a 60cm rise in sea level is taken into account.

There are currently 3 large projects off the Flemish Coast, designed to bring the level of protection up to the level of a 1000-year storm: The Integrated Coastal Safety Plan, the Public Works Plan in Oostende and the Zwin project. A 1000-year storm sounds a long way off, but it is a storm that occurs on average once in 1000 years. However, this storm can occur during every winter and formulated another way: if the average life expectancy for a person in Belgium is approximately 75 years, then people have approximately a 1 in 13 chance of experiencing such a storm in their lifetime.

The protection against a 1000-year storm (incl. factoring in the rise in sea level to 2050 of 30 cm at the high water level) is a minimum acceptable level of protection.

Some zones where the risk of flooding is large (risk = chance x consequence), as a result of severe consequences, for example construction immediately behind the sea defences, need to be protected against and even bigger storm in a 2nd phase. The centre of Oostende, which forms the weakest link in the Flemish Coast, will in future require protection against a 4000-year storm, due to the position of the town centre (average sea level) and its close proximity to the sea compared to the rest of the coastline, and as a result of the large risk of flooding. The Beach that was constructed in front of the dyke in Oostende in 2004, a precursor of the Public Works plan, was required due to the urgency of increasing the level of protection (previously only offered protection against a 25-year storm, after construction and maintenance there is a level of protection against a 100-year storm).

For the 21st century, the cost of adaptation is regarded as moderate [33], but a further rise in sea level would make adaptation much more difficult. Belgian researchers are taking part in the new EU project Safecoast, aimed at protecting North Sea coasts (report available on the website www.safecoast.org).

Flooding occurred in the past in the Scheldt estuary and its tributaries, leading to the adoption of the so-called 'Sigma-plan' several decades ago. In this framework, 13 'controlled flooding zones' were established. These zones are managed so that occasional flooding during very high tides is tolerable and helps lower the water level. Dykes protect the land behind the flood zone.

With the current climate, the risk level is estimated at one flood every 350 years, but the risk is expected to rise to up to one in 25 years by the year 2100 due to climate change. The Sigma-plan has been revised. The plan, adopted in July 2005, involves new controlled flood zones. A 60cm rise in sea level is now taken into account.

As a rule, a rise in sea level may either cause coastal ecosystems to move inland or disappear. In Belgium, the population density is high, and no significant displacement of natural zones is possible. The Zwin reserve, a small wetland area at the border between Belgium and the Netherlands, is a particularly important case that illustrates the complexity of the impacts of a rise in sea level. The ecological value of this natural zone is connected with the fact that seawater regularly enters the area, while there is no freshwater input. Its natural evolution would result in a slow filling of the water input channel by sand. However, this invasion by sand has accelerated in recent decades, probably due to the sand that is brought to the nearby beaches to counteract erosion. In the near future, it may be expected that the major problem will still

[41] Taken from the European Geosciences Union conference, in Vienna (Austria) in April 2008, available at http://www.newscientist.com/article/dn13721-sea-levels-will-rise-15-metres-by-2100.html

Figure 6.3 Land area below sea level (in blue)

Current situation; low-lying land (polders in the Netherlands) is protected by dykes.

Mean sea-level increased by 1 m.

Mean sea level increased by 8m, a possible situation by the year 3000.

Source: N. Dendoncker, Catholic University of Louvain, [2].

be this silting-up process. If the rise in sea level reaches one or more metres, however, the nature reserve would probably be lost. In addition, increased temperatures may cause drying of the soil.

Other expected impacts of an increase in sea level are a rising groundwater level and an increase in soil and groundwater salinity.

In conclusion, most designs along the coast are very flexible. Beach suppletions allow for a flexible way of dealing with rising sea levels and many solid constructions take into account the spatial context, rather than the most important water levels. Though it is important to look far into the future when selecting alternatives, it is not necessary to design all the measures up to 2100 right now, as the (social) costs of designing everything until 2100 right now are greater than for re-evaluation and possible modification in 2050. Modifications can also consist of other measures (e.g. extra flood plains, which mean that the walls do not need to be made higher). The building of some elements of the protection plan (controlled flood areas) is only economically viable if the rise in sea levels actually continues. The Sigma Plan examined at what point and where extra controlled flood areas can be constructed with a rise in sea levels of 60 cm over 100 years. These areas were spatially reserved for this purpose in the Regional Spatial Execution Plan.

Over the next decades, additional measurements will reveal the development (scenario) of rising sea levels and at the time that new projects are in study phase, the newly gained knowledge will be included.

6.2.8. Infrastructure, energy & industry

As explained in the 'climate scenarios' section, it appears probable that the magnitude or frequency of the most severe storms will increase, although this is not yet certain. The experience of the severe storms that struck in France at the end of 1999 ('Lothar' and 'Martin') shows that there may be serious damage to buildings and other infrastructure such as power lines.

Increased temperatures will reduce energy needs for warming in winter while increasing cooling demand in summer. The need for adaptation to severe heat waves is a new concern, and a lot of infrastructure is likely to be poorly adapted, e.g. some roads, or power stations which rely on river water for cooling.

6.2.9. Human health

The impact for human health of the consequences of climate change and adaptation/mitigation measures taken are the subject of discussions under the cooperation agreement between the federal, regional and community authorities on Environment and Health. These discussions are strengthened by the provisions made by the World Health Organisation in anticipation of the 5th Ministerial Conference on Environment and Health scheduled for February 2010 in Parma.

Heat waves

In Belgium, the heat wave of the summer of 2003 does not seem to have had health consequences as severe and difficult to manage as those in the French cities of Paris and Lyon, the most heavily affected. However, the number of deaths in excess of the mean has been estimated at about 1,300 in the 65 and older age group, equivalent to +19 % deaths during the first weeks of August [34]. Since high ozone concentrations usually come with heat waves, research is still needed to assess the respective importance of these two factors.

It is clear, however, that heat waves have a significant adverse impact in our country. It is also expected that warmer temperatures will reduce the prevalence of some winter diseases (e.g. cardio-vascular), although no detailed study of this issue is available for Belgium.

Problems caused by prolonged exposure to heat include exhaustion due to sweating, causing water and salt deficiencies, and heat stroke caused by loss of temperature control in the body, a severe condition that can rapidly cause death. The most vulnerable groups are babies and young children, along with elderly people and top class sportsmen and women. The heat wave of August 2003 was probably the most severe observed in Belgium. Part of its impact is thus connected with the limited experience of such events in the country, but we anticipate that climate change may cause such heat waves every other summer by the end of the century.

As a first step towards adaptation, the federal government, with collaboration at regional and community level, has set up a 'heat waves and ozone plan'[42] in framework of the national environment health action plan (www.nehap.be). This plan introduces a series of phased-in measures and communication initiatives in addition to actions targeting the reduction of ozone formation.

The first phase takes place every summer and focuses mainly on preparatory actions and public information, and calls for solidarity with people at risk. The pre-alert phase begins when the mean minimum and maximum temperatures, over a period of two consecutive days, exceed a threshold corresponding to the 95th percentile of summer temperatures. The alert phase is declared when a heat wave of three days or more is forecast by the Royal Institute of Meteorology or ozone concentrations above the EU information threshold are forecast by the Interregional Environment Unit. Warnings are sent to emergency and geriatric departments of hospitals, rest homes, etc.

A survey on the application of measures in these organizations is being conducted. This monitoring is one of the elements taken into account by the authorities when deciding whether it is necessary to move into the crisis phase, which implies the creation of a crisis unit and additional measures, e.g. in hospitals. Since 2007, the working group has widened the scope of its remit to include air pollution episodes affecting human health.

Another type of adaptation to heat waves is the structural protection of buildings: thermal insulation, solar protection via shutters, ventilation, etc. Initial regulations with this aim in view are being established in the framework of implementation of the EU Directive on the energy performance of buildings[43]. This is particularly the case in the Flemish Region, which recently established regulations specifically aimed at reducing the risk of overheating in new houses[44]. The Brussels region offers a 20% subsidy (up to a maximum of 400 EUR) of the cost of installing an external solar protection system.

Other health issues

In Belgium we have concluded since 1982 that the annual totals for the various types of pollen fluctuate greatly. There is a slight upward trend for birch pollen. However, this is not the case for grass pollen and for pollen from the herbaceous plants. Climate change creates an increased risk for hay fever sufferers, because in the coming years the risk period could last longer due to the establishment of exotic plant species with a late flowering period that cause allergies. [35].

The number of cases of Lyme disease increased rapidly during the last decade in Belgium, from under 100 to almost 1,000 per year. Ticks are responsible for the transmission of this disease, which leads to a severe condition affecting the skin, heart, nervous system, eyes, kidney and liver. Children are particularly susceptible to tick bites because they play outside and are closer to the ground. It is not yet certain that the increased prevalence of the disease is significantly linked with climate change. No specific studies are available as yet on this topic but a study conducted in Sweden shows that mild winters with increased daily minimum temperature are correlated with higher numbers of ticks. Climate change may thus play a role in the rise in number of people affected, and this trend is likely to continue in the future.

So far, adaptation is regarded as consisting in better knowledge of the issue by health professionals.

In the Brussels-Capital Region, the training of field professionals (park keepers, public sector gardeners) specifically targets the prevention of Lyme disease and intervention against tick bites (Brussels Institute for Environmental Management - IBGE).

Continued research is needed to give a better view of the health risks arising from global warming in Belgium. More information will be available in a report by the Federal Council for Sustainable Development currently under preparation [36].

[42] FPS Health, Food Chain Safety and Environment, https://portal.health.fgov.be/portal/page?_pageid=56,805538&_dad=portal&_schema=PORTAL ; http://www.picdepollution.be

[43] Directive 2002/91/EC, which the Member States must implement by January 2006.

[44] Decree (17 June 2005) setting of criteria for energy performance and interior climatic quality of buildings criteria http://www.energiesparen.be/energieprestatie/infopunt/download.php

6.2.10. Tourism

In Belgium, a moderate rise in the mean temperature should be rather positive for tourism (particularly on the coast). A similar effect has been observed in Great Britain: after one or more sunny summers, more British tourists stay in the country, and there are also more foreign tourists [37]. Additional efforts will nevertheless be needed to maintain beaches due to increased coastal erosion. This is not expected to be a severe problem during the 21st century, but if the rise in sea level reaches one or several metres in the coming centuries, it may become a critical issue. There are also limits to tolerable temperature increases, in particular due to heat waves, even though the drier air should make heat more acceptable. River sports and associated activities in Wallonia would be negatively affected by reduced river flow in summer but warmer temperatures may also favour "nature" tourism. Winter sports, which are already impossible during the warmer winters, may completely disappear. Rainy and possibly cloudy winters will not favour outdoor activities.

Indirect impacts of climate change on other sectors may also have effects on tourism, e.g. deterioration of natural zones, damage to infrastructures or historic buildings due to flooding. It should also be kept in mind that socio-economic factors may also have significant impacts on tourism.

6.3. Summary and vulnerability assessment

The table 6.1 summarizes projected impacts and adaptation measures. We also try to rate the importance of each impact. This should be regarded as preliminary and indicative; it is based on our current evaluation of the issues and is not the result of a detailed quantitative assessment.

The importance of impacts is reported in terms of vulnerability. Using the definition of the IPCC Third Assessment Report, vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change. Vulnerability is a function of climate variation, the degree to which the system responds to this variation, and its adaptive capacity.

When rating vulnerability, we take possible adaptation measures into account, as explained below, because the existence (or not) of such measures is an essential part of the problem. Vulnerability is relatively difficult to asses as it depends on a range of factors but it is of key importance for policy implications and society's perception of climate change. That is why we propose this preliminary evaluation of vulnerability while acknowledging that there is currently limited information available, particularly in quantitative terms. In spite of its limitations, information is nevertheless available and we are confident that this summary provides a useful view on future impacts. It is the result of an assessment by a group of experts, although it cannot encompass all available sources of information in Belgium. More research is needed to improve this assessment, as pointed out in the conclusions of this chapter. The ranking of the importance of impacts provided here reflects our current understanding; an effort is made to show where there are high uncertainties, but future assessments based on more data may lead to different conclusions.

It is important to note that we define three levels of vulnerability:

- high vulnerability means that this impact may have severe consequences and that we are not sure whether affordable adaptation measures can be found;
- medium vulnerability means that severe impacts are unlikely but significant impacts are likely, even after implementation of simple adaptation measures;
- limited vulnerability means that no severe impact is projected, the issue will probably be unimportant, at least when simple, low-cost adaptation measures are implemented.

A question mark means that the rating is particularly uncertain. This is mainly due to the limited evidence for the assessment because of a lack of appropriate information or studies. Uncertainty is also due to limited predictability of the future (e.g. human behaviour), but this seems to be a secondary limitation at the moment.

Two climate scenarios are also considered, and relate to 'major' and 'minor' climate change conditions by the end of the 21st century (and the following centuries for the rise in sea level). This is quite arbitrary since we do not have enough information to investigate scenarios corresponding to a mitigation of greenhouse gas emissions. As a first step, the 'minor' scenario refers to climate change under the mean values shown for the B2-PRUDENCE scenario in Figure 6.1, while the 'major' scenario refers to climate change above the mean values shown for A2-PRUDENCE.

Note that the ensemble mean temperature increase from PRUDENCE in summer is about 50% higher in Belgium than in the global average, so that a stabilisation to +2°C globally (from pre-industrial), as in the EU mitigation objectives, roughly corresponds to +3°C in Belgium.

Table 6.1 Summary of climate change impacts, adaptation and vulnerability

Vulnerable zones	Examples/Comments/Adaptation measures reported
Terrestrial ecosystems	**Vulnerability:** 'MINOR' scenario: mean (?) 'MAJOR' scenario: high – Species move north (observed); locally ◗ those adapted to warmer climate increase ◗ those adapted to colder climate may decrease – New species → competition with existing ones – Complex perturbation of ecosystems (e.g. broken food chain due to different changes among species)
Marine ecosystems	– Species move north (observed) – Possible impacts on fishing **Adaptation** **Existing measures, which need to be strengthened** – Reduction of all non-climate stresses. → Healthy ecosystems – Further creation of protected areas, migration corridors – Active and adaptable management: respond to observed evolution
Agriculture	**Vulnerability:** 'MINOR' scenario: limited to mean (?) 'MAJOR' scenario: mean
Forests	**Vulnerability:** 'MINOR' scenario: limited to mean 'MAJOR' scenario: mean to high – Compensation between two effects: ◗ CO_2 increases photosynthesis rate and water use efficiency (most crops); ◗ warming reduces yield of a number of crops. – Increased frequency of dry summers and heat waves may damage crops, grasslands and forests; moreover, this will inevitably lead to reduced water resources and though irrigation will become increasingly necessary, it must be balanced – Increased migration and distribution of pests – Increased decomposition of organic matter, reducing soil fertility – Increased salinity of soil in polders – Increased damage to forests due to extreme storms (probably limited + knowledge incomplete) – Vulnerability is greater for forestry because adaptation is slower (life cycle of trees, slower change). – Impact of response measures: ◗ Change of land use and landscapes due to expansion of biofuels and wood energy production **Adaptation** **Existing measures** Forest management focuses on plantation of species adapted to mild and rainy winters such as Douglas pine and broad-leaved trees. Regulations favour the planting of trees adapted to current climate and thus more resistant to change. The new Walloon Region Forest Code has been reviewed to include climate change issues. Forestry practices must take into account potential impacts related to climatic events (limiting clearings, etc.). At an agricultural level, conditionality and agri-environmental measures can prove useful tools within the context of adaptation to climate change (erosion control practices, etc.). **Future needs** – When appropriate, change the selection of crops and agricultural practices according to climate (more complex with large temperature increases and frequent dry summers). – Livestock: Monitor animal health (emergence of new diseases, heat waves, etc.)

Vulnerable zones	Examples/Comments/Adaptation measures reported
Water resources	**Vulnerability:** 'MINOR' scenario: limited to mean (?) 'MAJOR' scenario: mean to high (?) More evaporation and possibly less precipitation in summer reduce groundwater level; increased winter precipitation has the opposite effect. Water availability is already limited in parts of the country (specifically Flanders); future evolution is poorly known and is a growing concern. **Adaptation** **Existing measures** - Information campaign on water savings - Measures to improve water quality - Monitoring of certain water bodies **Future needs (based on existing measures)** Increased import of water from (sub)region to (sub)region will likely be needed, as well as other measures regarding drinking water production and demand in Flanders.
Floods (inland)	**Vulnerability:** 'MINOR' scenario: limited to mean (?) 'MAJOR' scenario: mean – Increased river flooding in summer – Probably increased risk of flooding due to heavy rain **Adaptation** **Existing measures** – Monitoring of river flows – Ban on construction in flood-sensitive areas – Improvement of water infiltration in soils, better use of natural ponds and rivers to retain water in urban area (Brussels region) – Building of rainwater harvesting basins – PLUIES plan

Vulnerable zones	Examples/Comments/Adaptation measures reported
Coastal area	**Vulnerability:** 'MINOR' scenario: limited to mean (?) 'MAJOR' scenario: high – Increased coastal erosion – Storm-related floods – Deterioration of natural ecosystems (indirect or long-term) **Adaptation** **Existing and planned measures** – Protection of low level rivers on the basis of recently updated 'Sigma plan', which projects new controlled flood zones and accounts for +60 cm sea level. – Beach management (addition of sand)
Human health	**Vulnerability:** 'MINOR' scenario: limited to mean (?) 'MAJOR' scenario: mean to high – Heat waves: increased mortality, problems such as sunstroke, consequences of more frequent ozone peaks – Probable contribution to increased prevalence of Lyme disease – Possible contribution to increase in pollen associated allergies – Food safety – Coordination between federal, regional and community authorities within the NEHAP framework (National Environment and Health Action Plan) **Adaptation** **Existing measures (continuation and reinforcement needed)** – Federal heat waves and ozone peaks plan, which will be expanded within the NEHAP framework – Regulations on structural protection of buildings (first stages) and alternatives for eco-construction and air conditioning energy
Tourism	**Vulnerability:** 'MINOR' scenario: limited 'MAJOR' scenario: limited – Impact of a moderate temperature rise should be positive – Reduced river flow in summer → impact on river sports, etc. – Even less snow in winter, but more rain → Fewer outdoor activities
Industry, energy and transport	**Vulnerability:** 'MINOR' scenario: limited 'MAJOR' scenario: mean (?) – Reduced energy demand for heating in winter, increased demand for air conditioning in summer – Probable (but not certain) increase in damage due to the heaviest storms – Possible difficulties in industries and sectors adapted to a colder climate (e.g. power stations cooled by river water)

6.4. Cooperation on adaptation

6.4.1. Development cooperation

Since 2008, the Belgian development cooperation has explicitly included the fight against climate change in its policy as a priority. This is due to the fact that the consequences of climate change in countries in the south are an important source of instability in terms of food security, affect on biodiversity, migration, public health and tensions that could even lead to conflicts. These countries will be the first victims of climate change, even though they are less responsible for the causes and have fewer means to combat climate change.

Not taking into account the possible impact of climate change carries the risk that all efforts to combat poverty and to achieve the Millennium Development Goals will be partially or entirely negated.

In March 2008, the minister for development cooperation organised the conference "Climate change, a new challenge for development cooperation?" to examine this problem. Following this exchange of ideas, Prof. van Ypersele, vice-chairman of the IPCC, wrote a report with recommendations for the Belgian policy on development cooperation. The fight against climate change must be the common thread throughout development policy and the focus must shift to support for adaptation in our partner countries. An action plan, intended to implement the recommendations made in the report by Prof. van Ypersele in the Belgian policy on development cooperation was worked out. The main goals of this action plan are: promoting awareness, building of knowledge and integration of the climate theme.

In addition to this report, dialogue with other donors will also yield resources to improve the Belgian policy on adaptation.

The OECD-DAC created a policy-supporting manual to facilitate the integration of adaptation to climate change via various aid modalities (budget assistance, sector assistance, programmes and projects)[47]. By participating in the DAC-EPOC working group, DGDC contributed to the creation of this document. The aim now is to implement these guidelines in our own policy. A research platform was created that will develop a practical web-based tool that will allow different existing resources for environmental integration to be applied within the Belgian development cooperation.

Currently we do not have correct indicators to identify the contributions of development cooperation to the efforts concerning the adaptation of developing countries to climate change, resulting in the total of the means implemented in the projects and programmes being unknown. In the statistical working group of the OECD-DAC, Belgium is involved in the development of an indicator for adaptation. This will allow for better monitoring and evaluation of efforts concerning this theme in future.

Bilateral cooperation

In the period 2005 – 2008, the Belgian development cooperation does not have any projects in its bilateral portfolio with a primary objective of contributing to the adaptation to climate change in its partner countries. However, the cooperation is active in sectors where the impact of climate change must be taken into account, such as agriculture, infrastructure and healthcare.

For example, in Burundi, Belgium supports ISABU (Institut des Sciences Agronomiques du Burundi). This support to ISABU fits the Belgian strategy of no longer offering public services, but rather reinforcing Burundian government institutions. The main goal of this 3 million EUR project is the improvement of the agricultural production, both in terms of quantity and quality. In addition, it also fits with the needs formulated in the Burundi National Adaptation Plan of Action.

In Mozambique, the reconstruction of the Avenida Milagre Mabote in Maputo will take into account the risks of flooding and the infrastructure will be adapted accordingly.

Indirect cooperation

By supporting non-governmental organisations in the northern and southern hemispheres and by supporting scientific institutions, Belgium is contributing to several programmes and projects that all tackle adaptation to climate change in one way or another. For example in Mali, Niger, Burkina Faso, Uganda and Rwanda, the programme by Vétérinaires sans frontières wants to implement a better harmonisation between agriculture and stock farming, thus creating a better supply of feed in the dry season and thereby improving the stock farming.

Multilateral cooperation

In the framework of multilateral cooperation, Belgium supports international agricultural research. The Consultative Group on International Agricultural Research (CGIAR) supports 15 research facilities with the aim of using science to ensure: improved food security, improved human nutrition and health, a higher income for the poor and improved management of natural resources. New varieties of crops, knowledge and other research products are made available to individuals and organisations across the world that support sustainable agricultural development. Approximately one third of the research programmes relate to the fight against (the impact of) cli-

[47] OECD DAC-EPOC « Policy Guidance on Integrating Climate Change Adaptation in Development Cooperation »

mate change. Centres such as IITA, CIAT, ICRISAT, ICARDA and WARDA conduct research into modified agricultural crops. The World Agroforestry Centre, ICRISAT, ICARDA and IITA research modified agricultural techniques and identify innovations at institutional and policy level for improved agricultural management related to climate change. Obviously the aspect of increasing capacity is an important motivation for the Belgian support of a research environment such as CGIAR.

More specifically, Belgium supports the following centres:

- CIAT: Centro Internacional de Agricultura Tropical (Colombia)
- CIP: Centro Internacional de la Papa (Peru)
- ICARDA: International Centre for Agricultural Research in the Dry Areas (Syria)
- ICRISAT: International Crops Research Institute for Semi-Arid Tropics (India and Niger)
- IITA: International Institute for Tropical Agriculture (Nigeria)
- Bioversity International (Italy)
- WARDA: West African Rice Development Association (Ivory Coast and Benin)
- World Agroforestry Centre and ILRI (International Livestock Research Institute) (Kenya).
- ITC: International Trypanotolerance Centre (Gambia).

Building awereness

Via publications and other sensitisation activities (e.g. conference on Climate and development cooperation in 2008), the Belgian development cooperation contributes to the public's awareness of the problem of climate change. The goal is to increase the participation of researchers and policy makers in the southern hemisphere in the debate on climate change by supporting their participation in international conferences.

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7. Financial resources and technology transfer

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7.1. Legislative and institutional framework of development cooperation policies and programmes

The Law of 25 May 1999 on international cooperation is the reference for Belgium's development cooperation policy. The most important goal is sustainable human development, to be achieved by combating poverty on the basis of partnership and in compliance with the criteria of relevance to development, as defined by the Development Assistance Committee of the Organisation for Economic Cooperation and Development (OECD-DAC). The law introduced the principle of geographical and sectoral concentration of aid.

In implementation of the federal government coalition agreement of 2003, Belgium's direct bilateral ODA targets 18 countries, 13 of which are located in Africa. Ten of these countries belong to the group of Least Developed Countries (LDCs). Five sectors are given priority: i) basic health care; ii) education and training; iii) agriculture and food security; iv) basic infrastructure; and v) conflict prevention and the consolidation of society. On top of these priorities four cross-sector themes relate to gender, environment, children's rights and welfare economics. In addition, the commitment made in Monterrey to increase Belgium's Official Development Assistance (ODA) to 0.7% of gross national income (GNI) by 2010 was confirmed by law in 2002. The promotion to ministerial rank in 2003 of the member of the government responsible for development cooperation is indicative of the importance the latter has acquired in government policy.

In November 2008 the Minister for Development Cooperation confirmed in a memorandum that Belgium would fully support the goals of the international community to realise the Millennium Development Goals (MDGs), with a catch-up action for Africa and special attention to fragile states. One of the priorities is the fight against climate change, with a focus on adaptation to climate change of the LDCs.

The Belgian parliament monitors cooperation policy, and helps to shape policy through its legislative function. Following the 1999 reform of the federal administration, Belgium consolidated new institutional structures and took measures to adapt these to the new international context

of development cooperation. As a result of this reform, in 2003 development cooperation was incorporated into the Federal Public Service Foreign Affairs, Foreign Trade and Development Cooperation (FPS FA) as the Directorate General for Development Cooperation (DGDC). Development cooperation is primarily the responsibility of the federal government at present.

However, the principle of transferring certain aspects of development cooperation to the federated entities (Regions and Communities), on the basis of responsibilities allocated to these entities internally, is embodied in the special Law of 13 July 2001 transferring various competencies to the federated entities, and was confirmed in a government statement of July 2003. This implies increasing the share of the budgets allocated to the regions and communities, keeping the overall budget target of 0.7%. This process is still under discussion. The priorities remain the development of synergy between federal and federated entities, which can carry out development cooperation activities based on their own competencies, as well as overall policy coherence.

Moreover, the bodies involved in indirect cooperation, particularly non-governmental organisations (NGOs) and universities, also play an important role in terms of specific types of development, supplying information to the public and raising awareness. They receive substantial support from the DGDC.

7.2. Belgian Official Development Assistance

The Belgian promise to meet the standards for development cooperation of the United Nations by 2010 was made in 2000. This standard determines that industrial nations must spend 0.7 % of their gross national product (GNP) on development cooperation.

Following the example of leading donor nations, Belgium decided to go further than the other EU member states, who set 2015 as a target date for this goal. A growth path was incorporated into legislation in 2002 and Belgium intends to reach the 0.7 % by 2010.

In 2008 the growth path needed to be adjusted, after official development aid in the years 2006 – 2007 decreased to just 0.43 % of the GNP, which is the same percentage as in 2002 when the growth path was incorporated into legislation. Whilst drawing up the budget for 2008, the government estimated a total ODA effort of 0.5 %. In contrast to 2006 and 2007, when the actual spending was only approximately 90 % of the approved budget, the budget for 2008 will be completely spent. Despite this, the target figure of 0.5 % for 2008 will not be achieved. The DGDC budget represents 60 % of the total Official Belgian Development Aid effort, with the other 40 % coming from other government departments and boards.

In a difficult economic context, the government decided in its budget for 2009 to maintain its promise to spend 0.7 % of the gross national product on development cooperation. In line with the agreed growth path, the government will already realise 0.6 % in 2009. This translates to an increase of 252 million EUR for the development cooperation budget in 2009, which is an increase in the budget of 23 % compared to 2008. This increase is in addition to the increase already realised in the 2008 budget and means a total increase of 42 % compared to the 2007 budget and an increase of 57 % compared to the realisations in 2007.

The Federal Public Service for Finance also plays a key role, managing country-to-country loans and contributions to international organisations, i.e. 10% of ODA. In addition to DGDC, other directorates-general of the FPS Foreign Affairs play an important role, since the Foreign Ministry is in charge of conflict prevention and part of humanitarian aid (i.e. 5% of the ODA budget). Measures are also taken by the regions and communities, the provinces and a large number of municipalities (5% of ODA), and depending on the year of debt relief, a variable share is managed by the National Delcredere Office (Belgian's leading overseas export credit insurer).

Belgium uses the Rio markers to report to the OECD-DAC about the official development aid that has been spent on activities to support the goals of the United Nations treaties on biodiversity, climate change and desertification (respectively UNCBD, UNFCCC and UNCCD). However, the climate marker reflects only activities aimed at mitigation (renewable energy, reforestation, energy efficiency,…).

Belgium is cooperating in the statistical working group of OECD DAC ENVIRONET (network for environmental experts) to develop an adaptation marker, to enable better reporting on the efforts to support developing countries in the adaptation to climate change (see chapter 6).

For the fifth communication to UNFCCC, the data for the calculations on expenditure concerning climate change were obtained from the ODA databank of DGDC. A sectoral analysis was performed, in which the following sectors were evaluated in their totality: environmental protection, water supply and sewage, agriculture and stock farming, forestry, energy and fishery/aquaculture.

Other sectors were partially included: humanitarian aid (sub sectors: coordination, prevention and reconstruction), industry (sub sectors: administration, research, agricultural industry, forestry industry) and multi-sectorial (sub sectors: general, alternative development, research, urban development, education and rural development). A weighing factor was applied to each sub

Table 7.1 Climate-related ODA for the period 2005-2008

	2005	%CC	2006	%CC	2007	%CC	2008	%CC	2005-2008	%CC
Environmental protection (total)	**15,767,077**		**17,173,756**		**21,602,958**		**23,995,853**		**78,539,643**	
Adaptation	2,167,219	14%	2,301,307	13%	3,041,510	14%	3,563,196	15%	11,073,232	14%
Mitigation	833,933	5%	1,411,717	8%	837,256	4%	1,672,033	7%	4,754,939	6%
Adaptation/mitigation	2,732,918	17%	2,801,474	16%	3,712,155	17%	3,709,595	15%	12,956,142	16%
Climate-related	5,734,070	36%	6,514,497	38%	7,590,921	35%	8,944,824	37%	28,784,312	37%
Water supply and sewage (total)	**29,581,054**		**42,327,401**		**34,893,415**		**34,140,481**		**140,942,352**	
Adaptation	3,644,726	12%	2,863,655	7%	2,674,894	8%	7,011,537	21%	16,194,812	11%
Mitigation	12,193,710	41%	19,549,764	46%	15,864,680	45%	12,738,392	37%	60,346,545	43%
Climate-related	15,838,435	54%	22,413,419	53%	18,539,574	53%	19,749,929	58%	76,541,357	54%
Agriculture and stock farming (total)	**45,457,504**		**55,086,796**		**51,688,931**		**62,732,492**		**214,965,723**	
Adaptation	4,950,845	11%	6,347,269	12%	4,561,017	9%	8,410,812	13%	24,269,943	11%
Mitigation	3,169,371	7%	3,663,383	7%	3,753,010	7%	4,710,083	8%	15,295,848	7%
Climate-related	8,120,216	18%	10,010,652	18%	8,314,027	16%	13,120,895	21%	39,565,791	18%
Forestry (total)	**744,412**		**2,335,860**		**3,467,881**		**3,661,068**		**10,209,222**	
Adaptation	685,678	92%	2,140,817	92%	3,263,520	94%	3,321,799	91%	9,411,814	92%
Mitigation	58,735	8%	195,043	8%	204,361	6%	339,269	9%	797,408	8%
Climate-related	744,412	100%	2,335,860	100%	3,467,881	100%	3,661,068	100%	10,209,222	100%
Energy (total)	**4,046,137**		**2,169,835**		**3,097,568**		**4,985,601**		**14,299,141**	
Adaptation	177,955	4%	16,085	1%	15,000	0%	42,000	1%	251,040	2%
Mitigation	1,694,721	42%	989,170	46%	1,826,823	59%	3,731,474	75%	8,242,187	58%
Climate-related	1,872,675	46%	1,005,255	46%	1,841,823	59%	3,773,474	76%	8,493,226	59%

	2005	%CC	2006	%CC	2007	%CC	2008	%CC	2005-2008	%CC
Humanitarian aid – emergency relief (total)	**7,370,877**		**30,938,320**		**27,356,851**		**37,671,742**		**103,337,790**	
Adaptation	737,088	10%	3,043,824	10%	2,720,094	10%	3,752,866	10%	10,253,872	10%
Mitigation	0	0%	0	0%	0	0%	0	0%	0	0%
Climate-related	737,088	10%	3,043,824	10%	2,720,094	10%	3,752,866	10%	10,253,872	10%
Industy (total)	**3,787,443**		**533,590**		**3,854,161**		**5,265,748**		**13,440,942**	
Adaptation	397,438	10%	104,530	20%	461,167	12%	718,221	14%	1,681,356	13%
Mitigation	43,507	1%	41,465	8%	10,753	0%	-16,926	0%	78,799	1%
Climate-related	440,945	12%	145,996	27%	471,920	12%	701,295	13%	1,760,155	13%
Multi-sectorial (total)	**165,739,601**		**179,539,179**		**196,538,971**		**209,558,412**		**751,376,163**	
Adaptation	16,055,709	10%	18,954,522	11%	19,428,103	10%	23,305,129	11%	77,743,463	10%
Mitigation	238,679	0%	2,009,467	1%	451,429	0%	3,357,390	2%	6,056,966	1%
Climate-related	16,294,388	10%	20,963,989	12%	19,879,532	10%	26,662,519	13%	83,800,428	11%
Fishing and aquaculture (Total)	**318,047**		**117,789**		**464,875**		**1,336,019**		**2,236,729**	
Adaptation	3,852	1%	0	0%	14,050	3%	31,055	2%	48,957	2%
Mitigation	4,820	2%	2,356	2%	3,677	1%	14,298	1%	25,152	1%
Climate-related	8,672	3%	2,356	2%	17,727	4%	45,353	3%	74,109	3%
Totaal	**272,812,153**		**330,222,526**		**342,965,611**		**383,347,415**		**1,329,347,705**	
Adaptation	28,820,509	11%	35,772,010	11%	36,179,355	11%	50,156,615	13%	150,928,489	11%
Mitigation	18,237,475	7%	27,862,365	8%	22,951,989	7%	26,546,013	7%	95,597,843	7%
Total Climate-related	**49,790,902**	**18%**	**66,435,848**	**20%**	**62,843,499**	**18%**	**80,412,224**	**21%**	**259,482,473**	**20%**

sector to estimate the contribution to the fight aigainst climate change, in accordance with the weighing factors used by the "Bonn Declaration"[48] for the Belgian contribution.

For each sub sector, it was also arbitrarily assumed that the projects within these sectors all aimed to achieve increased adaptation to climate change or increased mitigation of climate change. In addition, the subdivision was selected as bilateral (between Belgium or Communities/Regions and the partner country), indirect (NGOs, universities, research institutions…) and multilateral.

On the previous pages you will find a combined table (table 7.1) of the above-mentioned sectors, listing the total amount per sector (complete or partial), the estimated adaptation and mitigation components and the total climate-related part per sector; with the addition of the percentages of each subsection compared to the total of the relevant sector and this over the last four years (from 2005 to 2008). The figures for 2009 were not included in this report. Three double graphs for bilateral, indirect and multilateral, each for adaptation and mitigation, give an insight into the spending structure of the Belgian development cooperation as a whole for climate-related programmes and projects.

7.2.1. Financial contributions to multilateral institutions and programmes

From 2009, Belgium will resolutely opt for a rationalisation of the cooperation with multilateral organisations, in line with the Declaration of Paris and the principles of «Good multilateral donorship». In this context, Belgium will aim for maximum core funding of its multilateral partners from 2009 onwards and will limit earmarked contributions to programmes conducted by a multilateral partner organisation at a regional or country level at the request of the partner country.

Via the multilateral budget the DGDC finances a number of environment-related programmes that deal with climate change, biodiversity and actions to combat desertification (Rio Conventions). The main contributions to multilateral institutions and programmes are listed below.

GEF

The Global Environment Facility (GEF), established in 1991, helps developing countries fund projects and programmes that protect global environment. This international cooperation mechanism collects new and additional funds, which can be grants or soft loans to combat global deterioration of the environment. The breakdown of the GEF in the different areas of action is presented in Table 7.2.

In Belgium only DGDC contributes to GEF. During the negotiations for these funds for the period 2003-2006, Belgium pleaded for a significant increase in the GEF funds. Since 2003, the Belgian contribution has been substantially increased, to over 10 million EUR a year (Table 7.3). The negotiations about the composition of the means for the period 2006 – 2010, based on the "Overall Performance Study" (OPS-3) were completed in August 2006.

Even though GEF-4, at 3.10 billion US$, is the highest configuration to date, the U.S.A. has decreased its share by 26% and Japan by 31%. In order to save the budget, most of the other donors decided to increase their contribution, assisted by a favourable exchange rate compared to 4 years ago. Belgium was one of these donors, committing 46.18 million EUR for the period, to be paid in annual instalments of 11,545 million EUR and increasing its share from 1.55 % to 2.71%.

For the period 2004-2005, Belgium was again Council Member for its countries group. In 2006-2007, Belgium was an advisory member and became a Council Member again for two years in 2008. It is important that the GEF council members participate in the COPs of the treaties for which the GEF is the financial mechanism, in order to optimally facilitate the creation of guidelines towards the GEF.

[48] "Bonn Declaration" : during COP-7 (decision 7/CP.7) it was decided that the EU and its member states, together with Canada, Iceland, New Zealand, Norway and Switzerland would collectively provide 450 million US$ for climate change for the benefit of developing countries from 2005. This amount was due to be revised in 2008.

Table 7.2 Distribution of the GEF funds across the various activity domains

Year/mill. US$	1991-2007		2006-2007	
Biodiversity	2,444.27	33%	384.80	24%
Climate	2,413.15	33%	432.05	27%
International Waters	933.71	13%	126.28	8%
Ozone	182.73	2%	0.84	0%
POPs	215.34	3%	68.51	4%
Desertification	352.74	5%	259.31	16%
Intersectorial	819.86	11%	347.87	21%
Total	**7,361.80**	**100%**	**1,619.66**	**100%**

Table 7.3 Contribution from DGDC to GEF

GEF (x EUR)	2003	2004	2005	2006	2007	2008
Multilateral and European programmes (D4)	**10,495,000**	**10,495,000**	**10,495,000**	**10,495,004**	**11,545,000**	**11,545,000**
Obligatory contributions	10,495,000	10,495,000	10,495,000	10,495,004	11,545,000	11,545,000
Voluntary contributions	-	-	-	-	-	-
General means	-	-	-	-	-	-
Designated means	-	-	-	-	-	-
Special programmes (D2)	**-**	**-**	**-**	**-**	**-**	**-**
Total (D4 + D2)	**10,495,000**	**10,495,000**	**10,495,000**	**10,495,004**	**11,545,000**	**11,545,000**

Table 7.4 ODA contributions by Belgium to the international financial institutions (2004-2008 in million EUR – rounded figures)

	2004	2005	2006	2007	2008
Internat. Develop. Association (IDA)	74	148	74	74	171
Other contributions to World Bank	10	8	9	8	6
Regional & subreg. develop. contrib.	21	19	31	29	31
Multilateral debt cancellation			7	12	19
IMF	5				
TOTAAL IFIs	**110**	**175**	**121**	**123**	**237**

UNEP

The DGDC´s financial commitment to the UN Environment Programme for 2004-2008 amounts to 14.5 million EUR. The contributions are intended for three policy areas: maintenance and management of water quality, evaluation of the state of the environment and integration of sustainable environment into the national action plans to reduce poverty. From 2009, the Belgian contributions to UNEP will be destined for the general budget of the organisation and no longer for specific programmes and projects. This core financing is aimed at increasing the efficiency of the multilateral organisations and creating greater predictability of the assistance. UNEP is one of the 10 executive agencies of the GEF.

World Bank

The World Bank Group is a major partner of Belgian development cooperation, given the volume of Belgium's obligatory contribution, which in 2009 amounted to more than 98.4 million EUR. The DGDC also works closely with the World Bank on a voluntary basis.The World Bank is also one of the 10 executive agencies of the GEF.

It should be noted that the higher contributions in 2005 and 2008 can be explained by double payments made by Belgium in both years to catch up on arrears over the normal payment periods.

In keeping with the concentration policy, moreover, in 2004 it was decided to allocate the voluntary contributions to only three programmes focused on the Millennium Goals. Thus for the period 2004-2006, 6 million EUR were earmarked for the new phase of the 'Belgian Partnership for Poverty Reduction'. Through this World Bank programme, Belgium supports the preparation and implementation of poverty reduction plans in the six African partner countries: Mali, Niger, Mozambique, Rwanda, Burundi and DR Congo. Belgium also participates in the 'Clean Air Initiative' (CAI), part of the Sub-Saharan Africa Transport Policy Programme (SSATP), which concentrates on air pollution problems in urban regions in Africa (Cotonou and Ouagadougou). The Water and Sanitation Programme (WSP), more specifically the collaboration with the Regional Water Sanitation Group in East and Southern Africa, has also received support from the Belgian government. In 2004, all efforts under this programme were concentrated in DRC.

European Development Aid

European Development Aid (EDA) is governed by the Cotonou Agreements between 77 of the ACP (African, Caribbean and Pacific) countries and the European Council and EU in 2000. The financial arrangements are registered by the Protocol of the Ninth European Development Fund (EDF) for the period 2000-2007, in the amount of 13.5 billion EUR. The tenth European development fund that runs from 2008-2013 contains 22,682 billion EUR. 90% of these resources are used to combat poverty in LDCs. The main goal of EDA is economic sustainable development with a long term perspective, using the partners' Poverty Reduction Strategy Papers (PRSPs). The Belgian contributions to the EDF and to the European Development Bank (EBRD) are listed in table 7.5. It is currently not feasible to provide an analysis of the allocation of these amounts to environment issues. A specific effort for climate change (mitigation or adaptation) cannot be identified.

Multilateral Fund of the Montreal Protocol

Although ozone-depleting substances (ODS) make up a fair share of the greenhouse effect, the direct results of financial contributions to the Montreal Protocol Multilateral Fund on the mitigation of climate change are difficult to assess. Yet payments to the Montreal Protocol Multilateral Fund may be indicative of a country's commitment to international cooperation on sustainable development. The Belgian federal government's contributions to the current replenishment period of the Multilateral Fund amounted to 2.03 million EUR in 2003 and 1.7 million EUR in 2004. This amount will remain stable for the new replenishment period 2006-2008.

Special programme for Africa – IFAD

For the last few years the Belgian federal government has supported the Special Programme for Africa under the International Fund for Agricultural Development (IFAD). Field projects comprise rural development, water management, forestation and soil deterioration in those areas of sub-Saharan Africa that are especially vulnerable to climate change. These programmes, implemented by the Belgian Survival Fund (BSF), were reduced to 727,587 EUR in 2003 and 1,467,600 EUR in 2004. For the period 2005-2008 the contribution by BOF to IFAD was 25.4 million EUR.

Rio Conventions

The Belgian contributions to the core budget of the UN Convention to Combat Desertification (UNCCD) amounts to 70,000 EUR annually. The contribution to the core budget of the UN Convention on Biological Diversity and the Cartagena Protocol on Biosafety in the amount of 190,175 EUR in 2003 was divided in 2004 between the federal level (30% for DGCD) and the federated entities (70%). For the period 2005-2008 the DGDC contribution to UNCBD was 101,949 EUR and the contribution of the federated entities 251,311 EUR.

Table 7.5 Belgian ODA attributable contributions to the European institutions (2004-2008 in million EUR- Rounded figures)

	2004	2005	2006	2007	2008
EU budget (excl. EDF)	184	202	221	226	248
European Development Fund (EDF)	87	91	98	97	123
European Investment Bank (EIB)	6	13	7	10	10
Other contributions		1			
Total European Institutions	**276**	**307**	**326**	**333**	**381**

Belgium contributed 273,371 EUR to the core budget of the UN Framework Convention on Climate Change and the Kyoto Protocol in 2003. In 2004, the total amount of 212,234 EUR was divided between the federal level (30% for DGCD) and the regions and communities (70%).

For the period 2004-2008 DGDC contributed 238,788 EUR to the budget of the UNFCCC secretariat and 97,031 EUR to the Kyoto protocol. The total Belgian contribution was 477,228 EUR to the UNFCCC and 307,418 to the Kyoto-Protocol. In 2008 the Flemish government paid a voluntary contribution of 68,000 EUR to the Trust Fund for Supplementary Activities and the Trust Fund for Facilitating Participation of Parties.

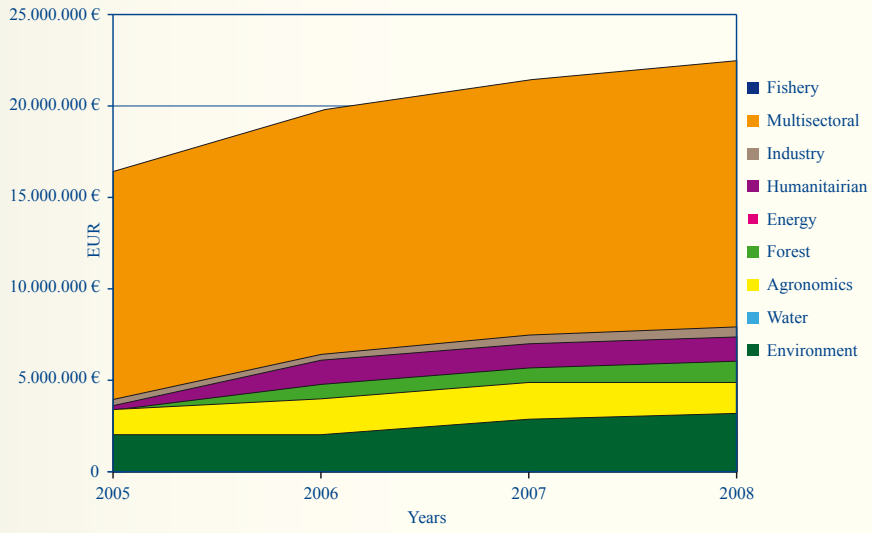
Other programmes

To a certain extent, other programmes not directly focused on climate change have benefits in term of mitigation or adaptation. Certain actions of the multilateral programme of the Food and Agriculture Organisation (FAO) contribute to mitigation: urban and pre-urban agriculture in RDC, Ivory Coast, Bolivia and Namibia; and participatory management of land use in Cambodia, Senegal, Niger and Burkina Faso.

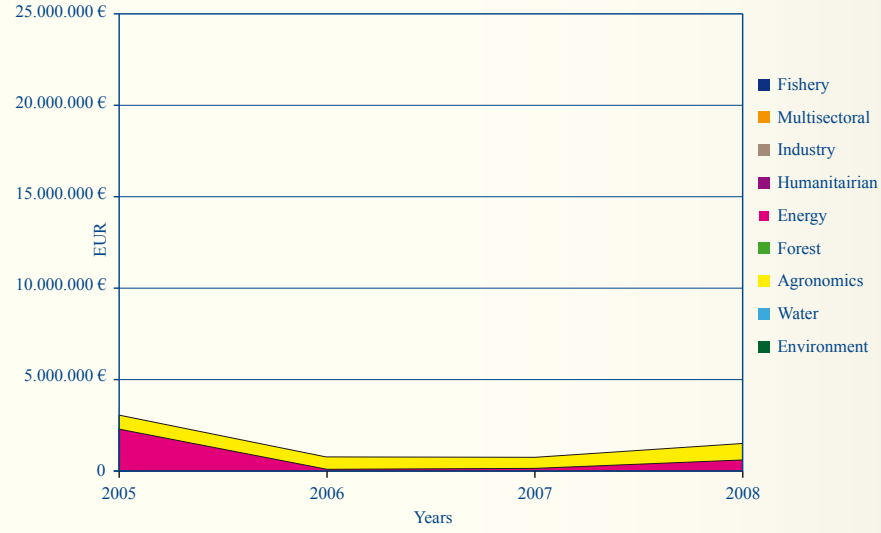
The UN Development Programme (UNDP), one of the 10 executive agencies of the GEF, is involved in a project for the rehabilitation of part of the electricity network in Iraq (ENRP).

Among the actions under the framework of the Consultative Group on International Agricultural Research (CGIAR), some are directly related to sustainable agriculture (see also chapter 6) and are aimed at adaptation to climate change. These include actions by the International Livestock Research Institute (ILRI) for the improvement of the management of grasslands, and the introduction of new agricultural products by the International Institute of Tropical Agriculture (IITA). Belgium gives more than 6 million EUR annually to the centres of the CGIAR.

MULTILATERAL Climate – oriented ADAPTATION



MULTILATERAL Climate – oriented MITIGATION



7.2.2. Belgian bilateral ODA

Belgian bilateral ODA is delivered through two channels. There is the direct bilateral cooperation (or government cooperation), which is made up of the different forms of aid managed at federal level or by regions / communities. There is also the indirect bilateral cooperation, which consists of the programmes co-financed by the DGDC, but prepared and implemented by so-called indirect players, mainly recognised NGOs, Belgian universities and scientific establishments and associations specialised in training human resources in the developing countries.

There are also special programmes relating to humanitarian aid and conflict prevention, as well as the Belgian Survival Fund (BSF). Indirect cooperation is steadily increasing and in 2008 it accounted for 193 million EUR. An increase to 244 million EUR is envisaged for 2009, which is 18% of Belgium's overall ODA. The geographical concentration of bilateral cooperation is increasing significantly: the three main recipients of bilateral aid (Congo DR, Rwanda and Burundi) accounted for an average of 51% of total bilateral aid in 2008. This figure demonstrates that LDCs and Central Africa are given clear priority.

The total ODA for the period 2005-2008 given via direct and indirect cooperation was approximately 1.6 billion EUR.

The main bilateral aid programmes related directly or indirectly to climate change issues are listed in table 7.6. These programmes or projects are to be found in the sectors of forestry, agriculture, fishery, water (supply and treatment of wastewater), energy, environmental protection, humanitarian aid, industry and integrated development. Approximately 584 million EUR was given to these sectors in 2005-2008 via the bilateral channels. All actions taken into account are Official Development Assistance (ODA) and have been reported by Belgium to the OECD-DAC (Development Assistance Committee). As a whole, in these sectors, 161 million EUR has been allocated for climate change via the bilateral cooperation for the period 2005-2008. Of these amounts, 45% concerned adaptation to climate change and 55% mitigation. Table 7.6 gives the complete overview of Belgium's efforts. These figures below relate to implementation of programmes/ project in the fields mentioned above. For figures on capacity building and technology transfer, see further.

Table 7.6 Belgian bilateral ODA (direct and indirect) for the sectors forestry, agriculture, fishery, water, energy, environmental protection, humanitarian assistance, industry and integrated development

	Total 2005-2008 (EUR)	Climate-related (EUR)	Mitigation (EUR)	Adaptation (EUR)
Direct	348,347,953	115,603,236	70,965,222	44,638,015
Indirect	235,558,321	45,178,859	18,506,434	26,672,425
Total bilateral	583,906,274	160,782,095	89,471,656	71,310,440

Forestry

In the period 2005-2008 almost 7.5 million EUR was invested in forestry and these funds were obtained from bilateral sources. This was spent mainly on activities for sustainable forest management in Bolivia, Peru and Congo DR (via delegated cooperation with the World Bank).

Agriculture and fishery

In the period 2005-2008 a total of 48.7 million EUR was spent on tangible initiatives in agriculture via direct bilateral cooperation. Approximately 21 % of the activities can be considered climate-related. NGOs, universities and specialised institutions play an important role at the level of sustainable agriculture. More than 100 million EUR was invested via indirect cooperation in developing the agricultural sector, of which we consider approximately 19 % as climate-related.

In the fishery sector (fishing and aquaculture) 1.7 million EUR was spent via direct bilateral cooperation in the period 2005-2008 and 292,213 EUR via indirect cooperation. Of this, we consider 3 % as climate-related.

Water

On the whole Belgium spent 118.7 million EUR on water supply and treatment in 2005-2008 via direct bilateral cooperation and 16.8 million EUR via indirect cooperation. The management of water systems took up some 4 % of all efforts over the period 2005-2008 and can be counted 50% as adaptation to climate change. Most projects and programmes in this sector consisted of the following activities: the protection of rivers, water basins and resources, the production of drinking water, and the construction of water supply and treatment plants. We consider just over half of the 74 million EUR of the Belgian bilateral efforts in the water sector as climate related.

Energy

The amounts delivered by Belgium in the energy sector for the period 2005-2008 were 13.9 million EUR via the bilateral cooperation. More than half of the resources were allocated to energy transmission and the rehabilitation of existing networks. These efforts are counted 50% for miti-

gation of climate change. Efforts in non-renewable energy and nuclear energy are counted 20% for mitigation, whereas wind and solar energy have been taken fully into account for mitigation. In Rwanda, an important activity can be reported for the recovery of mini water power plants as a function of rural development. Activities are also being planned to harness the benefits of solar energy. A study is currently being conducted into the possibilities of wind energy in Rwanda.

Environment

During the examined period, Belgium spent 78 million EUR on activities in the sector environmental protection. The greatest portion of this was destined for multilateral organisations.

In 2005-2008 Belgium made 5.8 million EUR available for environmental programmes via direct bilateral cooperation and 4.4 million EUR for indirect cooperation.

Most projects/programmes concerning biodiversity also contain a climate change component and are counted 50 % for mitigation. Only 1 % of all projects are 100 % focused on mitigation to climate change. In the area of land use and soil deterioration, 75 % of the projects can be considered as being related to mitigation to climate change.

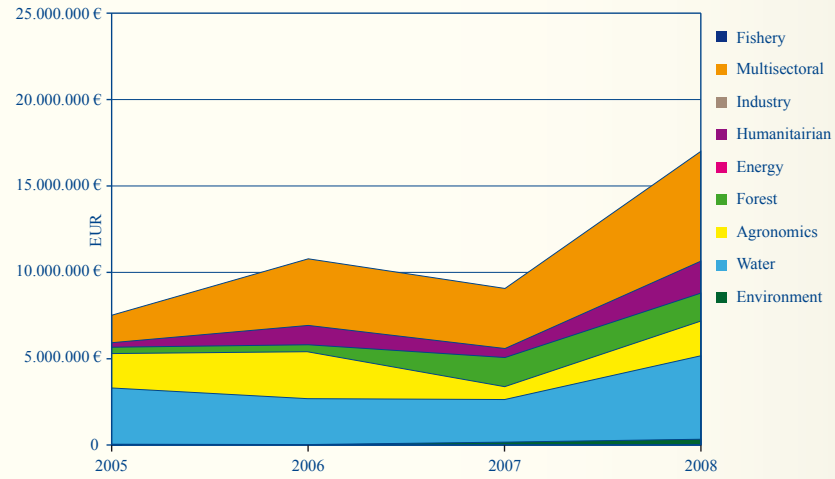
Industry

Projects and programmes worth 5.5 million EUR were realised in the period 2005-2008 in the industry sector via bilateral cooperation, mainly via the indirect route. The following activities were taken into account: activities in the wood processing industry, projects and programmes in the agro-industry, policy activities and investments in research for industrial applications. We consider approximately 12 % as climate-related.

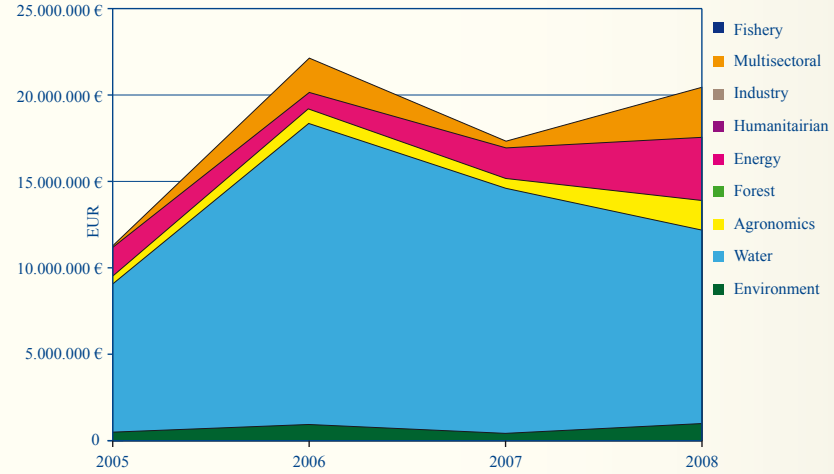
Multisectorial

This group of projects and programmes cover several sectors and aim for an integrated approach from, for example, rural development, urban development and education and formation. Approximately 200 million EUR was invested via the bilateral channels in this method of cooperation in the period 2005-2008, of which 30 million EUR was climate-related. These climate-related activities are primarily targeted at adaptation.

BILATERAL Climate – oriented ADAPTATION



BILATERAL Climate – oriented MITIGATION



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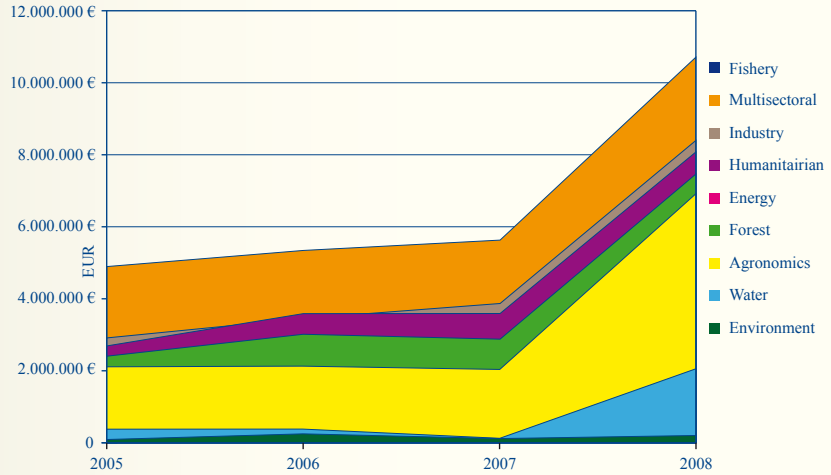

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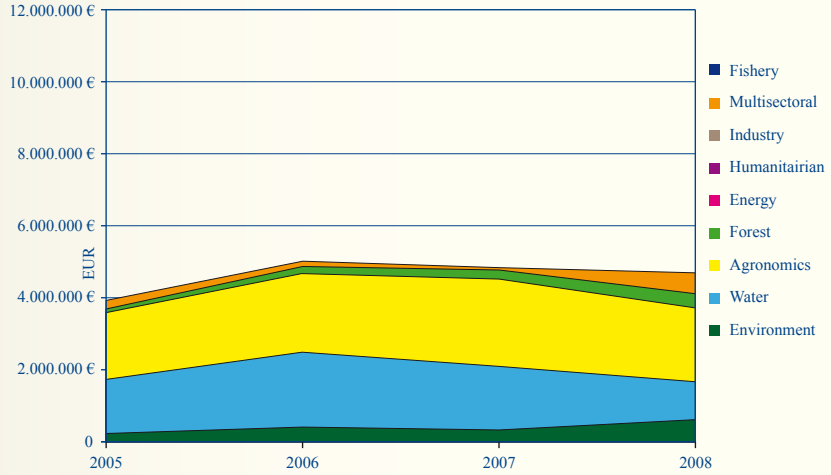

7.2.3. Flemish development cooperation

In the legislature 2004-2009, the budget for Flemish development cooperation increased by 70 percent. The ODA increased by 50 percent (from 28.9 million in 2004 to 43.4 million EUR in 2008).

The bilateral development cooperation is concentrated in southern Africa, more specifically the countries South Africa, Mozambique and Malawi.

The efforts of the Flemish development cooperation for climate change focus on sustainable water management and water supply, forestry, agriculture and management of natural resources.

Water

Projects concerning water management and management of natural resources in developing countries are financed within the UNESCO International Hydrological Programme (IHP). For the period 2006-2010 this involved a contribution of 3,522,330 USD, equivalent to 42.2 % of the total funds for the IHP.

Since 2003 there has been a large-scale water and sanitation programme in the district of Sekhukhune in South Africa.

The Flemish Partnership Water for Development was launched on World Water Day 2004 and is a cooperation by Flemish NGOs, companies, (educational) institutions and the Flemish government. Flanders has committed to providing water and/or sanitation for an equal number of people in developing countries as there are inhabitants in Flanders by 2015. The Partnership intends to achieve this goal via the implementation of projects in developing countries, the expansion of the support base, study work, the bundling of knowledge and expertise, the mobilisation and the increase of the financial means and the optimal application of knowledge and means.

Forestry

In 2002 the Flemish Government set up a Flemish fund for the conservation of the Tropical Forest. This was set up as implementation of international engagements on biodiversity and sustainable forestry. The projects supported by the Flemish Tropical Forest Fund are small-scale projects that are anchored by the local population. The projects aim to protect the biodiversity in nature parks and tropical forests, the fight against illegal logging, the promotion of sustainable logging to bring certified wood to our markets, the promotion of ecotourism and support of reforestation of degraded areas and agroforestry.

In 2006 the operation of the Flemish Tropical Forest Fund was evaluated. The action of the Flemish Tropical Forest Fund will in future better meet the challenge of climate change. The Fund wants to invest more in forestation and reforestation projects in the context of the Kyoto protocol

and simultaneously strive to ensure that such projects make a real contribution to maintenance of biodiversity and the social development of the population groups that are involved.

Integration in the Flemish policy for development cooperation

In Malawi and South Africa the Flemish development cooperation is thematically concentrated on agriculture and food security. The results of the development projects are affected directly by the far-reaching impact of climate change on agriculture (the dwindling availability of irrigation water, the decrease in fertile soil, the shorter growing season,…). In de strategy note with Malawi (2009-2013), climate change was included as a transversal theme within the cooperation. In the strategy note with Mozambique (2006-2010), 'sustainable development' was included as a transversal theme.

7.2.4. Walloon government

During the Ministerial Conference of French-speakers (CMF) held in Antananarivo on 22 and 23 November 2005, the Walloon Region assumed the commitment to involve itself in carrying out assignments during the four year period 2006-1009 relating to diversity, support, training and research, as well as in development of cooperation for the promotion of sustainable development and solidarity.

This translates into, among other things, a support of 765,000 EUR to the "institute for energy and environment of the francophonie" (IEPF). The IEPF programme includes:

- Support for the development of national strategies for sustainable development in developing countries
- Formation of experts in the maintenance of natural resources
- Support for developing countries belonging to the francophonie, to prepare for climate negotiations.

In addition, the Walloon government supports the following via bilateral cooperation:

- Research in Bolivia (La Paz region) into the effects of climate change on glaciers and implications for the policy on water for drinking water and energy supply.
- Research on climate change and the effect of people on climate change in Patagonia (Chile)
- Research on the fuel Bioterre as an alternative to charcoal in Senegal. This research started in 2004 and will be supported until 2011.

7.3. Activities related to technology transfer and capacity building

The DGDC as well as the federated entities have always included the aspects of technology transfer and capacity building in their bilateral agreements. The transfer of environmentally sound technology should allow rapid growth by the developing countries while safeguarding the general environment and natural resources. Capacity building serves the same purpose, as it prepares the individual countries for dealing with the wide array of international agreements, national plans, technology evolution, etc. Multilateral and indirect actors conduct most activities in the field of capacity building and technology transfer. Although precise estimates of the share of the programmes and projects related to climate change are difficult to make, the following is an overview of the efforts dedicated to capacity building and technology transfer, based on the same methodology as that used for the bilateral analysis.

7.3.1. Forestry

In 2005-2008 the activities in the area of capacity building (CB) were mainly cofinanced and executed by the non-governmental organisations. For example, the association ADGembloux, which supports an education centre for rural development and forest management in Senegal.

7.3.2. Agriculture

Belgium spent 7.5 million EUR on capacity building and information on agriculture in the period 2005-2008. In addition, considerable expenditure was made for agricultural research, 26 million EUR, spent mainly on the Advisory Group for International Agricultural Research (CGIAR). The Vlaamse Interuniversitaire Raad (VLIR) and the Conseil Interuniversitaire de la Communauté française (CIUF), with their annual scholarships for foreign students, contribute to a range of programmes. Sustainable agriculture and land management are important issues in these programmes and contribute to CB in climate change. It is estimated that 25 % of the research programmes and 15 % of the CB programmes include a climate change component.

7.3.3. Water

Relatively limited amounts are earmarked for CB and TT in water management: 2.5 million EUR for the period 2005-2008. These efforts are divided equally among bilateral, indirect and regional co-

operation (10%). For example, the Water Users Association Support Programme in Kenya that facilitates water management. Belgium does not support specific water research programmes, but does invest in broader research programmes on water. Examples are the contribution of DGDC towards water projects of the VLIR and the Flemish contribution to the Science Trust Fund of the UNESCO with water as its first priority. Half the other projects are related to CB in integrated water management.

7.3.4. Energy

In the period 2005-2008 Belgium did not invest in specific activities for formation concerning energy. In 2004 a research programme on solar energy in Morocco was supported (via CIUF, 74000 EUR).

7.3.5. Environment

Limited contributions are made to CB and TT in programmes exclusively aimed at formation concerning environmental protection. These are small-scale projects for a total of 290,000 EUR in 2005-2008. An example is the conference on desertification in 2008 and the conference "Climate and development cooperation", organised by the minister for development cooperation.

7.3.6. Cooperation with universities and scientific institutions

The institutional support to the Abomey Calavi University in Benin and the University of Kinshasa in Congo DR and to the specialised training at the Hassan II Ain Chock University in Morocco has a direct link to mitigation. These are education programmes concerning renewable energy and bio-fuels.

In addition, DGDC supports universities in Morocco, Ethiopia and Congo DR via CIUF and VLIR, who offer education programmes concerning management of natural resources, water management and land degradation and forest management. These activities are more closely related to the domain of adaptation to climate change.

There are also various initiatives for the study and tracking of the impact of climate change.

There is a subsidy for the Royal institute of sciences. This institution is responsible for the scientific management and the secretariat of the "national Belgian focal point for the biodiversity treaty". It is setting up a programme for capacity building in our partner countries with the following goals:

- promoting the study of biodiversity
- data processing concerning biodiversity, including monitoring the impact of climate change. ■

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Sustainable agriculture is an essential part of the project of VLIR-KUL, preventing erosion and water pollution in the Uluguru mountains in Tanzania

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8. Research and systematic observation

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Observation Department

8.1. General policy

Science, technology, and innovation (STI) are policy areas under the authority of all the Belgian federated and federal entities. For technology and innovation, the competent authorities are principally the Regions, responsible for economically oriented research, technological development, and the promotion of innovation in a broad sense. The regions also support research related to their specific (regional) areas of competence. The Communities are competent for basic research, mainly carried out in universities. They are in charge of applied research performed in institutes of higher education and for research related to their specific (community) areas of competence.

The federal government is responsible for scientific activities linked to its own domains of competence, i.e. scientific research in a few particular areas (Antarctica, space, and nuclear research), and develops STI activities of national and international interest, in agreement with the communities and regions. In addition, Public Research Organisations (PROs) are under the authority of the Regions, while both the Communities and the Federal Government are competent for a number of scientific institutes.

Cooperation and consultation underpinning the formulation of EU-related decisions and opinions is organised at the federal and international levels through a body called CFS-CIS, which includes the Commission of International Cooperation and the Commission of Federal Cooperation and comprises representatives of the federal government, the Communities, and the Regions. Decisions are made inside the CFS-CIS by consensus of all parties. The Inter-Ministerial Conference on Science Policy (CIMPS-IMCWB) is the highest level of cooperation, with ministerial representatives of the federal and federated entities.

Autonomously or in mutual collaboration, the different federated and federal entities manage research infrastructures, research dissemination structures, and collaboration at different levels. As a result, the Belgian science and innovation system is rather a blend of three major systems interacting to some extent in a number of areas, yet functioning independently within the Belgian context.

The different academies such as the Académie royale des Sciences, des Lettres et des Beaux-Arts de Belgique, the Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten, and the Belgian Academy of Medicine are mainly structures of support and dissemination of information on research subsidised by the different federated and federal entities.

Climate research policies exist at each governance level, and climate research activities are conducted mainly in universities and research institutes.

8.1.1. Federal Government

Belgian Federal Science Policy Office

At the federal level, the Council of Ministers of the federal government is the executive body responsible for STI policy. The administrative structure in charge of funding and implementing federal science policy is the Belgian Federal Science Policy Office,(www.belspo.be), placed under the authority of the Minister in charge of scientific research. The Belgian Federal Science Policy Office prepares and implements actions for which the federal government is responsible. This involves funding and managing research programmes, infrastructures, and activities. Federal research programmes and activities are developed autonomously by the federal authority or in the framework of co-operation agreements with the Regions or Communities. Essential tasks of the Belgian Federal Science Policy Office are to implement and coordinate scientific, technical, and earth observation activities requiring a multi-annual and often interdisciplinary approach. The Belgian Federal Science Policy Office administers the Belgian "space" budget for national and international space programmes.

Federal Scientific institutions

Ten Federal Scientific Institutions are placed under the supervision of the Federal Science Policy Office, which supports them in their administrative, financial, and material management and in coordinating and developing their research and scientific public service activities. Some of these Federal Scientific Institutions carry out climate research, develop and maintain climate-relevant collections, or are involved in climate observations.

Other federal departments administering substantial research budgets are Economic Affairs, National Defence, Social Affairs, Public Health and Environment, Justice, and Development and Cooperation, each in its specific domain.

Research infrastructures

Several research infrastructures used in climate research, such as the Belgica, a ship dedicated to marine research, and the Belgian 'zero emission' Princess Elisabeth Station, located on the Utsteinen Nunatak in Dronning Maud Land (East Antarctica), are (co)funded by the Federal Science Policy Office.

Through space programmes (co)funded by the Federal Science Policy Office, several space infrastructures such as instruments, satellites, and ground segments are or will be at the disposal of researchers. Through the strong participation of Belgium in ESA and EUMETSAT, researchers can also use data from operational and scientific satellite missions such as METEOSAT, MSG, MTG, METOP, ENVISAT, ERS, EARTH EXPLORERS, SENTINELS, etc.

Research dissemination and support structures

The Scientific and Technical Information Service (STIS), fully integrated into the Belgian Federal Science Policy Office, is an information intermediary serving both the scientific community and the for-profit and non-profit sectors. This notably includes the public authorities, but also students, teachers, self-employed workers, and private persons. The STIS manages the 'Belgian Portal for Research and Innovation' (www.research.be), where one can find abundant information on research, including climate research.

Within the programme Science for Sustainable Development, follow-up committees composed of local stakeholders (including decision-makers) and end-users have been set up for each project network. The goal is to enhance interactions between research and policy.

Scientific platforms managed by the Belgian Federal Science Policy Office, such as the Belgian Polar Platform and the Biodiversity Platform, inform scientists, policymakers, and the general public on related research topics and policy-relevant issues.

All research project reports, including those on climate, can be found at the Belgian Federal Science Policy Office website.

8.1.2. Walloon Region

In the Walloon Region, the Walloon Minister of Research and New Technologies is responsible for STI policy. He administers the most significant component of regional STI policy, namely research with technological implications. Other ministers are also empowered to fund research activities in their respective areas of competence. They are completely autonomous in developing these activities. The administrative body in charge of preparing and implementing policy is the Operational Directorate General for the Economy, Employment, and Research (DGO6). Within its departments "Competitiveness and Innovation", "Technological Development", and "Research Programmes", this administration develops projects and manages programmes and funds in support of R&D and technological innovation in companies, research centres, and universities of the region.

Other administrative directorates of the Ministry of the Walloon Region manage more limited budgets and actions in support of STI activities in their own areas of competence: natural resources and the environment, social programmes and health, town and country planning, equipment and transport, sustainable energy and building...

For more information about:

- Research in the Walloon Region, see the website : http://recherche-technologie.wallonie.be
- Environment in the Walloon Region, see the Website: www.environnement-wallonie.be
- Energy in the Walloon Region, see the Website: www.energie-wallonie.be

8.1.3. French community

In the French Community, the Minister of Higher Education and Scientific Research has primary responsibility for STI policy in this federated entity. Other ministers of the government of the Community are responsible for a limited portfolio of programmes within their own areas of competence. The administrative body in charge of preparing and implementing science policy is the Directorate General for Non-Compulsory Education and Scientific Research of the Ministry of the French Community (DGENORS).

Responsibilities of this administration include funding universities and institutes of higher education, promoting basic research (FNRS), developing Concerted Research Actions (ARCs), and training in industrial and agricultural research (FRIA). In practice, the National Fund for Scientific Research (Fonds National de la Recherche Scientifique, F.N.R.S.) is the main research funding and management body. It funds non-oriented basic research in a bottom-up way. Research topics are classified by research discipline and not thematically. Climate research is hosted mainly under the headings 'Earth Sciences' and 'Exact Sciences'. The Fonds pour la Formation à la Recherche dans l'Industrie et l'Agriculture (FRIA, the Fund for Research Training in Industry and Agriculture) is hosted by the FNRS and delivers research grants for more applied topics. Other associated funding bodies are: IISN - Institut interuniversitaire des Sciences nucléaires, FRSM - Fonds de la Recherche Scientifique Médicale, FRFC - Fonds de la Recherche fondamentale collective à l'Initiative des Chercheurs. The FNRS of the French Community of Belgium has a scientific cooperation agreement with the Fonds National de la Recherche (F.N.R.) of Luxembourg.

The ARC (Concerted Research Action) scheme constitutes an important scientific policy instrument overseen by the Minister and the academic authorities. The aim is to develop excellence centres of research on various topics.

The French Community, through the Commissariat général aux relations internationales (CGRI) and the Direction générale des Relations extérieures (DRI), has scientific cooperation agreements with Bulgaria, France, Italy, Slovakia, Romania, and Poland and provides funds to facilitate exchanges with researchers in these countries.

8.1.4. Flemish government (region and community)

Flemish science and innovation policy

From July 2004 until June 2009 a single minister, the Flemish Minister in charge of the Economy, Science, Innovation, Foreign Trade, and Entrepreneurship, was responsible for Flemish science and innovation policy. Over this legislation period, universities and institutes of higher education were under the authority of the Flemish Minister for Education and Labour.

Research funding for universities is provided on a direct and non-competitive basis (¼ is used for R&D purposes), via the Department of Education and Training, as well as on a competitive basis. In the latter case, the main funding sources are the Fonds voor Wetenschappelijk Onderzoek - Vlaanderen (FWO, Fund for Scientific Research - Flanders), the Bijzonder Onderzoeksfonds (BOF, Special Research Fund), and two instruments at the IWT: doctoral fellowships at the academic level and the SBO programme (Strategisch Basisonderzoek, Strategic Basic Research), whose purpose is to support cutting-edge research projects carried out in Flemish universities and PROs.

Noteworthy are some specific policy instruments used to support research, such as Odysseus (a programme aiming to bring top Flemish researchers back from abroad and to attract top-notch foreign researchers), Methusalem (a programme awarding long-term and structural excellence funding ad personam, and through which scientific talent can be retained more effectively), Hercules (for large-scale investment in research infrastructures for both fundamental and strategic basic research).

Economy, Science and Innovation

Since 2006, the structure of the Flemish public authority has consisted of a department with several agencies devoted to different (sometimes new) policy areas. In the field of science and innovation, a new policy area has been created, namely "Economie, Wetenschap, en Innovatie" (EWI, Economy, Science, and Innovation). The role of the EWI is to prepare, monitor, and evaluate public policy in the areas of economic support (including entrepreneurship), science, and innovation. Its mission is to facilitate and support knowledge boosting and a positive economic climate in Flanders by stimulating scientific research and technological innovation. The EWI manages a range of different tasks and plays a coordinating role in its policy area. Several Flemish research centres carry out climate-relevant research: the VILT (Vlaams infocentrum land- en tuinbouw) for agriculture, the INBO (Instituut voor Natuur en bosonderzoek) for forestry, the ILVO (Instituut voor Landbouw en Visserij onderzoek) for fisheries and agriculture, and the VITO (Flemish Institute for Technological Research).

The agencies in charge of executing and implementing policy decisions are the IWT (Institute for the Promotion of Innovation by Science and Technology in Flanders), the FWO (Fund for Scientific Research, which allocates funds on a competitive basis), and the PMV (Flanders Holding Company). Additionally, the Hercules Foundation has been established to support large research infrastructures. The relevant advisory body is the Vlaamse Raad voor Wetenschapsbeleid (VRWB, the Flemish Science Policy Council). The EWI essentially applies a bottom-up approach: support is awarded to initiatives proposed by the actors themselves, and generally speaking, there exist few content-specific Flemish research programmes.

Thematic priorities

Although the Flemish science and innovation policy approach is bottom-up, there are also thematic priorities set by the government, among which are Energy Technology and Sustainable Technological Development. The main research actors in these areas are IWT-Flanders, which gives priority to Sustainable Technological Development Projects related notably to energy efficiency and renewable energy sources, the two Institutes for Strategic Research in the field of Energy, the Flemish Institute for Technological Research (VITO), and the Interuniversity Microelectronics Centre (IMEC).

In 2004 the Flemish Government set up an Environmental and Energy Technology Innovation Platform (named MIP) to boost innovation in environmental and energy technology and to stimulate technology valorisation. In 2008 the focus of the MIP was reoriented towards projects related to the sustainable use of energy and materials. As of 2009, the VITO hosts the MIP, which will receive a budget of about 8.6 million EUR for the period 2009-2010 (both feasibility studies and co-operation projects can be funded).

In February of this year, the Flemish Smart Grid Platform was established for multidisciplinary and cross-sectoral co-operation between all Flemish actors in the field of smart grids (companies, research institutes and groups).

Thematic research priorities are highlighted by the 'steunpunten' (thematic information and coordination points) developed by the 'Departement leefmilieu natuur en energie' (the Flemish environmental administration). Climate topics are taken into account at the Sustainable Development 'steunpunt'.

8.1.5. Brussels-Capital Region

In the Brussels-Capital Region, scientific research depends on the Ministry for Research. Administratively, the "Brussels Institute for the Encouragement of Scientific Research and Innovation" (ISRIB), created by the decree of 26 June 2003, is responsible for funding scientific research and technological innovation in companies, universities, and institutes of higher education within the region. The ISRIB is also solely responsible for all matters concerning international cooperation and research: EU Framework Programmes for Research, Eureka, COST… Finally, the ISRIB has authorized the non-profit organisation "Research in Brussels (RIB)" to implement all the cooperation agreements signed by the region.

Other administrations, such as IBGE or AED, fund one-off studies directed rather towards defining and assessing their policies. The Brussels Enterprise Agency (ABE) helps companies evaluate, start up, and develop projects of an innovative nature or having a technological content.

8.1.6. German speaking Community

In the German-speaking Community, the Minister of Education and Scientific Research is responsible for scientific research issues. Funds for scientific research are used for doctoral and postdoctoral grants.

8.2. Research

Research activities in Belgium are carried out in universities, schools of higher education, research centres, (semi)-public centres for technological research, technology transfer, and innovation, and also sectoral joint research centres and spin-off companies.

Climate-change-related research conducted by these actors takes place either within federal or regional programmes or through participation in international research. These research activities are described below.

8.2.1. International co-operation

Climate-related research requires international collaboration. This is due notably to the trans-boundary nature and complexity of the climate system, which includes the dynamics, physics, and chemistry of the troposphere and atmosphere and their interactions, the role of the cryosphere and hydrosphere (including oceans), and the dynamics of eco- and geosystems and bio-geochemical cycles. It is also due to the trans-boundary nature of governance in this field, including mitigation and adaptation measures. This cooperation concerns diverse activities: observation and research, scientific assessment, and integration. Belgium plays an active part in these efforts.

Cooperation occurs through instruments allowing European-level coordination of nationally funded research: ERA-NETs (European networks of research funding and management offices) and COST' (an intergovernmental framework for European Research Cooperation). Several bilateral cooperation programmes running at diverse governance levels support both European and international bilateral cooperation.

Participation in international research programmes

Belgian scientists participate actively in international climate-related research programmes, among which are the following (this list is not exhaustive):

- the International Geosphere-Biosphere Programme (IGBP), in particular the core projects SOLAS (Surface-Ocean-Lower Atmosphere Study), PAGES (Past Global Changes), and IMBER (Integrated Marine Biogeochemistry and Ecosystem Research),
- the World Climate Research Programme (WCRP), notably Climate Variability and Predictability (CLIVAR and EUROCLIVAR), the Arctic Climate System Study (ACSYS), Climate and Cryosphere (CLiC), and Stratospheric Processes and their Role in Climate (SPARC)
- InterReg programmes
- the Energy Technology Systems Analysis Programme (ETSAP - IEA and OECD)
- the EU Seventh Framework Programme for Research and Technological Development (EU FP7): ice2sea, CARBO-Extreme, COMBINE, REDD-ALERT, EPOCA...)
- Intelligent Energy Europe (non technological research)
- the European Science Foundation's European Ice Sheet Modelling Initiative (EISMINT) and European Project for Ice Coring in Antarctica (EPICA)
- the ESSP (Earth System Science Partnership) Global Carbon Project

Belgium contributes substantially to international earth observation programmes such as those of GEO, ESA, EUMETSAT, ECMWF, GMES, etc. In this context, the Belgian Federal Science Policy Office is involved in developing and exploiting operational and scientific satellites.

In the framework of the creation of the European Research Area, Belgian funding agencies are participating in ERA-NETs, some of them relevant to climate research as detailed in later sections.

Belgium regularly participates in international highlights such as the International Polar Year 2007-2008 or the International Year of Planet Earth (UNESCO – 2007-2009).

Scientific integration and assessment

Belgium contributes to international efforts to develop scientific integration and assessment through the participation of Belgian experts in international expert panels and assessment and integration activities. Examples include the Intergovernmental Panel on Climate Change (IPCC), the World Meteorological Organisation (WMO), the Scientific Assessment Panel on Ozone Depletion, the European Ozone Research Coordination Unit (EORCU), and the European Funding Programmes.

The Belgian Federal Science Policy Office acts as an IPCC Focal Point, stimulating and funding scientists to participate actively in IPCC activities. It notably funds a technical-scientific team supporting the IPCC Vice-Chair, Prof Jean-Pascal van Ypersele.

8.2.2. Federal research programmes and activities

Implementation of actions within the scope of federal science policy is mainly the responsibility of the Belgian Science Policy Office. Climate Research managed by the Belgian Science Policy Office has mostly been integrated into the Scientific Support Plans for Sustainable Development SPSD 1 (1996-2000) and SPSD II (2000-2005). It is continued in the ongoing Science for Sustainable Development Programme (SSD, 2005-2009). A partnership agreement is in force between the federal and regional authorities for these programmes. The project selection procedure is based on calls for proposals, evaluation by foreign experts, and the strategic advice of a programme committee. Potential users of research results sit in user committees at the project level.

The ongoing SSD programme is briefly presented below. Detailed information can be obtained at www.belspo.be/ssd/.

The Science for Sustainable Development Programme (2005-2009)

The research programme 'Science for Sustainable Development' has a total budget of 65.4 million EUR for the period 2005-2009. Its priority research areas are: Energy, Transport, and Mobility, Agro-food, Health and Environment, Atmosphere, Climate, Terrestrial and Marine Ecosystems, and Biodiversity. Approximately 15 M EUR is dedicated to climate topics.

Climate research is subdivided into two main sections. The first, 'Understanding the climate system and atmospheric processes', is devoted to improving our understanding of atmospheric processes, interactions between them, and the evolution of the climate system. The second, 'Support for the preparation and evaluation of climate policy', is oriented towards providing multidisciplinary support to the preparation and evaluation of emissions reduction policy (including carbon capture and storage options) and of policy for adapting to climate change. A third section is open to research supporting the development of standards for monitoring and implementing climate and atmospheric policy. Different calls for proposals for two- to four-year projects are prepared by interdisciplinary networks of two to five teams with the possibility of one foreign team. Call 1 (mid-2005) concerned the research areas 'Climate' and 'Atmosphere' (including Antarctica). Call 2 (mid-2006) concerned biodiversity, mobility, energy, interactions between health and the environment and transport and the environment. Call 3 (mid-2007) is more focused on energy, including renewable energy and mitigation options. Call 4 (mid-2008) concerned the North Sea, including climate change. Call 5 (mid-2009) focuses on 'Climate mitigation by increasing household energy efficiency' and 'Evaluation of Belgian ecosystem services within the context of climate change'.

Antarctica, which makes a special contribution to the study of climate change, is one of the privileged research areas (see http://www.belspo.be/belspo/antar/index.htm for details).

Research on climate-related topics is also carried out in federal scientific institutions attached to the Belgian Science Policy Office, and notably: the Royal Belgian Institute of Natural Sciences, the Royal Meteorological Institute, the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium, and the Royal Museum for Central Africa.

The Climate change and health problems - database (2006-2010)

The AGORA Programme funds measures of scientific support to other departments and federal parastatal institutions, aiming to constitute, improve, and/or valorise their socio-economic databases. Within this programme, a database is produced to investigate relationships between climate change and public health (Collaboration between the Belgian Federal Science Policy Office and the Federal Public Service Health).

Remote sensing research programmes and activities

STEREO II (2006-2013): The aim of the STEREO II programme (Support to Exploitation and Research in Earth Observation) is to develop, as a contribution to a knowledge economy, autonomous Belgian expertise in earth observation meeting international standards. The budget is 25.8 M EUR. The programme's thematic research priorities are directly or indirectly related to climate: global monitoring of vegetation and changes in large terrestrial ecosystems, environmental management (water, soil, forests, agriculture, coastal areas, urban areas, and suburban areas), health and humanitarian aid, security and risk management. This program is the follow-up of 5 other research programmes that have increased Belgian expertise in earth observation for over 20 years.

Scientific support for the exploitation of the VEGETATION instrument (2001-2005) this programme was launched in parallel with Belgium's participation in the development of the VEGETATION instrument aboard the SPOT 4 and SPOT 5 satellites. It is intended both for basic research and for (pre-) operational developments in the area of 'monitoring vegetation and related parameters on the global and regional scales'. The total budget for this programme is 300,000 EUR, of which 200,000 EUR has been earmarked for research (see http://telsat.belspo.be/ for details). The VEGETATION-2 instrument is set to remain operational until 2008 at the very least.

ESA – PRODEX: Belgium has supported since 1988 several climate-related projects within the PROgramme for the Development of Scientific EXperiments (PRODEX) of the European Space Agency (ESA). PRODEX funds projects addressing the development of new instruments for ESA satellites (or those of other space agencies), the calibration and validation of satellite data, their processing including the development of algorithms, the development of specific applications, and the general use of scientific instrument data.

ESA – EOEP: Belgium has participated since 1999 in ESA's voluntary Earth Observation Envelope Programme. Several of the scientific missions developed through this programme are relevant to climate studies, e.g. GOCE (observation of global ocean levels), ACE (Atmospheric Climate Explorer), CRYOSAT (measuring fluctuations in the thickness of ice), SMOS (observation of soil moisture and ocean salinity), ADM-Aeolus (measuring vertical wind profiles), SWARM (survey of the geomagnetic field and its temporal evolution), and EarthCARE (observation of earth clouds, aerosols, and radiation).

ESA – Earth Watch – Global Monitoring of Essential Climate Variables: Belgium contributes to ESA's "Global Monitoring of Essential Climate Variables" programme. The objective is to contribute to the ECV databases by using long-term global earth observation archives established over the last thirty years. The work notably includes assessing trends in - and the consistency of - the ECV records and developing improved algorithms and data models.

EU – GMES: Since the very beginning of Global Monitoring for Environment and Security (GMES), Belgium has been participating in this European programme.

Starting with research projects, GMES is becoming a programme providing an increasing number of operational services. These services will certainly also contribute to research activities.

ECMWF - The European Centre for Medium-range Weather Forecasts (ECMWF) is an intergovernmental organisation specialised in medium-term (up to 10 days), monthly, seasonal, and multi-annual weather forecasts through the development of sophisticated atmospheric computer models in combination with observational data. ECMWF is also increasingly involved in monitoring and predicting atmospheric composition (greenhouse gases, aerosols, pollutants, etc.), in particular through its leadership in the GEMS and MACC projects in the framework of GMES. Belgium is a member of ECMWF and contributes annually around 1 million EUR.

International cooperation and capacity building

International cooperation on climate-related topics includes participation of the Belgian Science Policy Office in the CIRCLE ERA-NET aiming to align research agendas for adaptation to climate change and promoting the development of internationally managed nationally funded research. Other work on climate-related topics includes participation in the BiodiversA, Marinera, and EnvHealth ERA-NETs.

Through its Postdoc fellowships to non-EU researchers (Belgian Federal Science Policy Office), through grants for training and attending courses, and through research project funding (Federal Public Service of Foreign Affairs, Belgian Foreign Trade and Development Cooperation, the Directorate-General for Development Cooperation (DGDC)), Belgium contributes to capacity building (notably in climate-related areas) targeting researchers from developing countries.

Research programmes offer the opportunity to include a foreign team in a funded project to ensure internal capacity building and international data exchange.

In the framework of the bilateral cooperation activities managed by the Belgian Federal Science Policy Office, some projects also address climate issues. An example is the Belgian-Vietnamese project 'Development to Support Decision making in water management in the Mekong delta (Aqua SID).

8.2.3. Walloon Region

Specific research on energy

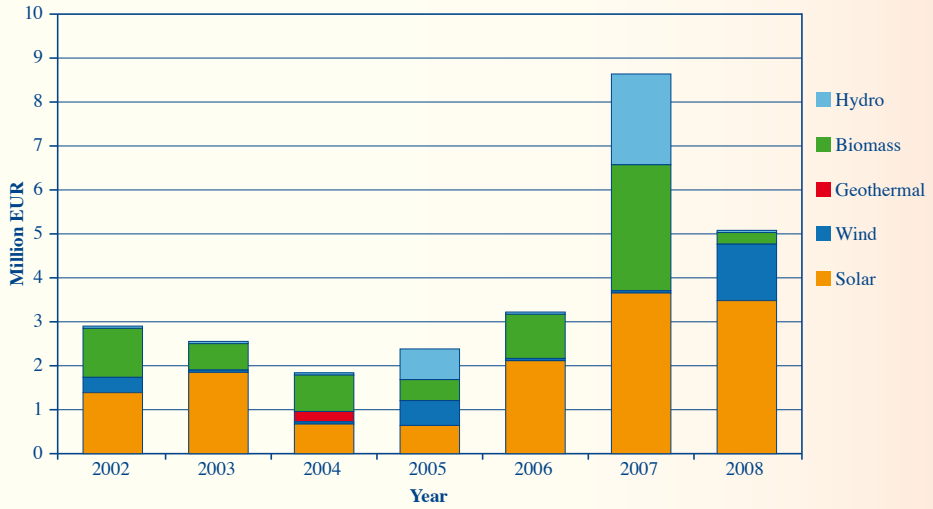
The budget of the Walloon Region for energy-related research and development amounts to about 20 million EUR a year. It includes grants for research projects. According to the IEA classification, the major research areas are renewable energy (35%) and energy conservation (45%), followed by power and storage technologies (15%).

In the framework of so-called 'Mobilising Programmes', the Walloon Region regularly issues calls for proposals to enterprises and universities for research focusing on specific thematic research priorities, the results of which are likely to be of interest to existing companies or might lead to the creation of new ones. Past programmes in the area of NNE RTD include:

- MINERGIBAT- 2006: Energy efficiency and sustainable energy production for buildings. Budget : 3.0 M EUR.
- FUTURENERGY- 2007: Renewable energy sources. Budget: 2.5 M EUR.
- ENERGYWALL 2008: Energy efficiency and renewable energy sources. Budget: 4.7 M EUR.
- R&D-SOLWATT -2008: Research in photovoltaics. Budget: 2.8 M EUR.

The "Plan for Mastering Sustainable Energy", endorsed by the Walloon Parliament in December 2003 and again in 2009, sets guidelines for 2010. In the mean time, the Walloon Region has maintained or in-

Figure 8.1 Renewable energy R&D spending in Wallonia (by research area)



One notably sees considerable variations in commitment budgets for research focusing on renewable energy R&D.

creased its support for work focusing on energy efficiency and end-use technologies, especially as regards buildings, biomass, thermal power, and (more recently) photovoltaic solar power. The Region has regularly supported work on low hydropower.

Since 1990, the Walloon Region (via Belgium) has participated in implementing agreements (IAs) of the International Energy Agency (IEA). The main IAs are 'Energy Conservation and Emissions Reduction in Combustion' (ECERC), the 'Energy Conservation in Building and Community Systems Programme' (ECBCS), and 'Solar Heating and Cooling' (SHC). The Walloon Region also funds, in collaboration with the other regions, participation of the Scientific and Technical Centre for Construction (CSTC) in the 'Hybrid Ventilation' annex of the IA ECBCS.

Various research projects and studies are funded to study specific items or to disseminate scientific and technical information to the building sector.

Other sectors

The competence of the Walloon Region in R&D concerns the application of results on an industrial scale. The "Action Plan to Prepare Wallonia for the Future", adopted in 1996, reflects the R&D strategy that the Walloon government wishes to promote through the Operational Directorate General for the Economy, Employment, and Research (DGO6). Since adoption of the plan, the efforts of the Walloon government have been oriented towards clearly identified technological niches, defined with all the players concerned.

Other programmes funded by the Walloon Region:

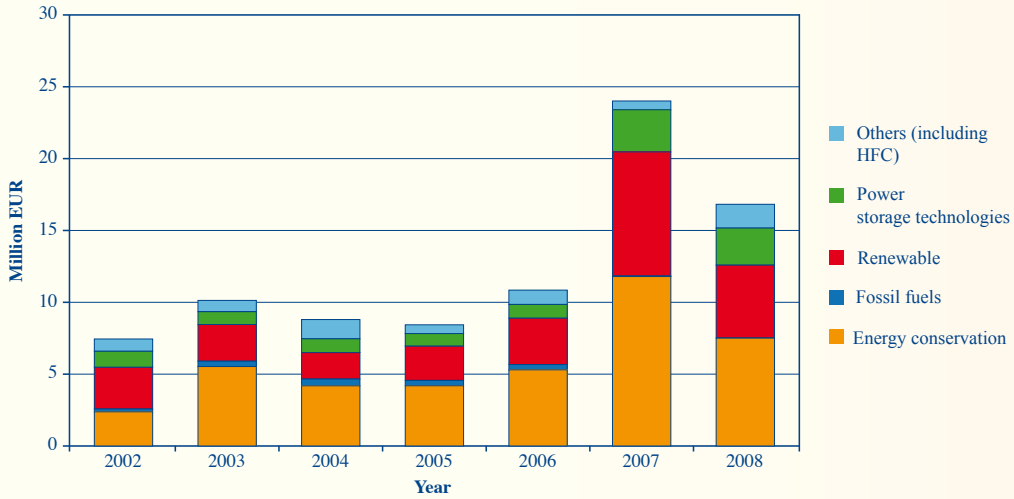
The "FIRST" programmes (Formation et Impulsion à la Recherche scientifique et technologique): these programmes give researchers the opportunity to get a taste of the industrial world while remaining rooted in a university, through an oriented research project liable to have an impact on the economic development of the Walloon Region.

"Excellence programmes": These programmes are divided into university programmes and public/private partnerships. Launched by the Walloon Region, they aim to cover all issues related to research and innovation.

The "Marshall Plan": This plan brings together universities, companies, and training centres around themes related to industrial development, embodied in five so-called "competitiveness poles" (Skywin, Biowin, Wagralim, Mecatech and Logistics in Wallonia). In this context, "Mobilising Programmes" constitute an essential instrument for funding industrial research in research units based in universities or schools of higher education, public research institutes, or certified research centres. **A specific call for proposals related to "Sustainable Development – Global Warminig" was issued in 2008** in order to identify actions liable to contribute concretely to sustainable development and to reducing the impact of human activities.

[48] "Bonn Declaration" : during COP-7 (decision 7/CP.7) it was decided that the EU and its member states, together with Canada, Iceland, New Zealand, Norway and Switzerland would collectively provide 450 million US$ for climate change for the benefit of developing countries from 2005. This amount was due to be revised in 2008

Figure 8.2 Government R&D spending in Wallonia, 2002-2007



Marshall Plan 2.0, while maintaining the orientation of its predecessor (competitiveness poles), aims to identify better ways to manage the challenges of the future (climate change, energy crises…).

It is important to note that all selected projects must include an environmental perspective. Several indicators have thus been developed to for use as project selection criteria.

The Operational Directorate General for Agriculture, Natural Resources and the Environment (DGO3) has called for scientific studies more directly related to the implementation of policies and measures. The main recent projects dealing with these aspects are 'The Carbon sequestration potential of forest ecosystems (1999-2003) and 'Estimating emissions of atmospheric pollutants (NH_3, CH_4 and N_2O) by the agricultural sector' (2000-2001).

On a broader scale, as part of the Standing Conference on Spatial Development (CPDT, created in 1998 with the aim of federating research in an area that has been insufficiently studied in Wallonia by comparison with other countries), most of the Region's governmental departments and the three major French-language universities are partners in an ambitious, multi-annual research programme on spatial planning. The programme focuses on urban planning, improving energy performance, mobility/transport, and modification of hydrological regimes.

Further research will include three complementary themes: enhancement of energy performance in urban planning, development of sustainable urban forms, and rationalisation of transport (notably of goods). See http://cpdt.wallonie.be/Index_texte.htm for details.

The DGRNE has also funded a number of studies on the analysis of CO_2, CH_4 and N_2O emissions by means of the EPM micro-economic model developed by ECONOTEC.

International cooperation

Reorganisation of the region's support for R&D will result in better integration of regional policy into European R&D programmes such as the EU 7th Framework Programme, the ERA-NET programme, the EU Structural Fund Programme funding projects associating research centres and companies, and the Interreg IV Programme (France-Wallonie-Flandre, Euregio-Meuse-Rhin, Wallonie-Lorraine-Luxembourg and Grande Région).

8.2.4. French community

The French Community of Belgium, through its ARC programme (Concerted Research Actions), funds major research projects dealing with climate-related topics. Water resources and the biogeochemical cycles influencing the CO_2 content of the atmosphere are the main topics covered.

Other research on climate-related topics is funded in the framework of non-oriented projects supported by the FNRS. This makes it hard to produce a structured overview.

8.2.5. Flemish Region

Research activities

Research activities are mainly performed in universities and in some research institutes. Climate-related research projects are funded through research grants awarded by the FWO (Fund for scientific Research, Flanders) and the IWT, the funding agency for applied (industry-related) R&D in Flanders. A small number of funded research projects concern climate issues. At the IWT, the Strategic Basic Research (SBO) programme provides funding (up to 100%) for research projects with the prospect of industrial or societal valorisation within 5 to 10 years. All scientific disciplines and all sectors are eligible. In this context, the CcASPAR research project (Climate Change and Changes in Spatial Structures in Flanders) involves research on impacts, vulnerability, and adaptation options in Flanders.

The VITO (Flemish Institute for Technological Research) carries out research on impacts, vulnerability, and adaptation with a view to adequate territorial planning and also in the framework of the economic costs and benefits of ecosystems and risk management in relation to climate change. Climate evolution topics are tackled in the earth observation department.

Research on adaptation of the coastal area is done in the framework of the Sigma Plan and the Integrated Coastal Security Plan (GKVP). Here, the conducted research is closely related to the Interreg IIIB project SAFECoast. This project focuses on the consequences of climate change along the North Sea on the horizon of 2050, as regards flooding.

The LNE department (Leefmilieu, Natuur en Energie, i.e. Environment, Nature, and Energy) funds adaptation projects prioritising impacts of climate change and possible adaptation measures in a number of sectors.

Flemish innovation policy aims to extend and deepen scientific know-how and technological skills in order to strengthen the integrated innovation capacity of Flanders and to achieve by 2010 a leading position in Europe's knowledge economy. Despite the absence of specific thematic R&D programmes in energy research in Flanders, the total amount of public R&D funding for energy research in 2007 was about 30 million EUR, channelled mainly via the IWT funding system. According to the classification of the IEA, 38% of the total public energy R&D budget of 2007 was spent on energy efficiency projects and about 37% on projects in the field of renewable energy.

Networking

Networking between industrial actors and researchers is stimulated through the Flemish Co-operative Innovation Networks (VIS). In this context two thematic innovation networks, in the fields of hydrogen and fuel cell technology and renewable energies, have been launched.

Excellence centres are special types of VIS networks and have been set up in a number of industrial sectors. These are Flanders DRIVE (automotive industry), VIL (logistics), FMTC (Flanders Mechatronics Technology Centre), Flanders Food (innovative foods), FLAMAC (Flanders Materials Centre), IncGEO (geographic information), VIM (mobility), and Flanders InShape (Product Development and Design).

Recently the Flemish Government has identified some strategic technological clusters, among which is Energy. Consequently, it has funded five "Green Technology" initiatives in 2009. The Photovoltaic Initiative, the Wind Energy Initiative, and the Smart Grid Initiative are public-private partnerships with considerable co-funding by the private sector. Governmental funding reached about 5 million EUR (Photovoltaic Initiative), 5 million EUR (Wind Energy Initiative), and 10 million EUR (Smart Grid Initiative). The two other initiatives are Interreg IV projects. The project "Hydrogen Region Flanders-Southern Netherlands" is co-funded by the Flemish Government (3.6 million EUR). For the Interreg project "Biobase Europe" focusing on the production of bioenergy and bioproducts from renewable biomass resources, Flemish co-funding amounts to 7 million EUR.

International cooperation

The EWI department is actively involved in the decision-making process of the EU Competitiveness Council and is represented in major international programmes such as the EU Framework Programme for Research and Technological Development (FP for RTD) and the EU Competitiveness and Innovation Programme (CIP). It also participates actively in the activities of multilateral organisations such as the OECD (within the Committee for Science and Technological Policy - CSTP, its thematic subgroups, and the Committee for industry, Innovation and Enterprise - CIIE), and supports and manages the Flanders UNESCO Science Trust Fund (FUST). The EWI department, the IWT, and the Flanders Enterprise Agency also carry out a number of activities related to science, research, and innovation (both as policy-making and participating entities and as programme-implementing bodies) at the international policy level, notably within the EU Committee of Regions, EFRD, ERIK, PRO-INNO, Joint Technology Initiatives (Ambient Assisted Living, AAL), EUROSTARS, ARTEMIS, ENIAC, the Fuel Cell and Hydrogen JTI, IMI, TAFTIE (Through the Association for Technology Implementation in Europe), INNO-net, IPREG (Innovation Policy Research for Economic Growth), ERRIN (European Regions Research and Innovation Network), ERA-NETs, INNO-networks, Open Method of Co-ordination Programmes, etc. IWT is the one-stop-shop for stimulating and supporting business R&D and innovation in Flanders. It runs the Flemish Contact Point for the EU FP for RTD.

Noteworthy is the participation of Flanders in the Interreg IV 'Future Cities' project dealing with climate change impacts, vulnerability, and adaptation in cities.

In its multilateral policy the Flemish government concentrates on stimulating Flemish participation in international research programmes (e.g. European Framework Programmes, EUREKA, COST, etc.), strategic networks, and ERA-NETs (e.g. HYCO, PV, Smart Grids, CRUE (concerning floods)). Its return on the 6FP for RTD is calculated at 2.12%. It has participated in 1051 projects for which the EU contribution was 352.29 million EUR.

8.2.6. Brussels-Capital Region

The Brussels Institute for the encouragement of Scientific Research and Innovation (ISRIB) supports environmental and sustainable development research throughout its funding programmes. The environment is one of the three pillars on which the Region of Brussels-Capital intends to build its excellence in research. Part of the European structural funds allocated to Brussels will be invested in the creation of a business incubator dedicated to environment-related activities. Brussels stimulates international cooperation by awarding up to 25% extra funding to projects that meet this criterion.

http://www.irsib.irisnet.be/

In the framework of its Air and Climate Plan, the IBGE has funded several studies related to the region's climate policy, focusing on air emission projections from road transport and measures to reduce them, CO_2 labeling food or research on the eco-construction concept and its practical implementation.

http://www.brusselsenvironment.be/

8.2.7. German speaking Community

The German-speaking Community participates, in the framework of the European Interreg Programme, in the research project 'ENERBIOM', which aims to define and disseminate schemes of agricultural biomass energy production taking into account different agro-ecological dimensions. It studies possibilities for developing, in a sustainable way, adapted activities in areas with major environmental constraints (mid-mountain areas, water-pumping areas, NATURA 2000 areas…).

www.enerbiom.eu

8.3. Systematic observation

8.3.1. Introduction

This report is a short version of the report requested by the UNFCCC, which provides additional information on national GCOS activities using the revised "UNFCCC reporting guidelines on global climate change observing systems" in order to reflect the priorities of the Global Climate Observing System implementation plan and incorporate the reporting on essential climate variables" as approved by COP 13 in Bali.

For the time being there is no GCOS National Coordinator or Coordination Committee. Some institutes, more than others, take the responsibility to coordinate relevant data, support international databases and contribute to international efforts. More and more, individual researchers report their data and observations through international research programmes, international databases and their publications. The Royal Meteorological Institute is focal point for GCOS and as such is the official information point for GCOS.

8.3.2. Ground based measurements in Belgium

Ground stations

Belgium is well covered by synoptic meteorological stations, which are operated by the Royal Meteorological Institute of Belgium (RMIB, 12 stations), the civil aviation service Belgocontrol (7 stations), and the military aviation service Meteowing (9 stations). They are part of the World Meteorological Organisation (WMO) Global Observing System (GOS).

The RMIB also operates since 1880 a dedicated network of currently more than 250 climatological stations with daily manual recording of min/max temperature and precipitation.

The longest and best analysed time series exist in Ukkel, since 1886. Ukkel is the only Belgian station which is part of the GCOS Surface Network (GSN).

The three stations of Ernage (in the center of the country), Beitem (relatively close to the coast) and Mont-Rigi are part of the Eumetnet EUCOS network which covers Europe with 250 km spacing.

Upper air stations

Long term upper air balloon soundings as part of the WMO GOS are available from Ukkel operated by the RMIB, and since the summer of 2008, midnight soundings have been started up from Bevekom operated by Meteowing with material and consumables provided by Belgocontrol.

Ozone profiles are included in the Ukkel soundings since 1969. The total amount of ozon and UV spectra are measured with ground based spectrofotometers since 1971. The Ukkel ozone measurements are part of the Network for Detection and Attribution of Climate Change (NDACC), of the WMO Global Atmospheric Watch program and are archived in the World Ozone and Ultraviolet Data Centre (WOUDC).

North Sea observations

Two fixed offshore meteorological station are operated by the Flemish Region (MDK – Afdeling Kust), 'Meetpaal 0' and 'Meetpaal 7 – Westhinder'. Belgium has two research vessels, the 'Belgica' operated by the management Unit of the Mathematical Model (MUMM) of the North Sea, and the 'Zeeleeuw' operated by the Flemish Region (Flanders Marine Institute in cooperation with DAB Vloot). A new Flemish research vessel 'Simon Stevin' is expected to be in operation by the end of 2011.

River discharge

Belgium is crossed by two major rivers flowing to the sea, the Meuse and the Scheldt, and the smaller river the Ijzer. The discharge of the Meuse to the sea is included in the Global Terrestrial Network – River Discharge (GTN-R) through a station at the mouth of the Meuse in the Netherlands. Stage gauges covering the Scheldt and the Ijzer are operated by the Department of Public Works (MOW), see http://www.waterstanden.be and www.overstromingsvoorspeller.be. The discharge of the Scheldt and the Ijzer to the sea could be covered in the GTN-R network by including a stage gauge near Antwerpen and Nieuwpoort.

Aerosol

Belgium has two Aeronet stations, one in Oostende operated by MUMM/KBIN, and a second one in Ukkel operated by the Belgian Institute for Space Aeronomy (BIRA-IASB) since 2006. RMIB plans to install a third one in Dourbes.

- From its Brewer spectrofotometer, the RMIB derives the UV aerosol optical depth at 320 and 340 nm.
- From the MAXDOAS infrared instrument operated at Ukkel, BIRA-IASB retrieves aerosol information.

8.3.3. Foreign ground based measurements

Atmospheric composition – NDACC

The Belgian Institute for Space Aeronomy (BIRA-IASB) is actively involved in the Network for the Detection of Atmospheric Composition Change (NDACC, formerly the NDSC), a major contributor to GCOS. In addition to operating its own NDACC-certified instruments at three stations in Europe and one station on Reunion Island, it also co-chairs three Working Groups of the network: the Infrared WG, the UV-Visible WG, and the satellite WG. Several NDACC measurement activities of BIRA-IASB are carried out in collaboration

with the University of Liège (ULg) and the Free University of Brussels (ULB).

Measurements have been taken at Jungfraujoch (Switzerland) since 1990, Harestua (Norway) since 1994, and Observatoire de Haute Provence (OHP, France) since 1998. They have also been performed on a campaign base at Ile de La Reunion since 2002 on a campaign basis, with transition to routine measurements starting mid-2009.

The measurements are done by FTIR spectroscopy and provide the amount of CO_2, troposperic and total column amounts of other GHGs like H_2O, N_2O, O_3 and some HCFC's.

African measurements

In the former Belgian Central African colony Congo and the mandate area Ruanda-Urundi, meteorological and climatological measurements were made following the same standards as in Belgium. The paper archives of these measurements are stored in het Rijksarchief. The Congolese measurements go up to 1959.

During the DARE (Data Rescue) project meteorological data from Africa as a whole have been archived on microfilms. The microfilms are stored at the RMIB. Most of the data goes up to 1990.

The Royal Museum of Central Africa (MRAC) has digitised monthly data (from « Bulletin climatologique annuel du Congo Belge et du Ruanda-Urundi ») for the period 1950-1959:

- Air T° max (83 stations)
- Air T° min (83 stations)
- Evaporation (83 stations)
- Humidity (60 stations)
- Sunshine (54 stations)
- Precipitations (16 stations)

A monitoring of Lake Tanganyika was implemented by MRAC and its partners (Department of Fisheries in Zambia and the Tanzania Fisheries Research Institute).

Regular lake observations (every two weeks) were done at two lake stations: one in Zambia and one in Tanzania in the frame of two research projects in the 2002-2006 period financed by BELSPO.

Amongst the essential variables mentioned as essentiel by GCOS, those were measured:

- lake temperature and conductivity. Water level was also recorded in Zambia.
- planktonic groups were studied through field observations by Ghent University and Namur Faculties and from remote sensing at Liège University.
- regular physo-chemistry survey have been undertaken in 40 crater lakes of Uganda since 2007 in the frame of the CLANIMAE project of BELSPO (Climate and anthropic impact on African ecosystems). Thermistors have been placed and retrieved from 4 lakes. Paleo-climate study of the sediments is taking place to re-construct climate history of the past thousands years in East Africa.

Among the ECvs of GOCS, the land cover (including vegetation type) of those volcanic bassins was studied in the frame of CLANIMAE to quantify the anthropic impact on lake ecosystems.

Antarctica

Belgium has opened a new research station 'Princess Elisabeth' in Antarctica, being also the first zero emission Antarctic research station. During the first antarctic summer season of 2008-2009, 2 climate observing projects were initiated, installing some year-round monitoring instruments.

KUL installed an automatic weather station measuring the surface weather and the energy balance and a ceilometer.

RMIB/BIRA/University of Gent installed instruments for the measurement of aerosol optical depth and black carbon concentration. The additional installation of an aerosol particle counter and a Brewer spectrophotometer for ozone column, UV radiation and UV aerosol optical depth is foreseen.

Kiev

The RMIB is sending a spare spectrofotometer to the University of Kiev for routine measurements of UV spectra and ozone.

8.3.4. Satellite observation

In dedicated areas of satellite observations, Belgium makes contributions at international or European level.

Earth radiation budget

For the Earth radiation budget, the RMIB is the main data processing centre for the Geostationary Earth Radiation Budget (GERB) instrument on board of Meteosat 8 and 9 with operational data since 2004. The Meteosat field of view includes Africa, Europe and the surrounding oceans.

The RMIB is also a CoInvestigator in the NASA CERES program which provides earth radiation budget data with global coverage.

Solar irradiance

The RMIB is one of the leading institutes for the measurement of total solar irradiance, with an instrument measuring from the SOHO satellite since 1996, and with a new instrument ready for launch on the French Picard microsatellite in November 2009.

BIRA is one of the leading institues for the measurement of spectral solar irradiance with currently operational measurements from the International Space Station.

Atmospheric composition

BIRA-IASB contributes to the operational retrieval algorithms for several satellite measurements of ECVs, by providing prototype retrieval algorithms and by working on their transfer to the operational environment. ECVs: methane and aerosols for IASI on board of the EUMETSAT MetOp series, and ozone for the ERS-

2 GOME, Envisat SCIAMACHY and GOME-2 satellites.

BIRA-IASB contributes actively to other international satellite missions measuring ECVs through geophysical validation and retrieval studies.

BIRA-IASB retrieves stratospheric aerosols from the SAGE and GOMOS satellite missions, and develops unified, long-term databases of stratospheric aerosols measured by different satellite instruments.

BIRA-IASB develops and operates the BASCOE 4D-var chemical data assimilation system. BASCOE has particular capabilities of generating consolidated long-term and global data sets of ozone and other GHGs through the re-analysis of satellite data records.

Vegetation

VITO (Vlaams Instituut voor Technologisch Onderzoek) hosts the data processing centre for the SPOT Vegetation satellite (CTIV). VITO also processes and archives data from the following satellites: ENVISAT-MERIS, NOAA-AVHRR, MODIS, MSG, METOP-AVHRR. Resolution, spatial coverage, historical archive depend upon the satellite characteristics but starts from 1981 for NOAA-AVHRR and from 1998 for SPOT-VEGETATION. Amongst others, the following vegetation parameters are routinely produced:

- fAPAR: fraction of absorbed photosynthetically active radiation
- DMP: Dry Matter Productivity
- Leaf area Index (LAI)
- Burned Areas

Some of these parameters are multi-sensor (based on A(A)TSR & VEGETATION) eg. LAI, burned areas.

In this context VITO is service provider to EC-JRC and leads the Global Vegetation Component in the GMES GEOLAND initiative.

VITO has a number of activities and datasets for Africa & China related to land cover mapping focused on agriculture.

Aerosols

In the context of the Eumetsat Climate Monitoring SAF and the Gerb project, the RMIB is deriving aerosol optical depth from the SEVIRI imager over the Meteosat disc.

Evapotranspiration

In the context of the Eumetsat Land surface analysis SAF, the RMIB is deriving Evapotranspiration from the SEVIRI imager over the Meteosat disc.

Ozone profiles

In the context of the Eumetsat Ozone Monitoring SAF, the RMIB is responsible for the validation of satellite retrieved ozone profiles by comparison with balloon soundings.

9. Education, Training and Public Awareness

The preparation of this chapter was coordinated by:
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9.1. Introduction

Effective reduction of Greenhouse Gas Emissions requires that all levels of society be well informed. The chapter reports on the actions taken in Belgium to raise public awareness of climate change, education and training relating to this issue. It presents essentially the activities organised or financed by the public sector, but also mentions actions undertaken by certain organisations of civil society or the private sector made possible by public funds.

The objective has not been to prepare an exhaustive picture but rather to present various initiatives which are contributing to raising awareness in Belgian public opinion. The actions with respect to public awareness are categorised by target (the general public, education or professionals) and according to the activities which can be influenced (consumption of energy, housing, travel, waste management).

A list of relevant internet sites rounds out this information.

9.1.1. The general context of raising awareness

Al Gore's film, *An Inconvenient Truth*, has certainly played a determining role in making Belgians aware of the urgent need to act to prevent climatic warming. The 2 Oscars which the film obtained in 2007 and the Nobel Prize for Peace which Al Gore shared with the Intergovernmental Panel on Climate Change (IPCC) in October 2007 further reinforced the impact of this documentary.

The media have given great resonance to information relating to climate change and contributed in turn to augmenting interest in this subject. One can add to this more recently the financial crisis, which has increased awareness of the need to reduce expenses on energy, which represent a very significant part of household and company budgets, particularly for transport and, in our colder regions, for heating.

The election in September 2008 of Belgian professor Jean-Pascal van Ypersele as Vice-Chair of IPCC and the interviews which he has been giving are another positive element for the Belgian media to disseminate information relating to the climate change.

The adoption on 17 December 2008 by the European Parliament of the Energy/Climate package also prompted the media to speak a lot about this subject.

International Polar Year 2007-2009, the construction and inauguration on 15 February 2009 of the Princess Elisabeth polar station in the Antarctic, the first station to operate without releasing greenhouse gases, also highlighted in a positive way the urgency of acting to prevent global warming.

Major promotional campaigns, both public and private, on behalf of install-

ing solar thermal panels, supported by grants, and more recently, for installation of photo-voltaic panels, with both grants and green certificates, have contributed as well to raising public awareness of energy management.

In mid-2009, the campaign around the release of *Home*, a film about the planet by Yann-Arthus-Bertrand and Luc Besson was another media event helping to raise awareness about the need to act to protect the climate.

In Flanders, the series *Low Impact Man* (with Steven Vromman) on the official television channel VRT also played a role in public awareness. The Climate Change Section re-read two chapters of the book which was published in this context. For her part, in 2007 Jill Peeters, "Mrs Météo" on the commercial channel VTM, published a collection of information entitled *Onze planeet wordt heet* with assistance from the Federal Climate Change Section ; the book was heavily promoted on this channel.

9.1.2. Is the Belgian public aware of the problem of global warming?

What is the level of awareness of the general public and its understanding of the issue of climate change?

Federal public survey on climate change

In 2009 the federal Climate Change Section launched a second public survey[49] to gain a better understanding of the evolution (between 2005 and 2009) of the knowledge of the Belgian public about the climate change problem (causes and consequences, information channels…), the subjective interpretation (urgency, government efforts, possibility of personal contribution…) and the personal attitude (the willingness of each person to do something about it).

Climate change took fifth place in the summary of environmental problems and scores lower than air and water pollution. Most Belgians do make the connection between the Kyoto Protocol and 'air pollution' (slightly better than in 2005), but only 1 % links the Protocol exclusively to climate change.

Only 40 % of Belgians is able to estimate correctly the geographical distribution of countries that cause climate change and those that suffer from it (industrial nations vs. developing countries), which is a marked increase compared to 2005. Phenomena such as the melting of the ice caps, rising sea levels and an increased frequency of storms and heat waves were correctly described as consequences by over 80 %.

Despite this improved knowledge, the Belgians give themselves an average score of 5.9 out of 10 for the extent to which they are informed about the problem of climate change. Passive information is acquired mainly via the traditional channels such as TV, newspapers, magazines and radio (especially among older people), while an active search for information is performed mainly via websites (and mainly by younger people). However, specific sites for these purposes are not well known.

Nearly all respondents say that emissions by industry (95 %!) and traffic contribute significantly to climate change and to a lesser extent emission by families and agriculture. However, they do acknowledge their responsibility by stating that climate change can be countered by changing the way in which they live and that their own actions can make a difference.

Just over half of the respondents are aware that climate change forms a threat to their daily lives and 68 % think that climate change is and immediate and urgent problem. 84 % know that it is a global phenomenon and almost 60 % say that the effects are already occurring in Belgium. Nearly ¾ believe that global warming can be countered by a different lifestyle, but only 59 % say that their own actions can make a difference (a similar response to the one of 2005).

The support measures from the government for energy saving techniques at home – particularly those for solar panels (79 %) and roof insulation (78 %) – are very well known. This is a marked increase in knowledge compared to 2005 (then 48 % for roof insulation). However, only a small percentage of respondents have made use of these supportive measures.

If we look at intentions, there is a very strong tendency to take action in the near future, e.g. buy an energy efficient car or start using solar or green energy (even though these percentages are still fairly low). Within the household people are willing to make an effort (for example using a water-efficient shower head…). In general, many respondents indicate that they are currently implementing a large number of energy-saving behaviours.

When it comes to household appliances and boilers, the energy consumption is already the most important purchase consideration (with 68 to 75 %). For cars this consideration only achieves a third place, after the quality and the price. Low-energy light bulbs are also purchased for this reason.

63 % of Belgians are satisfied about their own efforts to mitigate climate change, but only 12 % are very or extremely satisfied. They indicate that the government plays a crucial role, but more than half of respondents are currently not satisfied with the government's efforts.

[49] http://www.climat.be/spip.php?article341&fs= (FR) ; http://www.klimaat.be/spip.php?article342&fs= (NL)

Eurobarometer survey on European citizens' attitudes towards climate change

An Eurobarometer survey has been conducted, with the overarching aim of exploring European citizens' attitudes towards climate change. This Eurobarometer survey was commissioned by the Directorate-General for Communication of the European Commission, on behalf of the European Parliament and the European Commission. It was carried out between 16 January and 22 February 2009. The interviews were conducted among 26,718 citizens in the 27 Member States of the European Union, Croatia, Turkey, the Former Yugoslav Republic of Macedonia and in the Turkish Cypriot Community.

The main results concerning Belgium are summarized here.

1. Citizens' perceptions of climate change in relation to other world problems

69% of Belgian respondents' think that "poverty, the lack of food and drinking water" is one of the most serious problems our world faces now. Ranking seconds ex aequo at 54% are "climate change" (59% previously) and "a major global economic downturn" which more than doubled in mentions from 22% in spring 2008.

2. Citizens' perceptions of the seriousness of climate change

The respondents were invited to assess the level of seriousness of climate change on a scale from 1 to 10. More than two-thirds of Belgians think that "climate change" is a very serious problem (67%), while 21% find it a fairly serious problem and 11% do not think it is a serious problem.

3. The extent to which citizens feel informed about climate change – its causes, consequences and ways of fighting it

57% Belgians feel very well or fairly well informed about different aspects of climate change; however Belgium reports decreased levels of information for the consequences of climate change (66% felt well informed in 2008).

4. Citizens' attitudes towards climate change

While nearly two-thirds of Belgians (65%) do not think that the seriousness of climate change has been exaggerated, they are nevertheless predominantly optimistic and mostly disagree (69%) with the statement that the process of climate change is unstoppable.

However, just under a third (29%) are rather pessimistic and believe that climate change is an unstoppable process.

On the seriousness of climate change 32% of Belgians think that it has been exaggerated.

According to a wide majority of Belgians (79%), alternative fuels should be used to reduce greenhouse gas emissions.

As far as the causes of climate change are concerned, the majority of Belgian citizens (63%) disagree with the statement that CO_2 emissions have only a marginal impact on climate change.

More than six in ten Belgians (64%) claim that they have taken personal measures to fight climate change, while just over a third (35%) say they have not.

At Belgian level, more than 64% respondents think that fighting climate change could have a positive impact on the European economy.

http://ec.europa.eu/public_opinion/archives/ebs/ebs_313_en.pdf

RTBF-Le Soir Poll

These results have been confirmed by a poll arranged among the Francophone population of Belgium by Dedicated Research from March to April 2009. This was a follow-up to a similar poll in 2008. The representative sample contacted by telephone comprised 1,202 persons (501 residents of Brussels and 701 Walloons). The response rate was 68%, and the margin of error was 2.8%. This poll was carried out at the request of the public radio and television broadcaster RTBF within the framework of its Natural Planet operation (cf. below) and the daily newspaper Le Soir.

The respondents spontaneously list at the center of their concerns health (70%), pollution (61%), energy (58%) and global warming (60%), alongside employment (68%), quality of foodstuffs (63%), violence and insecurity (64%), the economic situation (60%), purchasing power (59%) and biodiversity (54%).

Nearly all the respondents had heard about climate change and two out of three believe that it is a real problem which may become worse and which merits our concern. Nonetheless, many experts questioned by Le Soir, are not considering it as a detailed knowledge.

When it comes to the causes or the consequences, the answers vary and become vague. 'For example, people systematically underestimate the impact of household heating on greenhouse gas emissions,' emphasises Edwin Zaccaï (Université Libre de Bruxelles). 'They confuse meteorological events such as the mild winter of 2007-2008 and climate change,' remarks Bernadette Merenne (Université de Liège).

The poll also deals with measures which the public authorities could take and with the adopted behaviours. The respondents agree (82%) that speed limitations lower than normal should be imposed during peaks of pollution, and driving may even be prohibited and free access granted on public transport during these peaks (91%). They agree to replace road transport of goods by alternative transport (84%) and

to promote telecommuting through tax policies (90%).

Although one person in two continues to go to work by car, eight out of ten indicate that CO_2 emissions will be one of the criteria when they purchase their next auto. Nine respondents out of ten recommend tax incentives to encourage use of public transport on the way to work and the same proportion believe that one should prompt the employers to offer a pass for travel by public transport as a benefit in kind.

Three out of four polled persons believe that in order to reduce greenhouse gases the actions to be taken should focus on companies as much as on the authorities and the citizenry.

Six persons out of ten agree to having one car-free day per month. As many support the idea of taxing an automobile according to the number of traveled km. One respondent out of two would agree to an additional tax on food products imported by plane.

During the previous year, 78% of the respondents installed economy light bulbs, 75% reduced the quantity of their household waste, 73% reduced the room temperature in their lodgings by at least 1 degree, 71% took showers instead of baths and 64% cut their use of electrical appliances.

9.2. Raising awareness of global warming

In order to raise public awareness, some activities linked to a day/month of energy savings, of the environment, of biodiversity or of mobility are being organised every year across the country. These large-scale initiatives are supplemented by more specific efforts at awareness-raising or by easily applicable practical solutions intended for certain target groups such as the young, energy managers in companies or other professionals (architects, teachers, heating specialists, mobility managers, etc.).

For example, a Night of Darkness (*"Nacht van de Duisternis"*) has been organised for the past 12 years in Flanders. It was extended to the Walloon Region in 2008 and to the Brussels-Capital Region in 2009. Its main objective is to make the population aware of light pollution and hence to the energy savings which we now know to be so important in the fight against climate change.

An annual event in the Flemish Region is 'October, Energy-Saving Month' (http://www.energiesparen.be/oktober). The theme of energy saving is highlighted via various initiatives during that month.

Campaigns relating to climate change are presented below, those about energy or mobility are presented further on.

9.2.1. Contribution to the launch of the EU Climate Change Campaign

At the end of May 2006, a European wide public campaign on climate change was kicked off together with www.climatechange.eu.com using the slogan 'You control climate change. Turn down, switch off, recycle, walk, change.' This campaign offers a full arsenal of practical and simple tricks to use and shows that by small efforts a person can truly contribute to the fight against climate change. The federal Climate Change Section helped to launch this campaign in the presence of Prime Minister Guy Verhofstadt. For the occasion, the statue Manneke Pis in Brussels received a T-shirt bearing the campaign's logo.

9.2.2. The federal communication to the general public

The federal authorities communicate to the public via the internet, brochures and specific guidebooks and thematic media campaigns (magazines, websites and radio). These various instruments of commu-

nication are used in order to disseminate among the citizens key information on climate change and the specific situation of Belgium. They deliver to the public all official reports, decisions of the Federal Government and concrete actions which concern the citizens.

The internet site (www.climatechange.be, also known by the French url www.climat.be and the Dutch url www.klimaat.be) was completely reworked and relaunched in December 2008. It contains headings on the phenomenon of climate change (causes and effects), the policy, financial support, but also a section devoted to action (federal campaigns, actions to be taken at the private level, actions by others…). In the end, this site should become a true portal.

Prepared by the National Commission on Climate, the report *Greenhouse Gas Emissions in Belgium 2007 – Trends, projections, and progress towards the Kyoto objective* has been translated and published in French and in Dutch by the federal Climate Change Section.

9.2.3. Financial support for local public awareness initiatives

The Climate Change Section of the Federal Public Service of Public Health, Food Chain Safety and Environment (Directorate General Environment) has developed a system of assistance intended to encourage and support events which inform the large public and increase involvement of citizens and create a participative platform for citizens. Each individual or legal entity which organises such an event in connection with information and training can apply. The grants cannot be made to political parties or used in support of political programmes.

The contents must be directly linked to the theme of climate change and the information provided must be scientifically correct; the presenters must possess the necessary competencies and the information session must be solution oriented (proposing techniques, measures and actions which may make a contribution to mitigate climate change).

9.2.4. Regional plans for the climate and their promotion

Along with the adoption of a *National Climate Plan* for Belgium, the climate plans adopted by the Regions have been promoted.

The Flemish Minister of Public Works, Energy, Environment and Nature disseminated a public brochure containing tips for consumers to help achieve all the objectives of the Flemish Climate Policy Plan 2006–2012.

A brochure to raise awareness and the internet site airclimat.wallonie.be, presenting the *Air-Climate Plan of the Walloon Region*, give advice to reduce greenhouse gases and provide access via links to many sources of practical information including CO_2 calculators. A quiz is also offered. Many concrete tools to raise awareness of the climate and energy challenges adapted to various audiences (students, adults) are being disseminated by the Directorate for Raising Awareness of the Environment of the Public Service of the Walloon Region. They are used both in schools and during events.

The Plan for Structural Improvement of Air Quality and the Fight Against Global Warming 2002-2010 of the Brussels-Capital Region accords great importance to the transport sector and to energy consumption

in buildings, which constitute major targets of the awareness raising and informational campaigns carried out by this region. In December 2007, the Government of the Brussels-Capital Region approved a roadmap for an integrated Climate Plan up to the year 2020. This draft plan aims at covering all the competencies of the Region having an impact on the climate, i.e., buldings, urbanism, socio-economic aspects, transport, the exemplary role of public authorities, the financing and production of energy. The second half of 2009 will be devoted to negotiations over measures identified with a view to preparing a second Climate Plan for the Brussels-Capital Region.

9.2.5. RTBF'S campaign Planète Nature

The Belgian Radio and Television Company of the French Community (RTBF) is an autonomous public enterprise having a cultural character. Via its six channels of radio and five channels of television, it is addressed to the entire French Community of Belgium, i.e., more than four million men and women of Brussels and the Walloon Region.

In March 2007, RTBF launched *Planète Nature*, a transversal operation to raise awareness about sustainable development. The project counts as well in-house as outside actions.

In-house, by means of various initiatives, the staff of RTBF has been led to reflect upon and to modify its consumption habits with respect to energy, paper, waste and mobility. These concrete actions, which mobilise all the staff, also steer the decisions concerning investments, buildings and infrastructures…

In radio, in television, in daily information or in magazines, and on the web, *Planète Nature* translates into an offer of broadcasts, discussions, forums and thematic commentaries (on biodiversity, air, water, waste…) as well as dissemination of various and recurrent sequences.

The broadcasts and sequences are led by young and dynamic journalists and strive to avoid an 'overdose' of information about the subject. By distilling from time to time capsules of awareness raising about this theme, it is possible gradually to induce the public to reflect on it. For example, the radio channel La Première offers three brief feature reports every morning at 7:20 AM (*Planète première*).

In addition to the small radio and television capsules, every 6 months a major television broadcast highlights a precise topic; the latest broadcasts dealt with air and energy. These special programmes are heavily promoted in the media and are shown on Sunday evening in the place of a very popular family show.

The aim is to make the public aware of these issues by putting them in the local context. The broadcast offers small demonstrations, advice and practical tips on improving the situation where you live.

A permanent team dedicated to Planète Nature has been given the task of centralising the information, processing the ideas, driving the projects forward.. Planète Nature has a priority partnership with the Polar Foundation. RTBF is also associated with other institutions, enterprises and NGOs concerned with the environment.

A blog allows listeners and viewers to share their ideas and comments. www.planetenature.be, the internet site helps you to find the list of broadcasts coming under the Planète Nature label.

For its part, the televised programme *Le Jardin extraordinaire* has shifted from the world of animals, which was its specialty in the beginning, to protection of the environment in general and regularly offers subjects related to climate protection.

9.2.6. Magazines, brochures and broadcasts in Brussels

A series of publications directed towards different audiences come from the environmental administration of the Brussels-Capital Region, which has recently been re-baptised Brussels-Environment. *Ma Ville Notre Planète* is a monthly free magazine dealing with Brussels environmental news published in paper and digital versions and sent to the residents of the Region, who request it. Twice a year this magazine has a special edition on the topic of energy and is distributed in all the mailboxes of the Region.

The tri-montly magazine *Bruxelles Environnement News* and the monthly electronic newsletter *E-news* are intended for professionnals and regularly highlight legislative news, actions of volunteers, general information, ad hoc activities (seminars, events…) and training sessions.

Brochures and leaflets deal with specific environmental topics. They cover the subjects in a general manner and carry practical tips, while making reference to more in-depth files and reports on the internet site of Brussels Environment. The internet site contains all the information on the situation and environmental and energy news (advice, regulations, filings, tools, authorised suppliers, lists of installation companies, etc.) and on the regional policy in this matter.

An aerial thermography aimed at raising awareness to insulation in buildings enjoyed major success with the public. All information relating to the *Prêt Vert Social* (loans at 0% for effective insulation and heating), to the project *Bâtiment Exemplaire* (exemplative buildings) and to energy grants available in the Region are set out in detail there.

The weekly programme *Bulle d'Air* (air bubble) on Télé Bruxelles deals with urban environmental issues so as to present, inter alia, the actions of the Region's public authorities, initiatives coming from the citizenry, and practical advice to be applied in daily life.

The Environment Festival is an annual event which brings together environmen-

tal associations active in Brussels in order to raise awareness in the general public to the environmental issues in a festive atmosphere.

In the Brussels-Capital Region, Brussels Environment organises communication campaigns (television ads, postings, announcements in the press) on rational use of energy, promotion of energy saving investments, as well as on mobility, encouraging the selection of less polluting modalities.

9.2.7. A low-energy metro station in the heart of Brussels

In partnership with the International Polar Foundation and with the participation, among others, of the Belgian explorer Alain Hubert and of Jean-Louis de Gerlache (great grandson of Adrien de Gerlache), the Brussels Transport Company STIB and the Brussels-Capital Region inaugurated in March 2009 'Belgica,' a metro station located in Jette.

Its name is closely linked with the history of Belgian exploration of the Antarctic, and so this station is naturally dedicated to the poles and to climate change.

Two gigantic frescos measuring 93 metres in length and 2 metres high illustrate, on the one hand, the history of exploration of the South Pole and, on the other hand, the causes of and solutions to climate change. Clear texts and illustrations provide indispensable information about the context in a very easy to understand manner.

One other specific feature worth mentioning: the station saves energy thanks to the installation of solar panels, detectors of motion and luminosity, energy saving escalators, etc. This represents in total annual savings of at least 23 tonnes of CO_2.

9.2.8. The competition *Communes Clim actives*

In order to encourage the inclusion of climatic considerations in communal policies and to stimulate positive initiatives which may be reproduced elsewhere, a competition entitled *Communes Clim actives* has been organised in the Walloon Region. The municipalities, public authorities close to the citizen, have a major role to play in the question of raising awareness and taking concrete actions in the domains of the environment, mobility, infrastructures and town planning. The project *Communes Clim'actives* also facilitates an exchange of information by the contacts which it creates among the candidate municipalities and by its internet site, which displays and highlights the initiatives of the participating municipalities in the struggle against global warming. Eighty-seven out of the 262 municipalities in the Walloon Region participated in the competition in 2009. The competition is financed by the Minister of the Environment, the Directorate General of Agriculture, the Environment and Natural Resources and the Walloon Air and Climate Agency.
http://www.climactives.be

9.2.9. The Climate Quarters

Climate Quarters are groups of families, living in the same street or quarter, or knowing each other via an association, a club, a school, work… They launch a bet with their own municipality: in six months time (from November to April), they will try to save 8% energy in comparison with the same period of the previous year. In order to do so, participants should however not invest in new technologies: the project aims at changing behavioural patterns in the first place. Therefore, participants meet from time to time, receive practical energy saving tips and check their electricity and natural gas meters at a very regular basis. These meter data are registered on the project's website, which will calculate the progress being made, taking into account the differences in outside temperatures with those of the previous year. In 2008-2009, 4,815 families from 450 quarters participated in the project and saved together over 12% energy, avoiding some 3,000 ton CO_2 emissions, which was the best result of the six year's carrier of the project.

The project is organised by the *Bond Beter Leefmilieu* ('Assocation for a Better Environment - umbrella organisation of the Flemish environmental NGOs) in collaboration with a.o. other environmental NGOs, electrical grid managers, municipalities and provinces and with the support of the Flemish Region and (in 2008-2009) of the European Intelligent Energy Programme.
(http://www.bondbeterleefmilieu.be/klimaatwijken).

9.3. Raising awareness of the environment

9.3.1. Belgian Awards for Energy and the Environment

Since 2006, each year the Belgian Energy and Environment Awards (http://www.eeaward.be) recognise those who either as individuals or via their organisations contribute in an exceptional way to building a sustainable future at the local, regional and national levels. Experts from the country's universities assist the jury, taking into account in particular the spirit of enterprise/dynamism, the innovative nature of the achievement, its economic viability, long-lasting improvement of environmental performance, the move away from carbon fuels, and the improvement of general well-being.

Fifteen prizes are given out within the framework of the EEAwards: a citizen's project, a project by young people, a business category and an institutional category, prizes for the media…

The Award is supported by industrial and institutional partners, as well as by the International Polar Foundation, more than 80 organisations which pass the invitation to their members. There is also a significant support coming from the media and outside the media (federations, associations, administrations) the whole year long.

9.3.2. Stop Pub

In order to help citizens put a stop to printed matter and junk mail advertising which is distributed to all mailboxes, and so to make a friendly gesture to the environment, the Walloon Region has created self-adhesive labels that can be pasted onto the mailboxes. A TV and radio advertising campaign accompanied the action which was relaunched in 2008 in the context of the awareness programme to reduce household waste.

9.4. Raising awareness of energy savings

9.4.1. Avoid energy guzzlers at home

Over-consuming, big fat refrigerators, cars, washing machines, radiators and lamps are the key characters in the Energy Guzzlers campaign (La campagne Energivores/De energievreterscampagne) by the federal authorities at the initiative of the Climate Change Section and the Product Policy Section of the FPS Public Health, Security of the Food Chain and Environment.

The sites www.energivores.be (in French) and www.energievreters.be (in Dutch) carry a calculator module for estimating energy consumption (and associated CO_2 emissions), for detecting energy guzzlers in one's home and above all for not letting new ones enter there by select-

ing energy efficient equipment or products.

One can estimate the energy consumption of household appliances and other categories of products (car, lighting, windows, roof insulation) having a major impact and make a selection of models which are cleaner and more economical on the basis of a series of personal criteria of usage so as to avoid purchasing new energy guzzling equipment. The site continues to add new product modules.

It was promoted by a campaign directed at the general public. Launched at the end of 2006, the first campaign was followed by new campagnes scheduled once or twice a year in order to draw attention to the module by means of a series of attractive and humorous visuals, banners on websites and radio ads.

The concept of the campaign was recognised by many "awards" at the Belgian, European and international level and – still more important – it directed more than 600,000 visitors to the website.

A presentation of the website and the campaign can be found at http://unfccc.int/cooperation_and_support/education_and_outreach/items/4834.php (English) or at http://www.climat.be/spip.php?article147 (French and Dutch).

The RTBF campaign Planète Nature (see 9.2.5) also presented the energy guzzlers website in a document showing best practices in households.

9.4.2. Rational Use of Energy

The federal authorities make available to those who are involved in projects of construction or renovation a portal (http://www.belgium.be/fr/logement/construire_et_renover/) which sets out the relevant legislation (permits, standards, etc.) and available assistance (subsidies, reduced taxes and VAT, etc.).

Promotion of 'passive' house is also the subject of special attention: http://koba.minfin.fgov.be/commande/pdf/NewFolder_MaisonsPassives_2009.pdf

Via campaigns in the media, advertising, internet sites, digital information bulletins, the Regions devote permanent attention to the Rational Use of Energy and to energy generation which is respectful of the environment. The objective is the following:

- raising awareness and changing behaviour with respect to Rational Use of Energy;
- promotion of investments which generate energy savings and energy production which is respectful of the environment;
- communication of the regulations and financial support measures

9.4.3. Energy challenge for households

What is at issue here is a programme of the Brussels-Capital Region aimed at encouraging behaviour in the Rational Use of Energy manner, without need for major financial investments. On a voluntary basis, the participants undertake to put in practice some simple gestures to reduce their home consumption of energy but also that linked to the use of a motor vehicle. An internet site (www.defi-energie.be) makes it possible to perform monitoring (via regular reading of the meters), all of which allows one to measure the change in energy consumption. A lot of practical information, advice and exchange of best practices is channeled via this internet site and conferences are regularly organised in this context by asbl Centre Urbain on specific topics. The Brussels Energy Agency (ABEA) forms an integral part of the asbl Centre Urbain, providing full services to private persons in the framework of a sustainable habitat involving renovation, mastery of energy consumption and use of renewable sources of energy.

9.4.4. Défi Energie in the schools

In 2008, Brussels Environment-IBGE strengthened its activities in 'energy education' by launching for the first time its *Défi Energie* (Energy Challenge) in the schools. Over the course of a year, the participating schools receive the support of an energy coach in order to help to meet the challenge of reducing energy consumption by between 10 and 20% simply by influencing behaviour. In addition to instruction assistance drawing upon the experience of turnkey projects, the schools get technical support (calculator of consumption, internet site, energy facilitator). It is no longer the teachers who sign up for a turnkey project but the management and their teachers who make a commitment via an agreement. In total, 10 secondary schools (8 French and 2 Flemish) and 25 primary schools (17 French and 8 Flemish) were busy trying to meet the challenge. The proj-

ect was launched in September 2008 and continues until the end of the school year 2010. A second version of the challenge was launched for the 2009-2010 school year. Some specific supports on the internet site were made to help this project.

In the framework of the *Défi Energie Ecoles*, turnkey projects turned into the *Défi Piano and Défi Forte*. For the school year 2008-2009, there were no less than 17 classes distributed across 12 primary schools (French and Flemish) which received a cycle of 3 to 4 events enabling these classes to carry out an energy project.

9.4.5. Exemplative buildings

Each year the Brussels-Capital Region launches a call for projects to design and make *Bâtiments Exemplaires* (Model Buildings) in terms of energy and environment. In 2007 and 2008, 76 projects, amounting to around 200,000 m² of habitable space were kept. The projects receive financial aid as much for the design as for the creation of model buildings, technical assistance to help the authors of the projects attain the quality objectives, and to honour the designers and the buildings selected. The call for projects is open to all owners (families, public authorities, parapublic institutions, non-profits, companies, promoters, etc.) who build or renovate on the territory of the Brussels-Capital Region. The goal of the competition *Bâtiments Exemplaires* is to demonstrate that it is possible to attain very good environmental performances with new or renovated constructions. In this context, an exhibition entitled *The New Face of Brussels (Le nouveau visage de Bruxelles)* highlighted for the general public buildings which had been selected from among the preceding calls for projects.

9.4.6. Energy Guides

The Walloon Region has supported many local projects linked to energy, as well as a nonprofit organisation which offers training to develop communal dynamism by welcoming, training and meeting with active citizen who are volunteers to become Energy Guides.

9.4.7. Assistance to disadvantaged groups of residents to help them make Rational Use of Energy

In the Flemish Region, thanks to a collaboration between the *Bond Beter Leefmilieu* ('Assocation for a Better Environment - umbrella organisation of the Flemish environmental NGOs) and various organisations, groups of residents from disadvantaged neighbourhoods are guided in the rational use of energy. This project has been repeated during the 2007-2008 period under a modified form.

In the Walloon Region, the Public Centres of Social Assistance (CPAS) may receive subsidies to provide social guidance in energy. They inform people about rational use of energy and about taking control of consumption. They conduct preventive and curative measures in these domains and spread information aimed at facilitating access to existing financial assistance. In their plan, the CPAS can also consider pre-financing certain aids to investment. Within the Union of Cities and Municipalities of the Walloon Region, a Social Unit for Energy was established to deal with various issues linked to energy: gas, electricity, Social Heating Oil Fund, social guidance in energy matters. This unit advises the members, collects information, establishes a repertoire of good practices, develops training sessions and plans visits. During the 2008 – 2010 period (5th call), the projects of 108 CPAS were selected.

In the Brussels-Capital Region, some experiments with social guidance in energy matters have been completed. Training programmes for social workers will also come into force beginning in 2009. Pilot and demonstration projects have also been proposed.

9.4.8. Environmental Newsletter

In the Brussels-Capital Region, a number of activities are being undertaken for the benefit of companies. An environmental newsletter from Brussels Environment - IBGE intended for enterprises regularly touches upon the inclusion of environmen-

tal, energy and climatic considerations in companies and industrial sectors. A collaboration between Brussels Environment and the Brussels Enterprise Agency (Agence Bruxelloise pour l'Entreprise) has been arranged.

9.4.9. Training on energy matters for adults

Associations of adults are supported by the Flemish Region in order to include environmental concerns in their operations. During the period of the 2006-2009 plan, a manual on environmental concerns was prepared in this way in the offices of the national secretariats of associations, some action guidelines to help volunteers to introduce environmental concerns in their operations. Support from associations in terms of financing and content is expected in the context of developing educational activities touching upon energy.

9.4.10. Energy Audits

In the Walloon Region, the combination of regional subsidies and federal tax deductions makes recourse to the services of energy auditors by private persons nearly free of charge. The aim is to avoid dispersal of efforts and to apply them where they are most effective and profitable. An audit is also very often an indispensable stage in applying for grants. The Walloon municipalities will next have at their disposal 'energy advisers' for a period of 24 months in order to prioritise rational use of energy at the level of public buildings (making an energy survey of buildings in the commune, a plan for improving energy performance of communal buildings) as well as private buildings. The Brussels Energy Agency (ABEA) makes energy advisers available to private individuals as well as tools to help private persons make decisions about saving energy. Each year 100 audits are performed free of charge on behalf of Brussels residents. These audits allow one to make a complete check-up of the envelope of habitation and of the behaviour of the occupants. Solutions are suggested to the occupants to reduce their energy consumption. ABEA provides advice via thematic brochures on insulation, heating, economical light bulbs, use of solar panels and rational use of energy, information about subsidies for solar energy in the Brussels-Capital Region and on the current standards for insulation.

9.4.11. Energy advisers in small enterprises

In the Flemish Region, subsidies are allocated to the employer organisations from the commercial sector for the hiring of one or more advisers in energy matters. They assist the companies (small enterprises whose annual energy consumption is less than 0.1 PJ.) to record, monitor and interpret energy consumption, detect areas of energy waste, offer ideas which can generate energy savings and provide information concerning the measures of support.

The Walloon Region gives financial aid to business federations (Walloon Union of Enterprises, Union of the Middle Classes, Chambers of Commerce and Industry) to set up advisory services on energy. In direct contact with their members, these advisers are best situated to prompt and assist the companies in their efforts at improving energy efficiency. Frequently their advice goes hand in hand with that given out by advisers on the environment and mobility made available to certain of these federations by the Region.

The Brussels-Capital Region also trains 'Energy Managers in buildings'. A specific training was put in place back in 2004, during which various subjects are dealt with from the perspective of energy performance and financial profitability: energy reporting, insulation of buildings, heating, ventilation, air conditioning, lighting, cogeneration, renewable energy, etc. The training comprises specific modules such as energy audits, renewable energy, high quality cogeneration, etc. The energy manager is made aware of all the available financial assistance. Finally, this training is an occasion to meet facilitators of energy who are charged with the task of providing free assistance to the various actors.

The Walloon Region trains energy advisers for its own needs as well as the needs of third parties including the municipalities and the private sector.

9.4.12. Eco-construction

In the Walloon Region three clusters (eco-construction/Tweed; sustainable energy/Cap 2020; sustainable construction) address architects, entrepreneurs and producers of materials with support from the regional authority. The clusters are places of exchange, value creation and prompting innovation.

The Brussels-Capital Region also offers a dynamic support of information exchange in the sector of eco-construction thanks to the Cluster Ecobuild.

9.4.13. Energy grants[50]

Many grants are available to the public or to enterprises for energy saving investments (insulation, windows, household appliances that do not use much electricity, boilers…), the installation of photovoltaic or thermal panels at the level of the regions, as well as provinces and municipalities. The systems vary according to the regional policies. The federal Government also stimulates these investments by appreciable possibilities for tax deduction. The conferral of green certificates helps make profitable the alternative production of energy by photovoltaic panels, bio-methane, wind farms, hydraulic generation.

The Regions also make 'facilitators' available to the public, information windows, as well as internet sites.

[50] See PAMs: NCP measure EC-B01.

Zero interest loans are also offered to low-income families to enable them to have access to these technologies.

The Brussels-Capital Region, for example, confers subsidies in the tertiary and industrial sectors to invest in economical equipment (Brussels public sector, non-commercial organisations, companies and the self-employed, as well as federations representing a sector of activity).

9.5. Raising awareness of mobility

9.5.1. Promotion of public transport

Various information campaigns (posters, advertising in the press, letters, a gift *Pass* for the train on the 16th anniversary of each inhabitant…) are organised in addition to reduced prices or free of charge use of public transport (see 4.3.2)

The Walloon Region participates in the week of mobility in his houses of mobility with a special free of charge Mobility Passport, which allows one to discover the alternatives to the private car (bus, train, car sharing, bicycle, etc.) and the organisation of the "day without cars" in September.

Various operations to raise awareness about the use of bicycles are going on in the Brussels-Capital Region such as the organisation in May of a week of bicycling (Operation *Dring Dring*) with a day for the entire public (a Sunday), a day for the schools and a day for companies.

In addition, the campaign *Friday Bike-day*, in collaboration with companies and the authorities is expected to encourage workers to get to work by bicycle on Fridays, seeing in this a bridge to the week-end period of pleasure.

Since 2006, the Region offers a grant *Bruxell'Air* to Brussels residents who turn in their license plate.

9.5.2. Sustainable Mobility

In May 2007, the annual promotional campaign *Week van de zachte weggebruiker* (Week of the Vulnerable Road Users) was organised by the Flemish Region under the new name *Heen-en-weer week* (round-trip week). Emphasis is placed above all on the alternatives to individual car use to travel between home and the place of work.

The *Aardig-op-weg-week* ('friendly on the roads' week), the accent is on habits relating to travel in one's own neighborhood. In addition, projects such as the *Duurzaam naar school* (sustainable travel to school) are subsidised and in the context of the billboard campaign *Excuus* (sorry!) draws attention to turning off one's motor and to car sharing.

Weeks of mobility are undertaken, as well as various special activities such as the *Awards of Mobile 'Enterprise*. They reward each year public and private enterprises which have made a positive contribution to society in the matter of sustainable mobility.

A renewed approach was continued in 2008.

In the framework of the *Commuter Fund,* a campaign prompts companies to develop projects addressing travel between home and the workplace. Companies receive a subsidy in accordance with the principle 'one Euro for one Euro.' The projects are supported for a maximum of four years.

In the Walloon Region, the Centre of Dissemination and Documentation on Mobility (abbreviation - CDDM) was created in 2001 within the Network of Walloon Advisers on Mobility in order to make available to all those who are interested a maximum of documentation and information on mobility.

The Brussels-Capital Region will set up a structure for information and raising awareness in the general public. The programme of activities is just at the start with respect to professionals. With respect to private individuals, various actions have been undertaken, such as the publication of a brochure, a web page on eco-mobility, a stand of the Air at the *Fêtes de l'Environnement* (Celebration of the Environment), at the *Brussels Eco-week-end*s, at the inauguration of the renewed Rue de la Loi (Lawstreet in Brussels), and during the *Days without cars* and activities in the framework of the operation *Défi Energie (Energy Challenge)*.

In the context of the *Défi Energie*, a specific commitment is proposed to households owning one or more vehicles: to save fuel by avoiding small trips by car or by adopting a flexible behaviour, testing travel using other travel modes (bicycles are made available, for example).

9.5.3. Eco-driving

Training is proposed to promote a driving style which is a respectful of the environment.

In recent years, the Flemish Region has implemented various projects focussing on energy-saving driving methods or projects that include energy-saving driving methods. Other projects are ongoing, including Ecodriven, which is an initiative by the *Bond Beter Leefmilieu* ('Assocation for a Better Environment - umbrella organisation of the Flemish environmental NGOs). This project is aimed at companies for both private cars and lorries. In 2008 a platform was created to synchronise the various initiatives concerning energy-saving driving techniques. Professional drivers are offered additional courses via the Flemish Service for Job Placement and Professional Education (VDAB) and the recognised driving schools. Participants use simulators to learn environmentally friendly driving techniques.

A campaign entitled *Rustig Op de Baan* (Calm on the road) bores particularly good results. Activities are foreseen addressing new target groups and working on a larger scale.

The non-profit Flemish association Ecolife also organises courses.

In the Brussels-Capital Region, information stands on eco-driving are held during events and training sessions on eco-behaviour are part of the training of bus drivers of the STIB.

In the Walloon Region, Centres of Competence in Logistics and Transport of the Forem, in collaboration with the Training Centres for heavy lorries and buses of Forem, propose to put in place specific training modules dealing with eco-driving.

For its part, the TEC group already trains is drivers in eco-driving.

9.5.4. Raising awareness about purchase of vehicles which economise on energy

At the federal level, a strengthening of legal provisions regarding the mention within advertising of fuel consumption and CO_2 emissions is underway.

The annual publication by the Federal Government of the *Guide CO_2 de la voiture - Roulez économe… un plus pour vous et la nature (CO_2 Guide to Cars – Drive economically… a plus for you and for Nature)* enables citizens who wish to purchase a new vehicle to have objective information comparing the various models available on the Belgian market. The guide includes the nomenclature with respect to labeling linked to CO_2 emissios [from A to G], the possibilities of tax reductions being granted, the type of fuel and consumption, etc. This guide is linked to a database accessible to the public via an internet site.

9.5.5. Ecoscore

In the Flemish Region, information relating to energy consumption and to vehicle emissions has been disseminated via vast information and awareness raising campaigns, as well as via training for car sellers. The environmental evaluation *Ecoscore* team communicated to the public and to those owning fleets in particular via the brochure *Ecoscore*, a flyer, a radio spot, streamers on websites, articles in all sorts of periodicals.

The Ecoscore was also promoted in the Brussels-Capital Region. Information tools are offered (Internet) and awareness-raising and information campains took place during some events, for example, the Automobile Exhibition 2008 (Salon de l'Auto) or the Day Without Cars.

The Walloon Air and Climate Agency also finances *Ecoscore*. In addition, the Walloon Region decided to promote the purchase of less polluting cars (new or second-hand) through ecobonus/ecomalus (bonus when the newly bought vehicle produces less CO_2 than the one being replaced, malus when it is the opposite). These provisions have been in place since January 1, 2008.

9.6. Education and training

In Belgium, education is the jurisdiction of the Communities: the French-, Flemish- and German-speaking Communities.

In the official primary and secondary school instruction, the theme of climate change is generally treated in a transversal manner, incorporated in the larger programmes of education relating to the environment or sustainable development. Environmental education is today firmly anchored in the Belgian educational system. Its pedagogical objectives rest on four stages: discovery, understanding, judgment and action. Starting from what the person has experienced, the methodology prioritises active pedagogy, direct contact with life and eco-systemic actions. Some activities of education in sustainable development, both inside and outside the school, are conducted by a growing number of actors in society. They will develop in particular during the decade of the United Nations for education serving sustainable development (2005-2014).

9.6.1. We are the climate

In January 2007, the Federal Climate Change Section launched, in collaboration with WWF, the educational dossier 'We are the climate' (*In de weer voor het klimaat / Le climat, c'est nous),* addressing teachers and pupils of the third level of primary schools and of the first level of secondary schools. This binder contains a couple dozen thematic files composed of information sheets for the teachers and ready to work sheets for the students. In an interactive manner it touches upon the existing correlation between our life style, climate change and biodiversity, and tries essentially to work out solutions. http://www.climat.be/spip.php?article325

A third edition of the binder appeared in 2009. In total, 4,800 dossiers have already been distributed, in French and in Dutch. (http://www.climat.be/spip.php?article320&fs=)

9.6.2. The project MOS (respect for the environment at school)

The schools of the Flemish community got materials to deal with environmental topics and to make turn environmental concerns into a sure bet in the school, particularly regarding transports and energy. For fundamental instruction, the MOS project makes available for each topic a complete set of tips and ideas. For the secondary schools, an energy pack and a mobility pack are offered.

http://www.milieuzorgopschool.be

9.6.3. Cooperation agreement between the Walloon Region, the French Community and the Brussels Region

In order to facilitate the cooperation between the Walloon Region and the French Community, an cooperation agreement was signed in 2003 to create a partnership structure between the concerned administrations and to encourage synergies between the Regional Centres of Initiation to the Environment of the Walloon Region and the outdoor centers (Centres de Dépaysement et de Plein Air) of the French Community. It also defines a series of priority objectives among which the multiplication of channels of information, a better incorporation of environmental education in the school syllabus, the preparation of common and complementary activities, a support for schools wishing to put Sustainable Development in their draft establishment, a collaboration in logistics and the setting up of reciprocal exchanges for the purpose of improving pedagogical practices. Since 2008, contacts have been made with the Brussels Region with a view to extending the partnership. Furthermore, the three signatory institutions, aware of the similarity of the objectives they are pursuing, decided to jointly apply their competencies to promote and developing environmental education while placing it in the perspectives of sustainable development and civil education.

9.6.4. Competition in Environmental Education

Since the school year 2004-2005, a Competition of projects in environmental education has been organised for school establishments in ordinary and specialised secondary education, taking all networks together. It aims at best raising awareness of this concept among students.

The winners of the Competition receive pedagogical and financial assistance to bring their projects to successful conclusion. After some years, the winners become a resource comprising a network of 'Good-Will Ambassadors.' During the 2009-2010 school year, the Competition will be extended to primary schooling.

9.6.5. The Directorate for Raising Environmental Awareness

Apart from the services which it offers directly, the Directorate for Raising Envi-

ronmental Awareness of the Walloon Region is continuing its collaboration with a range of associated partners who perform specific assignments providing information and are active in the area of Environmental Education.

In collaboration with the French Community, the Walloon Region has set the challenge of moving on from alarmist information about climate change to information and a structured as well as responsible information and training programmes. Training modules are offered to actors in the world of education so that they may, in turn, raise awareness of young people and help them to understand and be aware of the preponderant role they have to play in the issue of global warming and improvement of air quality.

© Empreintes asbl/CRIE of Namur

Children being taught to use their bike in one of the Walloon Regional Centres of Initiation to the Environnement

Each year the Walloon Region orders the writing of pedagogical materials by associations specialised in Environmental Education. They constitute the object of a systematic hand-out in the primary and secondary schools. On average, more than 10,000 hand-outs of documentation are assured each year. The majority of the documents are also downloadable on the site www.environnement.wallonie.be. On the occasion of the release of the Walloon Plan for the Air, a new document was prepared for teenagers.

9.6.6. Passport in Eco-pedagogy

The Walloon Region allocates subsidies to the Institut of Eco-pedagogy (IEP), which dispenses pedagogical training in the field of environmental education to teachers, animators and private persons and collaborates with the higher schools in order to incorporate environmental education in school programmes. Since 2008, IEP has also been pursuing the project *Passport in Eco-pedagogy (Passeport en Eco-pédagogie)*, it sets up an original training course to complement existing training and confers a certificate in eco-pedagogy practices.

9.6.7. An Inconvenient Truth

Distributed free of charge as a DVD in the schools and municipalities of the Walloon and Brussels regions, the documentary presented by Al gore has become a veritable support for raising awareness and disseminating information relating to climate change. In order to take full advantage of all the educational potential, pedagogical materials have been prepared to help prompt discussions and move on to action. They offer a series of instructional sequences and happenings.

9.6.8. The network of Regional Centres of Initiation to the Environment (CRIE)

Intended to provide a public information service, to raise awareness and inform citizens about the environment and nature, the 11 CRIE of the Walloon Region (www.crie.be) supply, inter alia, a methodology of running events, as well as didactic material for popularisation. Special events in the schools, training sessions, activities for families and for vacation constitute their main activities. They aim primarily at a young audience, however certain training courses are intended for adults: teachers, animators, nature guides, citizens… Furthermore, guided walks, exhibitions, days of 'open doors' and conferences arranged by the CRIE are also opportunities for family activities.

Between 2004 and 2008, over the course of 5 years, the CRIE have carried out more than around 32,000 half-day activities in which more than 500,000 person participated. The audience welcomed by the CRIE is permanently increasing. In 2004, 90,000 visitors came to them,

whereas in 2008 the number reached more than 115,000.

9.6.9. The Centres for a 'Change of Scenery' and the Outdoors (CDPA) of the French Community

Apart from their specific features, the 10 educational centres of 'change of scenery' and the outdoors (*Centres de Dépaysement et de Plein Air – CDPA)* organised by the French Community aim at providing students with an active citizenship through environmental education.

In this regard, they fit perfectly with the concrete implementation of instructional tasks such as those formlated in the decree of the French Community dated 24 July 1997.

Beginning with the discovery and analysis of their environment, the centres prompt awareness of the interaction of the ecological (biological, geographic, etc) and human diversity (historical, socio-economic, cultural, philosophical, etc) of the world which surrounds them. They also lead to actions which fit within the mission of sustainable development.

Distributed across the territory of the Walloon Region, the various centres receive pupils or students at all levels and from all networks for one day events or for residence, depending on their specialities.

9.6.10. The Day of warm pull-overs

The initiative *Dikke truiendag (Day of warm Pull-overs)* was born in 2005 at the initiative of the Environmental Care at School Programme (*Milieuzorg op School* – MOS, see before) and the Flemish Government. On this day the heating is lowered by 1°C to remind us of Belgium's commitments in terms of reducing greenhouse gas emissions and symbolically pupils or employees of participating companies put on warm pull-overs.

The Flemish mobilisation has been growing from year to year. In 2009, 810,000 persons from more than 1400 schools, 1200 families and 600 companies and authorities participated in the event resulting in a savings of more than 200 tonnes of CO_2.

9.6.11. The Idea network and Green Belgium

The Idea Network (Réseau IDée[51]) is the main centre of information on environmental education within the Walloon Region and the French Community for the Brussels-Capital Region. The network now has more than 100 members, and its main objective is to strengthen ties between all the concerned actors: teachers and educators at all levels, animators, parents, environmental advisers… There are as many interested parties who find themselves offering a large range of pedagogical tools, a documentation centre, data banks, internet sites and catalogues. It prioritises persons who regularly offer activities and tools encouraging better awareness of the interdependence between economic growth, social progress and the environment.

Support from the Walloon Region, also has made it possible since 2000 to distribute the magazine *Symbioses* in all the French-speaking schools of the Walloon and Brussels regions.

In the Brussels Region, the non-profit association Green Belgium has been given the task of developing and promoting a structure of information and promoting education about the environment for the Flemish speaking primary and secondary school networks.

Since the winter of 2008, the promotional activity *Day of the Heavy Pull-over* has been taken over by GREEN asbl and Brussels-Environment in the framework of a campaign entitled *Effect of young people versus the greenhouse effect (Effet de jeunes contre effet de serre),* which invites primary and secondary schools of the Brussels and Walloon Regions to mobilize for the climate all year long. This campaign receives the support of the regional Ministers of the Environment. More than a hundred

[51] http://www.reseau-idee.be/

schools participated in 2008 and 2009 and the success has been growing. Other strong elements in the campaign are a day of easy mobility (bicycle, car sharing and public transport), a day of the local apple (reflections on the transport of foodstuff and energy consumption implicit in consumer goods) and a day entitled *Récup'attitude* (http://www.assembleedesjeunes.be/v2/homepage.asp).

9.6.12. Commitment for the planet and energy ambassadors

The Brussels-Capital Region makes available to teachers a complete set of pedagogical materials to raise the awareness of young people to the subject of energy including a document of personal commitment by the child to act in the interests of his planet. It is intended for Brussels pupils in the last level of primary schools (years 5 and 6) and the first year of secondary instruction.

Specialists come into the classes in order to help the pupils to conduct an educational, civic and also entertaining project. The pupils become *energy ambassadors* and put into practice some simple gestures to reduce energy consumption within the school. For the 2006-2007 school year, 28 turnkey projects (19 schools) relating to energy took place.

9.6.13. Going to school by bike

The Walloon Region encourages the use of bicycles in the school context. Instructor-monitors have been trained and can be consulted by the municipalities, the schools and organisations wishing to develop action plans.

9.6.14. Zero Emission Class

At the initiative of the International Polar Foundation, the exhibition *Zero Emission Class (Classe Zéro Emission)* was organised in 2009 in Brussels with the support of the Flemish and French Communities.

The objective of this interactive exhibition is to introduce the pupils to the astonishing world of the North and South poles, a universe made of immaculate landscapes inhabited by a fascinating fauna and also a world of science and exploration. The pupils perform experiments which enable them to make the connection between these vulnerable regions and the phenomenon of climate change. The aim is to involve as many of the pupils as possible in the search for long-lasting solutions. The exhibition also allows one to follow the project of the polar station "Princess Elisabeth Antarctica" from construction right up to the polar scientific research, with a view on internal plans and technologies. This 100% Belgian project is the first 'zero emission' research station.

At the end of the exhibition, educational materials are distributed to the instructors in order to help them profit from the contents afterwards in the class.

9.6.15. Higher education

The issue of climate change is receiving growing attention in higher education: courses on this subject have been developed and research units specifically dedicated to environmental questions, to climate change and to glaciology have been created.

This is the case, for example, with the European University of Brussels-Wallonia (Pôle universitaire européen de Bruxelles-Wallonie[52], which comprises eleven institutions of higher learning in Brussels and which offers various educational courses in the 1st and 2nd cycles. Some of them are especially devoted to environmental questions: a master of sciences degre in managing the environment, a master of geological sciences degree and a master of bioengineering degree: environmental sciences and technologies within the Free University of Brussels (ULB).

The Catholic University of Louvain (UCL) organises a programme of specialised studies in science and in management of the environment[53]. This specialised training in the third cycle, which offers courses related to the climate and energy, aims at educating students in dialogue, in action and interdisciplinary decision-making in the domain of the environment. Back in 1980, UCL set up a research unit called *Architecture and Climate (Architecture et climat[54]),* which aims to develop the theory of 'climatic architecture' and sustainable architecture, perform research on optimal energy efficiency of buildings of the third stage and of their fittings, support instruction on architecture within the university and development of special teaching methods with a view to creating continuous education courses for architects and energy technicians.

9.6.16. Formation of building professionals and other occupations in the building sector

In the Flemish Region, education in trades in the building sector does not pay enough attention to sustainable building and living and energy performance. For example, sustainable building is an optional subject for architects and there are not enough courses in this field. In addition, knowledge and skills in energy-efficient renovation are limited. Research and consultation is in progress to ensure extra focus on sustainable and energy-efficient building both in the existing training courses and in additional courses.

9.6.17. Masters degree in renewable energy and in global warming

The Fund for Research Training in Industry and in Agriculture (FRIA) directs part of the money which it receives from the Walloon Region to finance doctoral theses on topics of renewable energy and

[52] http://www.ulb.ac.be/poluniv-bxl
[53] http://www.cgse.ucl.ac.be
[54] http://www-climat.arch.ucl.ac.be/US_index.html

global warming (at least three stipends beginning in 2008).

Conferences for the network of architectural schools

The network of architectural schools of Brussels was created in 2003 at the behest of Brussels Environment and comprises 6 of the largest schools in the Region. The objective of this network is to prompt reflection on the incorporation of eco-construction principles aimed particularly at reducing the indirect impact of the sector on the climate (e.g. the "gray" energy of materials, the judicious arrangement of buildings, highlighting the existing heritage). In order to achieve this, evenings of interactive discussions are organised each year with participation from the various schools of architecture, their students and professionals active in the milieu. Support is also given to creation of joint projects. The students form an integral part of the established procedures of these evening gatherings. They help define the annual concept and select the topics which it will deal with.

9.6.18. International collaboration and training in the countries of the South

Assistance is given by Wallonia-Brussels International (WBI) to the Institute of Energy and the Environnement of the French-speaking community (IEPF) to support the process of building of national strategies for sustainable development (SNDD) in the developing countries.

At the behest of the IEPF, more than 250 national experts were trained in mastering the tools of environmental management for development (evaluation of environmental impact and the economy of the environment) and a dozen countries in the South have been given human and institutional resources to participate in the struggle against the greenhouse effect particularly through the implementation of the Clean Development Mechanism (CDM) of the Kyoto protocol.

The participation of the member countries in international negotiations over the environment and development was enhanced, notably by making systematic preparatory meetings for the negotiaitons and bringing together the French-speaking participants and making available to them specialised tools such as the Guide for Negotiators.

The organisation of the 2009 Summer School on International Negotiations also receives assistance. The objective is to prepare the countries of the South which are members of the French-speaking world for negotiations relating to the regime of international management of the climate after the expiration of the Kyoto Protocol in 2012.

Specific assistance is given to writing a structured and consistent national energy policy by making available tools facilitating decision-making for efficient development of the energy sector in the Democratic Republic of Congo and organising a seminar of intensive training on energy assessment.

9.6.19. Ecocampus

The Flemish Region urges higher schools and universities to incorporate environmental concerns in their organisation.

They receive support needed in terms of method and content to broadly incorporate environmental concerns into their establishment. Emphasis is placed on measurable benefit for the environment, on respect for environmental legislation and on educational added value.

During their education, the students are encouraged to act in an environmently friendly manner and to maintain this attitude later on during their working lives. The students are helped to incorporate environmental concerns in their student lives and are able to reduce the impact on the environment of their own acts and activities.

9.6.20. Youth, Space, Surroundings and Environment (JeROM: "Jeugd, Ruimte, Omgeving en Milieu)

The Flemish Region encourages young people to be critically involved and have a sense of responsibility with behaviours which are respectful of the environment. Groups of young people are helped to incorporate environmental concerns in their operations. They receive appropriate knowledge, understanding and educational tools, and they are encouraged to reduce their impact on the environment. During the period of the 2006-2009 plan, a manual of environmental concerns was especially developed for this purpose, custom-made for the youth organisations; a project was begun to help youth movements to build, transform and insulate their premises in a manner respecting the environment. Apart from the youth movements themselves, various actors affected (municipalities, private owners of the premises rented by young people, operators of campsites and houses for campers, etc.) are encouraged to undertake initiatives facilitating the treatment of environmental issues within youth groups.

9.6.21. Rational Use of Energy Seminars

The Brussels-Capital Region organises Rational Use of Energy seminars directed at decision-makers, technical managers and energy as well as building professionals. The building professionnals are made aware of experiments and successful projects both in Brussels and in the rest of Belgium. The objective is to help them to manage investments, renovations and daily energy consumption.

In addition, to help the implementation of the Edict on Energy Performance of Buildings to succeed, educational courses have been put in place with the federa-

tions of architects. The contents of training target specifically good energy design of buildings, including 'passive' buildings, regulations and mastering the calculation method.

9.6.22. Education in the professions of energy saving renovations, sustainable construction and renewable energy

In the Walloon Region, the Centre of Environmental Competencies offers a programme on education in professions which will grow in future. It revolves around energy-saving renovation, sustainable construction, renewable energy, etc. These are clearly professions where there is a shortage of personnel. These educational programmes are accessible both to those currently working and to those seeking employment.

The three clusters (Eco-construction, Tweed and Cap 2020) also stimulate exchange of know-how and networking between enterprises active in these domains.

9.6.23. Educating energy experts

The three Regions provide for training experts in energy audits. These measures are described in Table 4.2.

9.6.24. Scan of eco-efficiency

The scan of eco-efficiency proposed by the Flemish Region examines enterprises closely with respect to various aspects of eco-efficiency: to employ more environmentally friendly processes, to design (transform) products in a more environmentally friendly manner, to get value from waste, to reexamine markets, modify demand and render tangible economic and ecological benefits. The objective is to scan a total of 1,000 SMEs over a period of 3 years. The Flemish authorities pay for expenses linked to application of the scan by advisers in these enterprises.

9.6.25. Social responsibility of enterprises

The social responsibility of enterprises is a process of improvement in the framework of which enterprises take on board in a voluntary, systematic and consistent way considerations of a social, environmental and economic nature in their management, in dialogue with their stakeholders (clients, personnel, suppliers).

The Wallon enterprises, especially the SMEs and the Very Small Enterprises, are not yet sufficiently aware of the added value of this kind of management. Sessions of awareness-raising/training will be organised for them in order for a larger number to develop, for example, projects linked to energy economy and use of renewable energy sources. Two sessions will be organised per province so as to directly reach about 150 enterprises (1,000 additional enterprises could be reached by the effect of advertising and an indeterminate number by best practices which will later be displayed on the website rse.wallonie.be. The campaign will be led by the Centres of Studies and Action for Social Cohesion in collaboration with the Walloon Region, the Union of the Middle Classes (UCM), the Chambers of Commerce and Industry, labour union organisations (consulting services) and employers' organisations (Walloon Union of Enterprises and, possibly certain industrial sector federations, even the Walloon Export Agency (AWEX).

Brussels Environment organises multiple sessions of information and training for professionals dealing with subjects linked to the environment (energy, eco-construction, mobility,…). Seminars, colloquia and guided tours aim at informing professionals about regulatory news, the latest technical developments, and offering practical advice from specialists and review of experience of other organisations, discovering model installations. The training courses are organised in cycles over the course of several months and generally ending by an evaluation and a certificate. They are addressed to a specialised audience wishing to acquire precise knowledge in a technical domain.

9.6.26. The label Eco-dynamic Enterprise

The Brussels-Capital Region has deployed a series of measures in order to improve the technical competence of professional actors in building construction, to create exchanges between the actors and to facilitate implementation of rational energy use measures in buildings. This arsenal of measures especially includes setting up a network of energy facilitators, grants, training courses, seminars and a specific programme of labeling. The label Eco-dynamic Enterprise (with coordination provided by Brussels Environment) is a public certificate conferred for a period of three years to organisations (enterprises, associations, administrations), which voluntarily undertake to implement a system of environmental management founded on the principle of permanent improvement in all the environmental domains including energy and mobility. The criteria for selection include among other things the existence of energy reporting, the technologies selected with respect to air conditioning and energy consumption, encouragement

of behaviours which make it possible to achieve savings, solutions involving replacement of private cars, etc.

In the Brussels-Capital Region calls for projects are launched for a Local Action Programme of Energy Management – PLAGE – in the Municipalities and the hospitals. A training of specialists in energy efficiency and assignments informs and supports developments of cogeneration of renewable energy (information, advice, critical review of projects, seminars, calls for projects). A partnership called 'BRISE' with the Inter-Union Network for the Environment aims at raising the awareness of workers, particularly highlighting rational use of energy in the enterprise.

9.6.27. Agreements per industrial sector

The Regions have concluded agreements by industrial sector with the main industrial federations within the framework of follow-up to the Kyoto Accords. They are aimed essentially at improving energy efficiency. Technical assistance by sector is organised within a 'covenant of audit' for provision of specific advice and awareness-raising.

9.6.28. Creation and orientation of a knowledge centre on energy for agriculture and horticulture

The Flemish Region has created a permanent structure dedicated to use of energy in agriculture and horticulture. An adviser provides information on rational use of energy and new energy technologies in the broad sense (both technical and administrative information). A second activity is the 'technology watch' and monitoring the market for available technology.

9.6.29. Environmental reporting in agriculture

In the Flemish Region, the services assisting farmers make them aware of the utility of advice and of doing environmental reporting (energy, water, fertilizers, pesticides). Information sessions are organised for this target group, as well as demonstration projects on energy related crops and biofuels.

9.7. Sources of information on the Internet

Many websites have been mentioned in this chapter. One will find below a list presenting them all, as well as others setting out information on the environment, climate change, energy and mobility (non-exhaustive list).

9.7.1. The environment in general and climate change

http://www.lne.be

This link sends you to the website of the Environment, Nature and energy department (LNE) of the Flemish Government. A special 'climate' unit is responsible for the issue of climate change and has its own internet site: http://www.lne.be/themas/klimaatverandering. This official site presents the policy of the Flemish environmental administration with regard to climate.

http://www.vmm.be

The *VMM* (Flemish Environment Agency) is one of the public administrations charged by the Flemish Region with the task of designing and adapting environmental policy. One of its tasks consists in reporting on the quality of the environment in general and that on air and water in particular.

http://www.bruxellesenvironnement.be and http://www.leefmilieubrussel.be

Brussels Environment – IBGE/BIM is the administration for the environment and energy of the Brussels-Capital Region. This institution has the tasks of studying, overseeing and managing the air, water, soil, waste, energy, noise, nature (green areas and biodiversity)… as well as to issue environmental permits, to check that they are respected and to support projects involving education about the environment in the Brussels schools, to participate in meetings and in negotiations at the Belgian and international levels… Lastly, Brussels Environment has developed activities in the domain of eco-construction and the links between health and the environment. Its website provides information on all the environmental topics. An info telephone line is also available. Since 2005, the Brussels-Capital Region has been choosing 'energy facilitators' who can be consulted by private persons, enterprises and institutions wishing to improve the energy performance of their buildings and of their activities.

http://airclimat.wallonie.be

This site presents the Transversal Air/Climate Plan of the Walloon Government as well as general documentation on air quality, its contaminants, the actions taken by the Region, the steps to take at the individual level to protect air and climate, the results of air analyses under way, legislation,… It is rounded out by a quiz on energy.

http://environnement.wallonie.be

The portal of the Walloon Region for environmental questions is managed by the Directorate General of Agriculture, Natural Resources and the Environment (*DGARNE*). The '2006-2007 Analytical Report on the State of the Walloon Environment' and the 'Control Panel of the Walloon Environment' published each year include a specific chapter relating to climate change.

http://www.irceline.be

The Interregional Belgian Unit of the Environment *(IRCEL-CELINE)* provides information about the qualilty of

ambiant air in the country's regions. Its website offers a daily ozone bulletin based on information gathered in various remote stations by telemetry, as well as from the archives (dating from 1998) on all these data. Every half-hour the air quality (O_3, NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$) is measured and data are published on the site.

http://www.climatchange.be
http://www.climat.be
http://www.klimaat.be

This is the site of the Climate Change Section of the Federal Public Service of Health, Food Chain Security and Environment (DG Environment). It provides citizens with information on the federal initiatives in the domain of climate policy but also on Belgium in general in this context, as well as a general survey of recent data on greenhouse gas emissions and general information on global warming. All the official reports, decisions of the Federal Government and concrete actions which affect citizens are set out there. It also includes brochures and specific guides plus thematic media campaigns (print media and radio).

The website was completely reworked and relaunched in December 2008 and in the end it should become a real portal.

http://www.educapoles.org

EducaPoles is the educational site of the International Polar Foundation (IPF). It aims at raising awareness among young people and the educational world to the importance of the Polar Regions and to climate change by offering tools and custom made pedagogical projects. Three other websites dealing with various activities of the Foundation are available: the website of IPF, Science-Poles and ExploraPoles.

9.7.2. Energy

http://www.economie.fgov.be

The webste of the Federal Public Service Economy, SMEs, Self-employed and Energy provides information about its areas of competence related to energy, including renewable energy (technologies, actors, financial regulations, legislation, statistics, links, etc.).

http://www.energivores.be
http://www.energievreters.be

By means of a calculator module, this energy guzzlers site of the federal authorities allows you to estimate the energy consumption and the CO_2 emissions associated with various energy consuming devices and materials (household appliances, car, lighting, windows, roof insulation). It helps you to make a selection of the cleanest and most economical models on the basis of a series of criteria of personal use with a view to making a new purchase. The site continues to add new categories of products.

http://www.energiesparen.be

The Flemish Energy Agency (VEA) of the Flemish Government has a website which provides a lot of information about all matters linked to energy: Flemish policy on energy, the rational energy use, statistics, the possibilities to receive subsidies, environmentally friendly energy production, etc. Under different headings, it offers diversified information for precise target groups (households, government actors, enterprises, architects, schools and associations). Brochures on Rational Energy Use (insulation, ventilation, energy audits, heating, practical advice, etc.) and sustainable energy (biomass, combined heat and power, solar energy, heat pumps, etc.) can be downloaded.

http://energie.wallonie.be/

In the Walloon Region, the website of the Walloon administration in charge of energy provides a great deal of information about all questions relating to the issue of energy. In addition, twelve energy offices spread out over the Walloon territory provide practical information and perform audits for private persons who wish to use energy more efficiently and also more rationally. Their services are independent and free of charge. The topics dealt with range from heating to production of hot water as well as the exterior insulation of buildings, needs with respect to ventilation, rational use of household appliances and sources of renewable energy, bioclimatic renovation, etc. A broad panoply of tools is made available to the public: brochures, specialised manuals, quantitative and qualitative audits, articles in the local press, etc.

http://www.curbain.be
http://www.stadswinkel.be

In the Brussels-Capital Region, the Urban Centre manages an information office which provides advice to the general public on possibilities for saving energy and recourse to renewable energy. It also offers free of charge residential energy audits.

http://www.defi-energie.be

The programme of the Brussels-Capital Region having as its goal to encourage ways of behaviour involving rational use of energy.

http://www.brugel.be

BRUGEL (standing for BRUxelles Gaz ELectricité/ BRUssels Gas and ELectricity) is the regulator of the energy market in the Brussels-Capital Region. Its tasks include advising the public authorities on the organisation and operation of the regional energy market, verification of laws application dealing with this and providing general information to the public.

http://www.emis.vito.be

EMIS, the *Information System on Energy and the Environment,* is a project of the government of the Flemish Region. This system collects and processes a

large array of information relating to energy and the environment which it divides into 4 major categories: energy numbers, guide to enterprises, environmental technology and legislation.

http://www.ode.be

The *Organisation for Sustainable Energy* (ODE) is the central vector of information on renewable energy in Flanders and addresses itself to both households and to enterprises. It has a permanent secretariat open to the public and manages activities such as the publication of high quality brochures or monitoring the share of renewable energy in overall energy consumption in Flanders.

http://www.bbri.be/antenne_norm/

This national website provides information on legislation, regulations, subsidies and the procedures to follow in the matter of thermal insulation and ventilation of buildings.

9.7.3. Mobility

http://www.mobilit.fgov.be

The site of the Federal Public Service Mobility and Transport explains how the issue of mobility fits into the federal policy on sustainable development. It also allows one to check the level of CO_2 emissions of various models of vehicles.

http://statbel.fgov.be/

The portal of the *National Institute of Statistics* is there for all studies, numbers and statistics linked to traffic and mobility. See in particular the sections on 'mobility and the environment' and 'climate and the greenhouse effect.'

http://www.mobielvlaanderen.be

This site of the government of the Flemish Region informs the population about various elements of the issue of mobility: a lot of information about the possibilities of public transport, freight traffic, travel between home and workplace, the policy of mobility at the various levels of government, statistics, etc.

http://mobilite.wallonie.be

Site used by the Walloon Region to publicise its policy on mobility and to inform the public about all questions in this area. Links are provided to the *Network of advisers on mobility,* the campaign *Mobility Week*, the *Centre for dissemination of documentation on mobility*, to alternative modes of mobility (bicycling organisations, car sharing group, etc.) and to *Data Sheets on Multimodal Accessibility.*

http://www.bruxellesmobilite.irisnet.be

Brussels Mobility (AED - Administration for Equipment and Travel of the Ministry of the Brussels-Capital Region) takes care of assignments relating to equipment on the roads and infrastructures of public transports in the Brussels Region. Its objectives are especially to improve mobility, to promote public transport, to integrate all users into the travel policy, to assist the taxis and to see to maintenance of equipment.

http://www.fridaybikeday.be

Since September 2007, the special campaign entitled Friday Bikeday has been raising awareness and encouraging employees in Brussels enterprises to come to work by bike… on Fridays. It is a way of doing something for health and the environment without fundamentally overturning one's habits.

http://www.ecoscore.be

The method of Ecoscore allows you to measure the environmental score of vehicles of all brands. It gives an indication of the overall ecological character of your vehicle or of the one you want to buy.

http://www.bruxelles.irisnet.be/fr/citoyens/home/mobilite_a_bruxelles.shtml

The website of the Brussels-Capital Region offers a special section devoted to mobility and informs citizens about the various travel modes within the Region.

http://www.mobimix.be

Mobimix.be is a digital platform for fleet managers, buyers, mobility experts and other professionals who work in mobility and transport. The website offers information about eco-driving, sustainable fleet management, taxation, mobility budget and smart mobility management. It uses information sessions and a free monthly newsletter to keep interested parties informed about changes in legislation, instruments for fleet managers and best practices for companies and governments. Mobimix.be is an initiative by the Flemish Government (Department of Mobility and Public Works and Department of Environment, Nature and Energy), the Flemish Institute for Technological Research (VITO), the Flemish Foundation for Traffic Knowledge (VSV), Mobiel 21 and the Society for a Better Environment (Bond Beter Leefmilieu).

http://www.uwe.be/mobilite

This website is managed by the Mobility Unit of the UWE, the Walloon Union of Enterprises. This unit plays the role of adviser to enterprises and helps them in their considerations and their practices vis-à-vis sustainable mobility of people and merchandise. The site provides information about *plans of mobility of enterprises* (integrated systems aiming at integrating all movements), the various means of transport (on foot, bicycling, car sharing, public transport), the role of 'mobility' coordinators within enterprises, tele-commuting, etc.

Annexes

Annex 1. Supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. Correspondance table

Information reported under Article 7, paragraph 2	NC5 section
National systems in accordance with Article 5, paragraph 1	3.3
National registries	3.4
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	7.2
Policies and measures in accordance with Article 2	4.3.2
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	4.2
Information under Article 10	
Art 10a	3.3
Art 10b	6.4
Art 10c	7.3
Art 10d	8
Art 10e	9.6
Financial ressources	7.2

Annex 2. Summary tables on emission trends

For carbon dioxide (CO_2), see pages 176 to 179.

For methane (CH_4), see pages 180 to 183.

For nitrous oxide (N_2O), see pages 184 to 187.

For fluorinated gas (HFC, PFC and SF_6), see pages 188 and 189.

For a global summary, see pages 190 and 191.

Table 1 (Part 1) Emission trends – CO_2

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	1999
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
1. Energy	**110.445,74**	**113.253,95**	**111.091,67**	**110.091,54**	**113.732,52**	**114.071,51**	**118.987,65**	**112.977,10**	**119.208,82**	**113.308,72**
A. Fuel Combustion (Sectoral Approach)	110.360,59	113.170,07	111.007,52	110.007,08	113.647,76	113.986,47	118.894,25	112.882,90	119.107,80	113.197,72
1. Energy Industries	29.947,52	29.689,02	28.505,19	27.983,75	29.798,05	29.266,22	28.995,05	27.873,29	30.634,50	26.953,39
2. Manufacturing Industries and Construction	33.117,63	33.186,93	31.652,13	30.535,90	32.188,40	32.409,26	31.985,41	31.119,64	33.584,48	32.019,33
3. Transport	20.093,26	20.264,72	20.976,94	21.465,59	21.931,36	22.007,52	22.433,16	22.645,04	23.306,36	23.661,22
4. Other Sectors	27.010,69	29.830,56	29.675,14	29.825,94	29.532,42	30.163,65	35.352,94	31.111,27	31.450,37	30.427,14
5. Other	191,50	198,84	198,11	195,91	197,53	139,82	127,69	133,65	132,09	136,65
B. Fugitive Emissions from Fuels	85,15	83,88	84,16	84,46	84,76	85,04	93,40	94,20	101,02	111,00
1. Solid Fuels	NA,NE,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
2. Oil and Natural Gas	85,15	83,88	84,16	84,46	84,76	85,04	93,40	94,20	101,02	111,00
2. Industrial Processes	**7.927,86**	**7.512,69**	**7.412,19**	**7.324,31**	**8.633,05**	**9.114,10**	**8.439,27**	**8.734,17**	**8.887,00**	**9.097,63**
A. Mineral Products	5.337,17	5.213,53	5.323,78	5.303,98	5.518,56	5.704,71	5.280,61	5.485,49	5.563,29	5.504,90
B. Chemical Industry	644,71	615,90	433,08	435,22	1.273,24	1.417,65	1.510,22	1.552,55	1.492,08	1.658,23
C. Metal Production	1.945,99	1.683,26	1.655,34	1.585,11	1.841,25	1.991,74	1.648,43	1.696,13	1.831,63	1.934,50
D. Other Production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Production of Halocarbons and SF_6										
F. Consumption of Halocarbons and SF_6										
G. Other	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE
3. Solvent and Other Product Use	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
4. Agriculture										
A. Enteric Fermentation										
B. Manure Management										
C. Rice Cultivation										
D. Agricultural Soils										
E. Prescribed Burning of Savannas										
F. Field Burning of Agricultural Residues										
G. Other										

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	1999
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
5. Land Use, Land-Use Change and Forestry[2]	**-1.422,19**	**-1.182,50**	**-1.552,26**	**-1.469,25**	**-1.478,40**	**-1.371,45**	**-1.377,05**	**-1.394,59**	**-1.268,69**	**-1.203,37**
A. Forest Land	-3.205,49	-2.919,18	-3.233,06	-3.162,04	-3.192,00	-3.018,81	-3.071,19	-3.093,34	-2.977,03	-2.919,91
B. Cropland	479,68	477,62	484,28	497,12	509,01	527,03	535,92	547,98	559,21	561,52
C. Grassland	1.303,63	1.259,07	1.196,52	1.195,67	1.204,59	1.120,33	1.158,22	1.150,77	1.149,13	1.155,02
D. Wetlands	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**253,06**	**122,78**	**146,00**	**145,35**	**151,22**	**111,92**	**113,26**	**132,92**	**99,79**	**131,17**
A. Solid Waste Disposal on Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
B. Waste-water Handling										
C. Waste Incineration	253,06	122,78	146,00	145,35	151,22	111,92	113,26	132,92	99,79	131,17
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other *(as specified in Summary 1.A)*	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**
Total CO_2 emissions including net CO_2 from LULUCF	**117.204,47**	**119.706,92**	**117.097,61**	**116.091,95**	**121.038,39**	**121.926,08**	**126.163,12**	**120.449,60**	**126.926,91**	**121.334,15**
Total CO_2 emissions excluding net CO_2 from LULUCF	**118.626,66**	**120.889,42**	**118.649,86**	**117.561,20**	**122.516,79**	**123.297,53**	**127.540,18**	**121.844,19**	**128.195,61**	**122.537,52**
Memo Items:										
International Bunkers	16.398,73	16.059,53	15.841,59	16.348,99	16.731,70	15.839,38	19.229,06	21.209,12	22.466,39	**19.424,96**
Aviation	3.095,64	2.600,40	2.585,01	2.559,16	2.519,77	2.884,65	3.338,98	3.599,70	4.064,52	4.579,73
Marine	13.303,08	13.459,13	13.256,58	13.789,83	14.211,93	12.954,73	15.890,08	17.609,41	18.401,87	14.845,22
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 Emissions from Biomass	2.076,72	1.835,96	1.994,29	1.606,54	2.154,80	2.374,87	2.463,06	2.523,72	2.559,02	2.662,42

Table 1 (Part 2) Emission trends – CO_2

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
1. Energy	114.337,11	115.220,44	113.282,86	117.171,27	116.504,14	113.336,66	109.030,23	104.780,64	**-5,13**
A. Fuel Combustion (Sectoral Approach)	114.170,77	115.071,73	113.128,78	117.058,74	116.400,61	113.231,15	108.898,41	104.689,50	-5,14
1. Energy Industries	28.150,71	26.591,57	28.078,10	29.555,68	29.615,60	29.178,31	27.657,34	26.803,44	-10,50
2. Manufacturing Industries and Construction	32.782,11	32.362,17	30.447,53	30.160,96	29.216,10	27.822,29	27.437,98	26.294,47	-20,60
3. Transport	24.114,90	24.732,59	25.056,27	25.614,75	26.627,80	25.730,07	25.192,84	25.064,64	24,74
4. Other Sectors	28.996,48	31.248,06	29.410,54	31.592,53	30.812,10	30.371,44	28.481,07	26.425,32	-2,17
5. Other	126,57	137,34	136,35	134,82	129,01	129,03	129,18	101,63	-46,93
B. Fugitive Emissions from Fuels	166,33	148,71	154,08	112,53	103,53	105,51	131,81	91,14	7,04
1. Solid Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NE,NO	NA,NE,NO	NA,NO	NA,NO	0,00
2. Oil and Natural Gas	166,33	148,71	154,08	112,53	103,53	105,51	131,81	91,14	7,04
2. Industrial Processes	9.194,90	8.722,14	9.598,68	9.595,32	10.000,07	9.988,10	9.977,10	9.678,97	**22,09**
A. Mineral Products	5.814,66	5.478,45	5.581,06	5.430,24	5.522,90	5.430,93	5.735,54	5.605,81	5,03
B. Chemical Industry	1.652,62	1.654,25	1.992,21	2.465,45	2.822,24	3.022,04	2.644,24	2.646,29	310,47
C. Metal Production	1.727,62	1.589,44	2.025,40	1.699,63	1.654,93	1.535,12	1.597,32	1.426,86	-26,68
D. Other Production	NA	NA	NA	NA	NA	NA	NA	NA	0,00
E. Production of Halocarbons and SF_6									
F. Consumption of Halocarbons and SF_6									
G. Other	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	0,00
3. Solvent and Other Product Use	NA	NA	NA	NA	NA	NA	NA	NA	0,00
4. Agriculture									
A. Enteric Fermentation									
B. Manure Management									
C. Rice Cultivation									
D. Agricultural Soils									
E. Prescribed Burning of Savannas									
F. Field Burning of Agricultural Residues									
G. Other									

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
5. Land Use, Land-Use Change and Forestry[2]	**-1.531,51**	**-2.824,76**	**-2.318,67**	**-1.699,98**	**-1.153,54**	**-370,01**	**-1.060,86**	**-1.473,48**	**3,61**
A. Forest Land	-3.235,85	-4.510,39	-4.079,09	-3.458,08	-2.900,50	-2.094,61	-2.776,94	-3.169,37	-1,13
B. Cropland	570,90	552,19	565,43	565,41	569,37	576,14	575,38	577,86	20,47
C. Grassland	1.133,44	1.133,44	1.195,00	1.192,69	1.177,59	1.148,45	1.140,70	1.118,02	-14,24
D. Wetlands	NE	NE	NE	NE	NE	NE	NE	NE	0,00
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	0,00
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	0,00
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	0,00
6. Waste	**146,19**	**149,76**	**161,21**	**185,23**	**127,74**	**107,64**	**78,16**	**85,09**	**-66,38**
A. Solid Waste Disposal on Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0,00
B. Waste-water Handling									
C. Waste Incineration	146,19	149,76	161,21	185,23	127,74	107,64	78,16	85,09	-66,38
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	0,00
7. Other *(as specified in Summary 1.A)*	NA	NA	NA	NA	NA	NA	NA	NA	**0,00**
Total CO_2 emissions including net CO_2 from LULUCF	**122.146,69**	**121.267,57**	**120.724,08**	**125.251,84**	**125.478,41**	**123.062,39**	**118.024,62**	**113.071,22**	**-3,53**
Total CO_2 emissions excluding net CO_2 from LULUCF	**123.678,19**	**124.092,33**	**123.042,75**	**126.951,82**	**126.631,95**	**123.432,40**	**119.085,48**	**114.544,70**	**-3,44**
Memo Items:									
International Bunkers	20.704,89	20.409,84	26.145,03	26.784,33	27.965,44	28.494,16	30.969,05	34.214,40	**108,64**
Aviation	4.653,37	4.209,27	3.503,91	3.814,07	3.718,62	3.537,83	3.684,31	3.787,08	22,34
Marine	16.051,52	16.200,58	22.641,12	22.970,26	24.246,82	24.956,33	27.284,74	30.427,32	128,72
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	0,00
CO_2 Emissions from Biomass	2.694,34	2.881,05	3.003,44	3.587,58	4.114,47	4.440,94	5.240,66	5.663,52	172,71

Table 2 (Part 1) Emission trends – CH_4

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	1999
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
1. Energy	**61,98**	**57,22**	**49,93**	**47,63**	**44,50**	**44,71**	**45,20**	**41,73**	**40,49**	**39,69**
A. Fuel Combustion (Sectoral Approach)	21,28	22,46	21,75	21,18	19,22	19,16	20,36	18,29	17,94	17,09
1. Energy Industries	0,48	0,48	0,42	0,41	0,47	0,46	0,40	0,35	0,46	0,47
2. Manufacturing Industries and Construction	3,73	3,46	3,14	2,85	2,83	2,88	2,67	2,66	2,91	2,83
3. Transport	5,59	5,86	5,86	5,80	5,73	5,64	5,61	5,19	4,97	4,66
4. Other Sectors	11,47	12,66	12,32	12,13	10,18	10,17	11,68	10,08	9,60	9,13
5. Other	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01
B. Fugitive Emissions from Fuels	40,70	34,76	28,18	26,45	25,29	25,55	24,84	23,44	22,55	22,60
1. Solid Fuels	15,70	9,98	4,10	0,89	0,83	0,83	0,83	0,75	0,65	0,62
2. Oil and Natural Gas	25,01	24,78	24,08	25,56	24,45	24,72	24,01	22,70	21,90	21,97
2. Industrial Processes	**0,00**	**0,01**	**0,01**	**0,01**	**0,04**	**0,06**	**0,07**	**0,12**	**0,12**	**0,08**
A. Mineral Products										
B. Chemical Industry	0,00	0,01	0,01	0,01	0,04	0,06	0,07	0,12	0,12	0,08
C. Metal Production										
D. Other Production										
E. Production of Halocarbons and SF_6										
F. Consumption of Halocarbons and SF_6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use										
4. Agriculture	**277,84**	**274,90**	**275,26**	**278,34**	**279,04**	**283,15**	**279,42**	**277,54**	**278,50**	**279,41**
A. Enteric Fermentation	196,47	195,13	193,08	193,16	194,32	196,37	192,93	190,41	188,49	188,79
B. Manure Management	81,37	79,78	82,19	85,17	84,72	86,78	86,49	87,13	90,01	90,62
C. Rice Cultivation	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Agricultural Soils	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NE	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NE,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	**1999**
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
5. Land Use, Land-Use Change and Forestry	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**
A. Forest Land	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
B. Cropland	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C. Grassland	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
D. Wetlands	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**136,02**	**135,25**	**135,45**	**125,01**	**128,38**	**124,85**	**113,27**	**112,32**	**105,72**	**97,02**
A. Solid Waste Disposal on Land	125,24	124,41	124,48	114,02	117,31	113,59	101,84	100,72	94,32	86,70
B. Waste-water Handling	10,45	10,50	10,56	10,56	10,54	10,37	10,21	9,92	9,59	8,31
C. Waste Incineration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. Other	0,33	0,33	0,41	0,43	0,52	0,89	1,22	1,68	1,80	2,01
7. Other (as specified in Summary 1.A)	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total CH_4 emissions including CH_4 from LULUCF	**475,84**	**467,38**	**460,66**	**450,99**	**451,96**	**452,78**	**437,96**	**431,70**	**424,83**	**416,21**
Total CH_4 emissions excluding CH_4 from LULUCF	**475,84**	**467,38**	**460,66**	**450,99**	**451,96**	**452,78**	**437,96**	**431,70**	**424,83**	**416,21**
Memo Items:										
International Bunkers	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,03	0,02
Aviation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Marine	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 Emissions from Biomass										

Table 2 (Part 2) Emission trends – CH_4

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
1. Energy	**38,39**	**38,50**	**35,64**	**34,94**	**34,57**	**34,58**	**34,70**	**34,13**	**-44,92**
A. Fuel Combustion (Sectoral Approach)	16,41	16,87	15,11	15,31	15,23	14,49	14,75	14,17	-33,38
1. Energy Industries	0,50	0,51	0,56	0,57	0,57	0,59	0,64	1,00	107,15
2. Manufacturing Industries and Construction	3,25	3,36	3,18	3,22	3,27	2,80	3,12	2,74	-26,57
3. Transport	4,25	3,93	3,61	3,41	3,17	2,89	2,77	2,63	-53,04
4. Other Sectors	8,40	9,07	7,76	8,11	8,21	8,21	8,21	7,80	-31,95
5. Other	0,01	0,01	0,01	0,01	0,01	0,00	0,01	0,00	113,27
B. Fugitive Emissions from Fuels	21,98	21,63	20,53	19,63	19,34	20,09	19,96	19,96	-50,96
1. Solid Fuels	0,63	0,64	0,54	0,53	0,57	0,56	0,57	0,50	-96,82
2. Oil and Natural Gas	21,35	20,99	20,00	19,09	18,77	19,54	19,39	19,46	-22,17
2. Industrial Processes	**0,10**	**0,12**	**0,11**	**0,10**	**0,56**	**2,08**	**2,72**	**2,77**	**454.581,15**
A. Mineral Products								NA	0,00
B. Chemical Industry	0,10	0,10	0,11	0,10	0,14	0,12	0,02	0,02	3.761,48
C. Metal Production		0,02			0,42	1,96	2,70	2,75	100,00
D. Other Production									
E. Production of Halocarbons and SF_6									
F. Consumption of Halocarbons and SF_6									
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	0,00
3. Solvent and Other Product Use									
4. Agriculture	**274,38**	**270,71**	**262,13**	**253,61**	**249,35**	**246,48**	**244,23**	**244,58**	**-11,97**
A. Enteric Fermentation	187,03	188,64	181,59	175,61	173,35	171,13	169,42	169,94	-13,51
B. Manure Management	87,35	82,07	80,53	78,00	76,00	75,35	74,81	74,64	-8,26
C. Rice Cultivation	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0,00
D. Agricultural Soils	NA	NA	NA	NA	NA	NA	NA	NA	0,00
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	0,00
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0,00
G. Other	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0,00

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
5. Land Use, Land-Use Change and Forestry	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**0,00**
A. Forest Land	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	0,00
B. Cropland	NE	NE	NE	NE	NE	NE	NE	NE	0,00
C. Grassland	NE	NE	NE	NE	NE	NE	NE	NE	0,00
D. Wetlands	NE	NE	NE	NE	NE	NE	NE	NE	0,00
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	0,00
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	0,00
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	0,00
6. Waste	**90,56**	**74,02**	**64,00**	**57,49**	**55,10**	**46,62**	**40,48**	**35,56**	**-73,85**
A. Solid Waste Disposal on Land	80,39	65,15	55,21	48,86	46,62	38,26	32,40	27,66	-77,92
B. Waste-water Handling	7,94	6,78	6,57	6,60	6,26	6,27	6,03	5,85	-43,99
C. Waste Incineration	NA	NA	NA	NA	NA	NA,NO	NA,NO	NA,NO	0,00
D. Other	2,23	2,08	2,22	2,02	2,21	2,09	2,05	2,05	519,77
7. Other (as specified in Summary 1.A)	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**0,00**
Total CH_4 emissions including CH_4 from LULUCF	**403,43**	**383,34**	**361,88**	**346,13**	**339,58**	**329,76**	**322,14**	**317,05**	**-33,37**
Total CH_4 emissions excluding CH_4 from LULUCF	**403,43**	**383,34**	**361,88**	**346,13**	**339,58**	**329,76**	**322,14**	**317,05**	**-33,37**
Memo Items:									
International Bunkers	0,02	0,02	0,03	0,03	0,03	0,04	0,04	0,04	147,82
Aviation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	877,08
Marine	0,02	0,02	0,03	0,03	0,03	0,03	0,04	0,04	127,81
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	0,00
CO_2 Emissions from Biomass									

Table 3 (Part 1) Emission trends – N_2O

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	**1999**
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
1. Energy	**2,57**	**2,73**	**2,79**	**2,88**	**3,04**	**3,10**	**3,30**	**3,39**	**3,55**	**3,60**
A. Fuel Combustion (Sectoral Approach)	2,57	2,73	2,79	2,88	3,04	3,10	3,30	3,39	3,55	3,60
1. Energy Industries	0,75	0,81	0,81	0,79	0,81	0,76	0,82	0,82	0,82	0,74
2. Manufacturing Industries and Construction	0,19	0,19	0,18	0,16	0,15	0,16	0,14	0,15	0,15	0,15
3. Transport	1,18	1,26	1,32	1,45	1,61	1,72	1,84	1,95	2,10	2,25
4. Other Sectors	0,45	0,46	0,47	0,47	0,46	0,46	0,50	0,47	0,47	0,47
5. Other	0,01	0,01	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00
B. Fugitive Emissions from Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
2. Oil and Natural Gas										
2. Industrial Processes	**12,69**	**12,36**	**11,32**	**12,12**	**13,80**	**14,96**	**16,41**	**15,41**	**15,61**	**15,14**
A. Mineral Products										
B. Chemical Industry	12,69	12,36	11,32	12,12	13,80	14,96	16,41	15,41	15,61	15,14
C. Metal Production										
D. Other Production										
E. Production of Halocarbons and SF_6										
F. Consumption of Halocarbons and SF_6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**0,79**	**0,79**	**0,80**	**0,80**	**0,79**	**0,77**	**0,77**	**0,77**	**0,76**	**0,76**
4. Agriculture	**17,76**	**17,53**	**17,39**	**17,61**	**17,69**	**17,87**	**17,60**	**17,61**	**17,66**	**17,76**
A. Enteric Fermentation										
B. Manure Management	3,10	3,08	3,05	3,12	3,14	3,19	3,19	3,18	3,15	3,17
C. Rice Cultivation										
D. Agricultural Soils	14,66	14,45	14,33	14,49	14,55	14,68	14,41	14,43	14,51	14,58
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NE	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NE,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	**1999**
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
5. Land Use, Land-Use Change and Forestry	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**
A. Forest Land	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
B. Cropland	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C. Grassland	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
D. Wetlands	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**0,95**	**0,96**	**0,98**	**0,99**	**0,96**	**0,95**	**0,95**	**0,95**	**0,96**	**0,98**
A. Solid Waste Disposal on Land										
B. Waste-water Handling	0,95	0,96	0,98	0,99	0,96	0,95	0,95	0,95	0,96	0,98
C. Waste Incineration	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other (as specified in Summary 1.A)	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total N_2O emissions including N_2O from LULUCF	**34,76**	**34,39**	**33,29**	**34,39**	**36,27**	**37,65**	**39,02**	**38,11**	**38,55**	**38,24**
Total N_2O emissions excluding N_2O from LULUCF	**34,76**	**34,39**	**33,29**	**34,39**	**36,27**	**37,65**	**39,02**	**38,11**	**38,55**	**38,24**
Memo Items:										
International Bunkers	2,34	2,37	2,34	2,43	2,51	2,29	2,80	3,10	3,24	**2,62**
Aviation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01
Marine	2,34	2,37	2,34	2,43	2,51	2,28	2,80	3,10	3,24	2,61
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
CO_2 Emissions from Biomass										

Table 3 (Part 2) Emission trends – N_2O

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
1. Energy	**3,76**	**3,82**	**3,85**	**3,93**	**3,97**	**3,72**	**3,69**	**3,78**	**47,25**
A. Fuel Combustion (Sectoral Approach)	3,76	3,82	3,85	3,93	3,97	3,72	3,69	3,78	47,25
1. Energy Industries	0,80	0,79	0,79	0,83	0,80	0,53	0,49	0,46	-38,60
2. Manufacturing Industries and Construction	0,16	0,16	0,14	0,12	0,12	0,12	0,15	0,27	47,49
3. Transport	2,34	2,42	2,49	2,52	2,59	2,62	2,62	2,63	123,24
4. Other Sectors	0,45	0,46	0,43	0,45	0,45	0,45	0,43	0,42	-6,69
5. Other	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-94,97
B. Fugitive Emissions from Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	IE,NA,NO	0,00
1. Solid Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0,00
2. Oil and Natural Gas								IE,NA,NO	0,00
2. Industrial Processes	**14,72**	**14,16**	**12,81**	**10,33**	**10,96**	**11,00**	**8,27**	**6,13**	**-51,66**
A. Mineral Products								NA	0,00
B. Chemical Industry	14,72	14,16	12,81	10,33	10,96	11,00	8,27	6,13	-51,66
C. Metal Production								NA	0,00
D. Other Production									
E. Production of Halocarbons and SF_6									
F. Consumption of Halocarbons and SF_6									
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	0,00
3. Solvent and Other Product Use	**0,81**	**0,81**	**0,80**	**0,80**	**0,80**	**0,80**	**0,80**	**0,80**	**0,20**
4. Agriculture	**17,05**	**16,79**	**16,46**	**15,64**	**15,64**	**15,35**	**15,19**	**14,47**	**-18,53**
A. Enteric Fermentation									
B. Manure Management	3,10	3,07	2,95	2,75	2,80	2,75	2,69	2,56	-17,44
C. Rice Cultivation									
D. Agricultural Soils	13,95	13,72	13,51	12,88	12,83	12,61	12,50	11,91	-18,76
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	0,00
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0,00
G. Other	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	NA,NE	0,00

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	**Change from base to latest reported year**
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
5. Land Use, Land-Use Change and Forestry	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**	**0,00**
A. Forest Land	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	0,00
B. Cropland	NE	NE	NE	NE	NE	NE	NE	NE	0,00
C. Grassland	NE	NE	NE	NE	NE	NE	NE	NE	0,00
D. Wetlands	NE	NE	NE	NE	NE	NE	NE	NE	0,00
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	0,00
F. Other Land	NE	NE	NE	NE	NE	NE	NE	NE	0,00
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	0,00
6. Waste	**0,84**	**0,85**	**0,84**	**0,86**	**0,87**	**0,87**	**0,88**	**0,88**	**-7,04**
A. Solid Waste Disposal on Land									
B. Waste-water Handling	0,84	0,85	0,84	0,86	0,87	0,87	0,88	0,88	-7,04
C. Waste Incineration	0,00	0,00	0,00	0,00	0,00	IE,NA,NE,NO	IE,NA,NE,NO	IE,NA,NE,NO	-100,00
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	0,00
7. Other (as specified in Summary 1.A)	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**0,00**
Total N_2O emissions including N_2O from LULUCF	**37,18**	**36,43**	**34,77**	**31,55**	**32,22**	**31,74**	**28,82**	**26,06**	**-25,02**
Total N_2O emissions excluding N_2O from LULUCF	**37,18**	**36,43**	**34,77**	**31,55**	**32,22**	**31,74**	**28,82**	**26,06**	**-25,02**
Memo Items:									
International Bunkers	2,84	2,86	4,00	4,05	4,27	4,40	4,81	5,36	**128,65**
Aviation	0,01	0,01	0,01	0,02	0,02	0,01	0,02	0,02	4.233,33
Marine	2,83	2,85	3,98	4,04	4,26	4,38	4,79	5,34	127,81
Multilateral Operations	NO	NO	NO	NO	NO	NO	NO	NO	0,00
CO_2 Emissions from Biomass									

Table 4 Emission trends – HFCs, PFCs and SF_6

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	**1999**
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
Emissions of HFCs[3] - (Gg CO_2 equivalent)	**439,03**	**439,03**	**439,03**	**439,03**	**439,03**	**439,03**	**527,30**	**638,99**	**779,49**	**817,12**
HFC-23	NA	NA	NA	NA	NA,NE,NO	NA	NA	NA	NA	NA
HFC-32	NA	NA	NA	NA	NA,NE,NO	NA	NA	NA	0,00	0,00
HFC-41	NA	NA	NA	NA	NA,NE,NO	NA	NA	NA	NA	NA
HFC-43-10mee	NA	NA	NA	NA	NA,NE,NO	NA	NA	NA	NA	NA
HFC-125	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,02	0,03
HFC-134	NA	NA	NA	NA	NA,NE,NO	NA	NA	NA	NA	NA
HFC-134a	0,33	0,33	0,33	0,33	0,33	0,33	0,38	0,44	0,49	0,45
HFC-152a	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,03
HFC-143	NA	NA	NA	NA	NA,NE,NO	NA	NA	NA	NA	NA
HFC-143a	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,02	0,03
HFC-227ea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
HFC-236fa	NA	NA	NA	NA	NA,NE,NO	NA	NA	NA	NA	NA
HFC-245ca	NA	NA	NA	NA	NA,NE,NO	NA	NA	NA	NA	NA
Unspecified mix of listed HFCs[4] - (Gg CO_2 equivalent)	NA	NA	NA	NA	NA,NE,NO	NA	NA	NA	NA	NA
Emissions of PFCs[3] - (Gg CO_2 equivalent)	**1.753,32**	**1.677,72**	**1.829,52**	**1.758,67**	**2.113,04**	**2.335,24**	**2.217,41**	**1.211,43**	**669,33**	**347,97**
CF_4	0,05	0,05	0,05	0,05	0,06	0,07	0,07	0,02	0,00	0,00
C_2F_6	0,06	0,05	0,06	0,05	0,07	0,07	0,07	0,04	0,02	NA,NO
C_3F_8	0,02	0,02	0,03	0,02	0,03	0,03	0,03	0,03	0,01	NA,NO
C_4F_{10}	0,03	0,03	0,03	0,03	0,03	0,04	0,04	0,02	0,01	0,00
c-C_4F_8	NA,NO	NA,NO	NA,NO	NA,NO	NA,NE,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C_5F_{12}	0,04	0,04	0,05	0,04	0,06	0,06	0,06	0,02	0,03	0,02
C_6F_{14}	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,02	0,02	0,02
Unspecified mix of listed PFCs[4] - (Gg CO_2 equivalent)	NA,NO	NA,NO	NA,NO	NA,NO	NA,NE,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Emissions of SF6[3] - (Gg CO_2 equivalent)	**1.662,49**	**1.576,25**	**1.743,82**	**1.676,67**	**2.035,35**	**2.205,16**	**2.120,86**	**526,39**	**271,44**	**121,95**
SF_6	0,07	0,07	0,07	0,07	0,09	0,09	0,09	0,02	0,01	0,01

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
Emissions of HFCs[3] - (Gg CO_2 equivalent)	**951,95**	**1.083,46**	**1.303,34**	**1.467,22**	**1.511,95**	**1.496,48**	**1.601,32**	**1.765,48**	**302,13**
HFC-23	NA	NA	NA	NA	NA	NA	NA,NE,NO	NA,NE,NO	0,00
HFC-32	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,02	100,00
HFC-41	NA	NA	NA	NA	NA	NA	NA,NE,NO	NA,NE,NO	0,00
HFC-43-10mee	NA	NA	NA	NA	NA	NA	NA,NE,NO	NA,NE,NO	0,00
HFC-125	0,04	0,06	0,07	0,09	0,10	0,11	0,12	0,13	14.290,70
HFC-134	NA	NA	NA	NA	NA	NA	NA,NE,NO	NA,NE,NO	0,00
HFC-134a	0,48	0,52	0,58	0,63	0,62	0,57	0,61	0,66	99,64
HFC-152a	0,10	0,07	0,38	0,32	0,29	0,20	0,21	0,30	61.840,31
HFC-143	NA	NA	NA	NA	NA	NA	NA,NE,NO	NA,NE,NO	0,00
HFC-143a	0,05	0,06	0,07	0,09	0,10	0,11	0,11	0,13	11.954,75
HFC-227ea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2.152,53
HFC-236fa	NA	NA	NA	NA	NA	NA	NA,NE,NO	NA,NE,NO	0,00
HFC-245ca	NA	NA	NA	NA	NA	NA	NA,NE,NO	NA,NE,NO	0,00
Unspecified mix of listed HFCs[4] - (Gg CO_2 equivalent)	NA	NA	NA	NA	NA	NA	NA	NA	0,00
Emissions of PFCs[3] - (Gg CO_2 equivalent)	**360,90**	**222,60**	**82,22**	**208,68**	**306,19**	**140,97**	**152,21**	**172,29**	**-90,17**
CF_4	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	-91,00
C_2F_6	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NE,NO	NA,NE,NO	-100,00
C_3F_8	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NE,NO	NA,NE,NO	-100,00
C_4F_{10}	0,00	NA,NO	NA,NO	0,00	0,01	0,01	0,01	0,01	-74,97
c-C_4F_8	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NE,NO	NA,NE,NO	0,00
C_5F_{12}	0,03	0,01	0,01	0,00	0,01	0,00	0,00	0,00	-93,58
C_6F_{14}	0,02	0,02	0,00	0,02	0,02	0,01	0,01	0,01	-68,54
Unspecified mix of listed PFCs[4] - (Gg CO_2 equivalent)	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0,00
Emissions of SF6[3] - (Gg CO_2 equivalent)	**111,52**	**129,06**	**112,03**	**99,91**	**84,34**	**83,85**	**74,88**	**80,98**	**-95,13**
SF_6	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	-95,13

Table 5 Emission trends – SUMMARY

GREENHOUSE GAS EMISSIONS	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)
CO_2 emissions including net CO_2 from LULUCF	117.204,47	119.706,92	117.097,61	116.091,95	121.038,39	121.926,08	126.163,12	120.449,60	126.926,91	121.334,15
CO_2 emissions excluding net CO_2 from LULUCF	118.626,66	120.889,42	118.649,86	117.561,20	122.516,79	123.297,53	127.540,18	121.844,19	128.195,61	122.537,52
CH_4 emissions including CH_4 from LULUCF	9.992,59	9.814,95	9.673,77	9.470,79	9.491,18	9.508,28	9.197,12	9.065,72	8.921,45	8.740,42
CH_4 emissions excluding CH_4 from LULUCF	9.992,59	9.814,95	9.673,77	9.470,79	9.491,18	9.508,28	9.197,12	9.065,72	8.921,45	8.740,42
N_2O emissions including N_2O from LULUCF	10.775,28	10.660,01	10.318,49	10.660,03	11.244,53	11.670,19	12.097,67	11.815,60	11.949,55	11.853,29
N_2O emissions excluding N_2O from LULUCF	10.775,28	10.660,01	10.318,49	10.660,03	11.244,53	11.670,19	12.097,67	11.815,60	11.949,55	11.853,29
HFCs	439,03	439,03	439,03	439,03	439,03	439,03	527,30	638,99	779,49	817,12
PFCs	1.753,32	1.677,72	1.829,52	1.758,67	2.113,04	2.335,24	2.217,41	1.211,43	669,33	347,97
SF_6	1.662,49	1.576,25	1.743,82	1.676,67	2.035,35	2.205,16	2.120,86	526,39	271,44	121,95
Total (including LULUCF)	**141.827,17**	**143.874,89**	**141.102,23**	**140.097,14**	**146.361,50**	**148.083,97**	**152.323,48**	**143.707,72**	**149.518,17**	**143.214,90**
Total (excluding LULUCF)	**143.249,36**	**145.057,38**	**142.654,49**	**141.566,39**	**147.839,91**	**149.455,42**	**153.700,53**	**145.102,31**	**150.786,86**	**144.418,27**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)
1. Energy	112.543,58	115.303,25	113.004,81	111.985,06	115.608,05	115.970,25	120.959,09	114.903,84	121.159,09	115.258,81
2. Industrial Processes	15.716,61	15.038,24	14.934,64	14.955,02	17.499,03	18.730,78	18.394,21	15.889,11	15.448,80	15.078,74
3. Solvent and Other Product Use	246,25	246,21	248,52	246,97	243,48	239,57	237,75	237,25	236,19	235,01
4. Agriculture	11.339,95	11.208,07	11.170,94	11.303,26	11.343,94	11.485,46	11.323,54	11.286,16	11.324,43	11.371,75
5. Land Use, Land-Use Change and Forestry[5]	-1.422,19	-1.182,50	-1.552,26	-1.469,25	-1.478,40	-1.371,45	-1.377,05	-1.394,59	-1.268,69	-1.203,37
6. Waste	3.402,96	3.261,61	3.295,58	3.076,08	3.145,40	3.029,37	2.785,94	2.785,95	2.618,34	2.473,97
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)[5]	**141.827,17**	**143.874,89**	**141.102,23**	**140.097,14**	**146.361,50**	**148.083,97**	**152.323,48**	**143.707,72**	**149.518,17**	**143.214,90**

GREENHOUSE GAS EMISSIONS	2000	2001	2002	2003	2004	2005	2006	2007	Change from base to latest reported year
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	(%)
CO_2 emissions including net CO_2 from LULUCF	122.146,69	121.267,57	120.724,08	125.251,84	125.478,41	123.062,39	118.024,62	113.071,22	-3,53
CO_2 emissions excluding net CO_2 from LULUCF	123.678,19	124.092,33	123.042,75	126.951,82	126.631,95	123.432,40	119.085,48	114.544,70	-3,44
CH_4 emissions including CH_4 from LULUCF	8.471,99	8.050,23	7.599,49	7.268,75	7.131,18	6.924,93	6.764,91	6.658,04	-33,37
CH_4 emissions excluding CH_4 from LULUCF	8.471,99	8.050,23	7.599,49	7.268,75	7.131,18	6.924,93	6.764,91	6.658,04	-33,37
N_2O emissions including N_2O from LULUCF	11.525,41	11.292,64	10.779,25	9.781,92	9.989,71	9.840,45	8.933,61	8.079,31	-25,02
N_2O emissions excluding N_2O from LULUCF	11.525,41	11.292,64	10.779,25	9.781,92	9.989,71	9.840,45	8.933,61	8.079,31	-25,02
HFCs	951,95	1.083,46	1.303,34	1.467,22	1.511,95	1.496,48	1.601,32	1.765,48	302,13
PFCs	360,90	222,60	82,22	208,68	306,19	140,97	152,21	172,29	-90,17
SF_6	111,52	129,06	112,03	99,91	84,34	83,85	74,88	80,98	-95,13
Total (including LULUCF)	**143.568,46**	**142.045,55**	**140.600,39**	**144.078,32**	**144.501,76**	**141.549,09**	**135.551,54**	**129.827,31**	**-8,46**
Total (excluding LULUCF)	**145.099,97**	**144.870,31**	**142.919,06**	**145.778,30**	**145.655,31**	**141.919,10**	**136.612,40**	**131.300,79**	**-8,34**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004	2005	2006	2007	Change from base to latest reported year
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	(%)
1. Energy	116.308,19	117.214,20	115.225,09	119.121,94	118.459,43	115.215,83	110.902,08	106.670,04	-5,22
2. Industrial Processes	15.185,05	14.549,81	15.071,11	14.575,23	15.310,48	15.163,08	14.427,20	13.657,78	-13,10
3. Solvent and Other Product Use	252,07	250,31	248,66	248,17	247,85	247,41	246,68	246,74	0,20
4. Agriculture	11.046,93	10.889,06	10.608,44	10.172,94	10.083,30	9.936,06	9.836,19	9.621,48	-15,15
5. Land Use, Land-Use Change and Forestry[5]	-1.531,51	-2.824,76	-2.318,67	-1.699,98	-1.153,54	-370,01	-1.060,86	-1.473,48	3,61
6. Waste	2.307,73	1.966,94	1.765,77	1.660,01	1.554,25	1.356,71	1.200,25	1.104,75	-67,54
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	0,00
Total (including LULUCF)[5]	**143.568,46**	**142.045,55**	**140.600,39**	**144.078,32**	**144.501,76**	**141.549,09**	**135.551,54**	**129.827,31**	**-8,46**

List of acronyms

	FR		NL		EN	
AA	-	Quantité assignée	-	Toegewezen hoeveelheid	AA	Assigned amount
AATL	AATL	Administration de l'Aménagement du Territoire et du Logement	BROH	Bestuur Ruimtelijke Ordening en Huisvesting	-	Public Service for Housing and Spatial Planning
AAU	UQA	Unité de Quantité Attribuée	-	toegewezen emissie-eenheid	AAU	Assigned Amount Unit
ABE	ABE	Agence Bruxelloise de l'Entreprise	BAO	Brussels Agentschap voor de onderneming	-	Brussels Enterprise Agency
ABEA	ABE(A)	Agence Bruxelloise de l'Energie	(A)BEA	Brussels Energie Agentschap	-	Brussels energy agency
ABP	ABP	Agence Bruxelles-Propreté	-	Net Brussel	-	Brussels agency for cleanliness
ACI	ACI	Accord de Coopération Interrégional	-	Interregionaal samenwerkingsakkoord	-	interregional cooperation agreement
ADSEI	DGSIE	Direction Générale Statistique et Information Economique	ADSEI	Algemene Directie Statistiek en Economische informatie	-	General Direction of statistics and economic information
AED	AED	Administration de l'Equipement et des Déplacements (Bruxelles mobilité)	BUV	Bestuur Uitrusting en Vervoer (Mobiel Brussel)	-	Brussels Mobility
AEE	AEE	Administration de l'Economie et de l'Emploi	BEW	Bestuur Economie en Werkgelegenheid	-	Public Service for the Economy and Employment
AFB	AFB	Administration des Finances et du Budget	BFB	Bestuur Financiën en Begroting	-	Public Service for Finance and Budget
AGION	-	Agence pour l'infrastructure dans l'enseignement	AGION	Agentschap voor Infrastructuur in het Onderwijs	-	Agency for School Infrastructure
AIE	AIE	Agence Internationale de l'Energie	IEA	Internationaal Energieagentschap	IEA	International Energy Agency
ANB	-	Agence pour la nature et la forêt	ANB	Agentschap Natuur en Bos	-	Nature and Forestry Agency
APEE's	PAEE	Plan d'Action Efficacité Energétique	APEE's	Actieplan inzake energie-effciëntie	EEAP	Energy Efficiency Action Plan
AQ/CQ	AQ/CQ	Assurance Qualité / Contrôle de Qualité	-	Kwaliteitsborging/ kwaliteitscontrole	QA/QC	Quality Assurance / Quality Control
AR	AR	Arrêté Royal	KB	Koninklijk besluit	-	Royal decree
ARCI	ARCI	Administration de la règlementation, de la circulation et de l'infrastucture	BVRI	Bestuur van de Verkeersreglementering en van de Infrastructuur	-	-
ASBL	ASBL	Association Sans But Lucratif	VZW	vereniging zonder winstoogmerk	NPO	non-profit organisation
AWAC	AWAC	Agence Wallonne de l'Air et du Climat	-	Waals Agentschap voor Lucht en Klimaat	-	Walloon Agency for Air and Climate
AWEX	AWEX	Agence Wallonne à l'EXportation et aux investissements étrangers	-	Waals Agentschap voor Export en Buitenlandse Investeringen	-	Wallonia Export and Investment Agency
BAO	ABE	Agence Bruxelloise de l'Entreprise	BAO	Brussels Agentschap voor de onderneming	-	Brussels Enterprise Agency
BAT	MTD	Meilleure technologie disponible	BBT	beste beschikbare technologie/techniek	BAT	Best Available Technology
BAU	-	Maintien du statu quo	-	Met ongewijzigd beleid	BAU	Business as usual
BBP	PIB	Produit Intérieur Brut	BBP	Bruto Binnenlands Product	GDP	Gross domestic product
BBRI	CSTC	Centre Scientifique et Technique de la Construction	WTCB	Wetenschappelijk en Technisch Centrum voor het Bouwbedrijf	BBRI	Belgian Building Research Institute

	FR		NL		EN	
BBT	MTD	Meilleure Technologie Disponible	BBT	beste beschikbare technologie/techniek	BAT	Best Available Technology
BCR	RBC	Région de Bruxelles-Capitale	BHG	Brussels Hoofdstedelijk Gewest	BCR	Brussels Capital region
BEI	BEI	Banque Européenne d'Investissement	EIB	Europese Investeringsbank	EIB	European Investment Bank
BELSPO	BELSPO	Politique scientifique fédérale	BELSPO	Federaal Wetenschapsbeleid	BELSPO	BELgian Science POlicy
bep	bep	Baril d'équivalent-pétrole	-	Vat olie-equivalent	boe	Barrel of oil equivalent
BERD	BERD	Banque Européenne pour la Reconstruction et le Développement	EBRD	Europese Bank voor Heropbouw en Ontwikkeling	EBRD	European Bank for reconstruction and development
BEW	AEE	Administration de l'Economie et de l'Emploi	BEW	Bestuur Economie en Werkgelegenheid	-	Public Service for the Economy and Employment
BFB	AFB	Administration des Finances et du Budget	BFB	Bestuur Financiën en Begroting	-	Public Service for Finance and Budget
BFP	BFP	Bureau Fédéral du Plan	FPB	Federaal Planbureau	FBP	Federal Planning Bureau
BHG	RBC	Région de Bruxelles-Capitale	BHG	Brussels Hoofdstedelijk Gewest	BCR	Brussels Capital region
BIM	IBGE	Institut Bruxellois pour la Gestion de l'Environnement (Bruxelles Environnement)	BIM	Brussels Instituut voor Milieubeheer (Leefmilieu Brussel)	IBGE-BIM	Brussels Environment
BIRA	IASB	Institut d'Aéronomie Spatiale de Belgique	BIRA	Belgisch Instituut voor Ruimte-aeronomie	-	Belgian Institute for Space Aeronomy
BIV	TMC	Taxe de Mise en Circulation	BIV	belasting op de inverkeerstelling	-	Tax for bringing cars on the road
BKG	GES	Gaz à Effet de Serre	BKG	broeikasgassen	GHG	Greenhouse gas
BMM	UGMM	Unité de Gestion du Modèle Mathématique de la mer du Nord et de l'estuaire de l'Escaut	BMM	Beheerseenheid van het Mathematisch Model van de Noordzee en het Schelde-estuarium	MUMM	Management Unit of the North Sea Mathematical Models and the Scheldt estuary
BNI	RNB	Revenu National Brut	BNI	Bruto nationaal inkomen	GNI	Gross national income
boe	bep	Baril d'équivalent-pétrole	-	Vat olie-equivalent	boe	Barrel of oil equivalent
BOF	FBS	Fonds Belge de Survie	BOF	Belgisch Overlevingsfonds	BSF	Belgian survival fund
BRISE	BRISE	Réseau InterSyndical Bruxellois pour l'Environnement	BRISE	BRussels Intersyndicaal SEnsibiliseringsnetwerk voor het milieu	-	Brussel Inter-Union Network for the Environment
BROH	AATL	Administration de l'Aménagement du Territoire et du Logement	BROH	Bestuur Ruimtelijke Ordening en Huisvesting	-	Public Service for Housing and Spatial Planning
BRUGEL	BRUGEL	BRUxelles Gaz ELectricité	BRUGEL	BRUssel Gas ELektriciteit	-	Society distributing gaz and electricity in the Brussels-Capital region
BSF	FBS	Fonds Belge de Survie	BOF	Belgisch Overlevingsfonds	BSF	Belgian survival fund
BTW	TVA	Taxe sur la Valeur Ajoutée	BTW	belasting op de toegevoegde waarde	-	Value added tax
BUV	AED	Administration de l'Equipement et des Déplacements (Bruxelles mobilité)	BUV	Bestuur Uitrusting en Vervoer (Mobiel Brussel)	-	Brussels Mobility
BVRI	ARCI	Administration de la règlementation, de la circulation et de l'infrastucture	BVRI	Bestuur van de Verkeersreglementering en van de Infrastructuur	-	-
CAP	PAC	Politique Agricole Commune	GLB	Gemeenschappelijk Landbouwbeleid	CAP	Common Agricultural Policy

	FR		NL		EN	
CATF	CATF	Changement d'Affectation des Terres et Foresterie	-	Verandering van landgebruik en bosbouw	LUCF	Land Use Change and Forestry
CB	-	Renforcement des capacités	-	Capaciteitsopbouw	CB	Capacity building
CC	CC	Changements Climatiques	-	Klimaatverandering	CC	Climate Change
CCGN	CCGN	Centrale à Cycle Combiné au Gaz naturel	STEG	Stoom- en gascentrale	CCGT	Combined-cycle gas power plant
CCGT	CCGN	Centrale à Cycle Combiné au Gaz naturel	STEG	Stoom- en gascentrale	CCGT	Combined-cycle gas power plant
CCIM	CCPIE	Comité de Coordination de la Politique Internationale de l'Environnement	CCIM	Coördinatiecomité Internationaal Milieubeleid	CCIEP	Coordination Committee for International Environmental Policy
CCNUCC	CCNUCC	Convention-Cadre des Nations Unies sur les Changements Climatiques	-	Raamverdrag van de Verenigde Staten inzake Klimaatverandering	UNFCCC	United Nations Framework Convention on Climate Change
CCPIE	CCPIE	Comité de Coordination de la Politique Internationale de l'Environnement	CCIM	Coördinatiecomité Internationaal Milieubeleid	CCIEP	Coordination Committee for International Environmental Policy
CCS	CSC	Capture et Stockage de Carbone	-	Afvang en opslag van koolstof	CCS	Carbon Capture and Storage
CDCF	-	Fonds "Carbone" de Développement Communautaire	-	"Koolstoffonds" voor communautaire ontwikkeling	CDCF	Community Development Carbon Fund
CDDM	CDDM	Centre de Diffusion et de Documentation sur la Mobilité	-	Centrum voor informatieverspreiding en documentatie over mobiliteit	-	Center for spreading information about mobility
CDM	MDP	Mécanisme pour un Développement Propre	-	Mechanisme voor schone ontwikkeling	CDM	Clean Development Mechanism
CDPA	CDPA	Centres de Dépaysement et de Plein Air	-	Centra voor "een andere ongering" en openluchtcentra	-	centres of 'change of scenery' and the outdoors
CELINE	CELINE	Cellule interrégionale de l'Environnement	IRCEL	Intergewestelijke cel voor het leefmilieu	-	Belgian Interregional Cell for the Environment
CER	URCE	Unités de Réduction Certifiées des Emissions	-	gecertificeerde emissiereductie	CER	Certified Emission Reduction
CET	CET	Centre d'Enfouissement Technique	-	centrum voor technische ingraving	-	waste landfill
CGIAR	-	Groupe consultatif pour la recherche agricole internationale	-	Adviesgroep Internationaal Landbouwonderzoek	CGIAR	Consultative Group on International Agricultural Research
CGRI	CGRI	Commissariat Général aux Relations iInternationales	-	Commissariaat-generaal Internationale betrekkingen	-	Commissariat general International relations
CH_4	CH_4	méthane	CH_4	methaan	CH_4	Methane
CHP	PCCE	Production Combinée de Chaleur et d'Electricité (cogénération)	WKK	Warmtekrachtkoppeling	CHP	Combined Heat and Power
CIE	CIE	Conférence Interministérielle de l'Environnement	ICL	Interministeriële Conferentie voor het Leefmilieu	ICE	Interministerial Conference for the Environment
CIIE	CIIE	Comité pour l'Industrie, l'Innovation et l'Entrepreunariat	-	Comite voor de industrie innovatie en het ondernemerschap	CIIE	Committee for industry, Innovation and Entrepreneurship
CIMPS	CIMPS	Conférence InterMinistérielle de la Politique Scientifique	IMCWB	Interministeriële Conferentie voor Wetenschapsbeleid	-	Interministerial Conference on Science Policy
CITL	-	journal des transactions communautaire indépendant	-	-	CITL	Community Independent Transaction Log
CIUF	CIUF	Conseil Interuniversitaire de la Communauté Française	-	Interuniversitaire Raad van de Franse Gemeenschap	-	Interuniversity Council of the French Community
CMF	CMF	Conférence Ministérielle de la Francophonie	-	Ministerconferentie van de gemeenschap van Franssprekenden	-	Francophonie ministerial meeting
CNC	CNC	Commission Nationale Climat	NKC	Nationale Klimaatcommissie	NCC	National Climate Commission
CO	CO	Monoxyde de carbone	CO	koolmonoxide	CO	carbon monoxide

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CO_2	CO_2	Dioxyde de carbone	CO_2	koolstofdioxide	CO_2	carbon dioxide
CONCERE	CONCERE	CONCertation Etat-Régions pour l'Energie	ENOVER	ENergie OVERleg Staat-Gewesten	-	Concertation between the federal state and the regions about energy
COP	COP	COnférence des Parties	COP	Conferentie van de Partijen	COP	Conference Of the Parties
COST	-	Coopération Européenne en Science et Technologies	-	Europese samenwerking op het vlak van wetenschap en technologie	COST	European Cooperation in Science and Technology
COV	COV	Composés Organiques Volatiles	VOS	Vluchtige organische stoffen	VOCs	Volatile Organic compounds
CPAS	CPAS	Centre Public d'Action Sociale	OCMW	Openbaar Centrum voor Maatschappelijk Welzijn	-	Public center of social welfare
CPDT	CPDT	Conférence Permanente du Développement Territorial	-	Permanente Conferentie voor Ruimtelijke Ontwikkeling	-	Standing Conference on Territorial Development
CPST	CPST	Comité pour la Politique Scientifique et Technologique	-	Comité voor het wetenschaps- en technologiebeleid	CSTP	Committee for Scientific and Technological Policy
CR	-	Registre communautaire	CR	Communautair register	CR	Community Registry
CREG	CREG	Commission de Régulation de l'Électricité et du Gaz	CREG	Commissie voor de Regulering van de Elektriciteit en het Gas	CREG	Commission of Regulation of Electricity and Gas
CRF	-	Format de rapport commun	-	Formaat voor gemeenschappelijke rapportering	CRF	Common reporting format
CRIE	CRIE	Centre Régional d'Initiation à l'Ecologie	GCIE	gewestelijke centra voor ecologie-initiatie	-	Regional center for ecology initiation
CSC	CSC	Capture et Sstockage de Carbone	-	Afvang en opslag van koolstof	CCS	Carbon Capture and Storage
CSTP	CPST	Comité pour la Politique scientifique et Technologique	-	Comité voor het wetenschaps- en technologiebeleid	CSTP	Committee for Scientific and Technological Policy
CSTC	CSTC	Centre Scientifique et Technique de la Construction	WTCB	Wetenschappelijk en Technisch Centrum voor het Bouwbedrijf	BBRI	Belgian Building Research Institute
CV	CV	Certificat Vert	GC	Groenestroomcertificaten	GC	green certificate
CWATUP	CWATUP	Code Wallon de l'Aménagement du Territoire, de l'Urbanisme et du Patrimoine	-	Waalse Wetboek van Ruimtelijke Ordening, Stedenbouw en Patrimonium	-	Walloon Code of Town and Country Planning, Urban Development and Heritage
DAC-EPOC	-	Comité d'aide au développement et comité des politiques d'environnement	-	Ontwikkelingshulpcomité en Comité voor Milieubeleid	DAC-EPOC	Development Assistance Committee and the Environment Policy Committee
DAR	-	Services pour la politique générale du gouvernement	DAR	Diensten voor het Algemeen Regeringsbeleid	-	Services for the general government policy
DD	DJ	Degrés-Jours	-	Graaddagen	DD	Degree-days
DES	-	-	-	-	DES	Data exchange standards
DG	DG	Direction Générale	DG	Directoraat-generaal	-	Directorate-general
DGARNE	DGARNE	Direction Générale Opérationnelle de l'Agriculture, des Ressources Naturelles et de l'Environnement	-	Directoraat-Generaal Landbouw, Natuurlijke hulpbronnen en Leefmilieu	-	Directorate-general of the Agriculture, Natural Resources and Environment
DGCD	DGCD	Direction Générale de la Coopération au Développement	DGOS	Directoraat-Generaal van Ontwikkelingssamenwer-king	-	Belgian Development Cooperation
DGE	DGE	Direction Générale Coordination et Affaires européennes	DGE	Directie-Generaal Europese Zaken en Coördinatie	DGE	Directorate-general for European Affairs and Coordination
DGENORS	DGENORS	Direction Générale de l'Enseignement Non Obligatoire et de la Recherche Scientifique	-	Directoraat-Generaal van het Niet-Verplicht Onderwijs en het Wetenschappelijk Onderzoek	-	Education and Scientific Research of the Ministry of the French Community
DGOS	DGCD	Direction Générale de la Coopération au Développement	DGOS	Directoraat-Generaal van Ontwikkelingssamenwer-king	-	Belgian Development Cooperation

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DGRNE	DGRNE	Direction Générale des Ressources Naturelles et de l'Environnement	-	Directoraat-Generaal Natuurlijke hulpbronnen en Leefmilieu	-	Directorate General of Natural Resources and the Environment
DGSIE	DGSIE	Direction Générale Statistique et Information Economique	ADSEI	Algemene Directie Statistiek en Economische informatie	-	Directorate-general of statistics and economic information
DIV	DIV	Direction pour l'Immatriculation des Véhicules	DIV	Dienst voor Inschrijvingen van de Voertuigen	-	Vehicle Registration Service
DJ	DJ	Degrés-Jours	-	Graaddagen	DD	Degree-days
DNA	-	Autorité nationale désignée	-	Aangewezen nationale autoriteit	DNA	Designated National Authority
DRC	RDC	République Démocratique du Congo	DRC	Democratische Republiek Congo	DRC	Democratic Republic of the Congo
DRI	DRI	Direction Générale des Relations Internationales	-	Directoraat-Generaal van Internationale betrekkingen	-	Directorate-general for international relations
EBRD	BERD	Banque Européenne pour la Reconstruction et le Développement	EBRD	Europese Bank voor Heropbouw en Ontwikkeling	EBRD	European Bank for Reconstruction and Development
ECONOTEC		Consultants en énergie et environnement	-	Energie- en milieuconsulent	-	Energy and environmental consultants
EDA	AED	Aide Européenne au Développement	EDA	Europese Ontwikkelingshulp	EDA	European Development Aid
EDF	FED	Fonds Européen de Développement	EOF	Europees Ontwikkelingsfonds	EDF	European Development Fund
EEAP	PAEE	Plan d'Action Efficacité Energétique	APEE's	actieplan inzake energie-effciëntie	EEAP	Energy Efficacy Action Plan
EFRO	FDER	Fonds européen de développement régional	EFRO	Europees Fonds voor Regionale Ontwikkeling	ERDF	European Regional Development Fund
EIB	BEI	Banque Européenne d'Investissement	EIB	Europese Investeringsbank	EIB	European Investment Bank
eID	eID	Carte d'identité électronique	eID	Elektronische identiteitskaart	eID	Electronic identity card
EMAS	-	management écologique et schéma d'audit	-	Milieubeheer- en milieuauditsysteem	EMAS	Eco-Management and Audit Scheme
EMIS	-	Système d'information pour l'énergie et l'environnement	EMIS	Energie- en milieu-informatiesysteem	-	Information system for energy and environment
ENOVER	CONCERE	CONCertation Etat-Régions pour l'Energie	ENOVER	ENergie OVERleg Staat-Gewesten	-	Concertation between the federal state and the regions about energy
EOF	FED	Fonds Européen de Développement	EOF	Europees Ontwikkelingsfonds	EDF	European Development Fund
EPB	PEB	Performance Energétique des Bâtiments	EPB	Energieprestaties en binnenklimaat van gebouwen	EPB	Energy performance of buildings
ERDF	FDER	Fonds européen de développement régional	EFRO	Europees Fonds voor Regionale Ontwikkeling	ERDF	European Regional Development Fund
ErE	ErE	Education relative à l'Environnement	NME	Natuur- en Milieueducatie	-	Environmental education
ERU	URE	Unité de Réduction des Emissions	-	Emissiereductie-eenheid	ERU	Emission Reduction Unit
ESA	ESA	Agence Spatiale Européenne	-	Europees Ruimteagentschap	ESA	European Space Agency
ETS	-	échanges de quotas d'émission	-	emissiehandelssysteem	ETS	Emission Trading Scheme
EU	UE	Union Européenne	EU	Europese Unie	EU	European Union
EUA	-	quotas d'émission européens	-	Europese emissierechten	EUA	European Union Allowances
EWI	-	Economie, Sciences et Innovation	EWI	Economie, Wetenschap en Innovatie	-	Economy, Science and Innovation Department
FAO	-	Organisation des Nations Unies pour l'alimentation et l'agriculture	-	Voedsel- en Landbouworganisatie van de Verenigde Naties	FAO	Food and Agriculture Organization (of the United Nations)

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FBP	BFP	Bureau Fédéral du Plan	FPB	Federaal Planbureau	FBP	Federal Planning Bureau
FBS	FBS	Fonds Belge de Survie	BOF	Belgisch Overlevingsfonds	-	Belgian survival fund
FEBIAC	FEBIAC	Fédération belge de l'Automobile et du Cycle	FEBIAC	Belgische automobiel- en tweewielerfederatie	-	Belgian federation of the Cycle and Motor-car industry
FED	FED	Fonds Européen de Développement	EOF	Europees Ontwikkelingsfonds	EDF	European Development Fund
FED	FED	Gouvernement fédéral	FED	Federale regering	FED	Federal government
FEDESCO	FEDESCO	Société publique de Services Energétiques	FEDESCO	Publieke Energy Services Company	FEDESCO	Federal Energy Services Company
FEDR	FDER	Fonds européen de développement régional	EFRO	Europees Fonds voor Regionale Ontwikkeling	ERDF	European Regional Development Fund
FEM	FEM	Fonds pour l'Environnement Mondial	-	-	GEF	Global Environment Facility
FIDA	FIDA	Fonds International de Développement Agricole	-	Internationaal Fonds voor Landbouwontwikkeling	IFAD	International Fund for Agricultural Development
FLW	FLW	Fonds du Logement Wallon	-	Waals woningfonds	-	Walloon housing fund
FNR	FNR	Fonds National de la Recherche (du Luxembourg)	-	Nationaal Fonds voor Onderzoek (van Luxemburg)	-	National Research Fund (of Luxembourg)
FNRS	FNRS	Fonds National de la Recherche Scientifique	NFWO	Nationaal Fonds voor Wetenschappelijk Onderzoek	-	National Fund for Scientific Research
FOD	SPF	Service Public Fédéral	FOD	Federale Overheidsdienst	FPS	Federal Public Service
FONL	FRIA	Fonds pour la formation à la Recherche dans l'Industrie et dans l'Agriculture	-	Fonds voor opleiding tot het onderzoek in nijverheid en landbouw	-	Research education in industry and agriculture
FOREM	FOREM	Service public wallon de l'emploi et de la formation professionnelle	-	Waalse overheidsdienst voor beroepsopleiding en arbeidsbemiddeling	-	Walloon public service of work and professional education
FP	-	Point focal	-	Aanspreekpunt	FP	Focal Point
FPB	BFP	Bureau Fédéral du Plan	FPB	Federaal Planbureau	FBP	Federal Planning Bureau
FPS	SPF	Service Public Fédéral	FOD	Federale Overheidsdienst	FPS	Federal Public Service
FR	RF	Région flamande	VG	Vlaams Gewest	FR	Flemish region
FRCE	FRCE	Fonds de Réduction du Coût global de l'Energie	FRGE	Fonds ter Reductie van de Globale Energiekost	-	fund for the reduction of the overall cost of energy
FRFC	FRFC	Fonds de la Recherche fondamentale Collective	-	Fonds voor collectief fundamenteel wetenschappelijk onderzoek	-	Fund for Collective Fundamental Scientific Research
FRGE	FRCE	Fonds de réduction du coût global de l'énergie	FRGE	Fonds ter Reductie van de Globale Energiekost	-	fund for the reduction of the overall cost of energy
FRIA	FRIA	Fonds pour la formation à la Recherche dans l'Industrie et dans l'Agriculture	-	Fonds voor opleiding tot het onderzoek in nijverheid en landbouw	-	Research education in industry and agriculture
FRSM	FRSM	Fonds de la Recherche Scientifique Médicale	-	Fonds voor medisch-wetenschappelijk onderzoek	-	Fund for Medical Scientific Research
FSC	-	Conseil de bonne gestion forestière	-	Raad voor duurzaam bosbeheer	FSC	Forest Stewardschip Council
FWO	-	Fonds pour la recherche Scientifique en Flandre	FWO	Fonds voor Wetenschappelijk Onderzoek - Vlaanderen	-	Fund for Scientific Research Flanders
GC	CV	Certificat Vert	GC	Groenestroomcertificaten	GC	green certificate
GCIE	CRIE	Centre Régional d'Initiation à l'Ecologie	GCIE	Gewestelijke centra voor energie-initiatie	-	Regional centre of ecology initiation
GCOS	SMOC	Système Mondial d'Observation du Climat	-	Globaal klimaatobservatiesysteem	GCOS	Global climate observation system

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GDP	PIB	Produit Intérieur Brut	BBP	Bruto Binnenlands Product	GDP	Gross domestic product
GEF	FEM	Fonds pour l'Environnement Mondial	-	-	GEF	Global Environment Facility
GEN	RER	Réseau Express Régional	GEN	Gewestelijk Expresnet	-	Suburban network
GES	GES	Gaz à effet de serre	BKG	Broeikasgassen	GHG	Greenhouse gas
GHG	GES	Gaz à effet de serre	BKG	Broeikasgassen	GHG	Greenhouse gas
GIEC	GIEC	Groupe d'experts Intergouvernemental sur l'Evolution du Climat	-	Intergouvernementele Werkgroep inzake klimaatverandering	IPCC	Intergovernmental Panel on Climate Change
GIS	-	(Système d'investissement environnemenal)	-	Groene beleggingsfondsen	GIS	Green investment schemes
GLB	PAC	Politique Agricole Commune	GLB	Gemeenschappelijk Landbouwbeleid	CAP	Common Agricultural Policy
GMES	-	-	-	-	GMES	Global Monitoring for Environment and Security
GNI	RNB	Revenu National Brut	BNI	Bruto nationaal inkomen	GNI	Gross national income
GOG's	-	Zones d'inondation controlees	GOG's	Gecontroleerde Overstromings Gebieden	-	Controlled flood areas
GPL	GPL	Gaz de Pétrole Liquéfié	-	vloeibaar petroleumgas	LPG	liquefied petroleum gas
GRUP	-	Plan communal d'aménagement de l'environnement	GRUP	Gemeentelijk Ruimtelijk Uitvoeringsplan	-	regional spatial implementation plan
GT	GT	Groupe de Travail	WG	Werkgroep	WG	Working group
GWP	PRG	Potentiel de Réchauffement Global	-	Vermogen tot opwarming van de aarde	GWP	Global Warming Potential
HDD	-	Degrees-Jours	-	Graaddagen	HDD	Heating degree days
HEB	SER	Sources d'Energie Renouvelables	HEB	hernieuwbare energiebronnen	RES	Renewable Energy Source
HF	HF	fluorure d'hydrogène	HF	waterstoffluoride	HF	hydrogen fluoride
HFC	HFC	hydrofluorocarbone	HFK's	hydrofluorkoolstof	HFC	hydrofluorocarbon
HFK's	HFC	hydrofluorocarbone	HFK's	hydrofluorkoolstof	HFC	hydrofluorocarbon
HVAC	-	Chauffage, ventilation et climatisation	-	Verwarming, ventilatie en luchtbehandeling	HVAC	Heating Ventilation Air Conditionning
IASB	IASB	Institut d'Aéronomie Spatiale de Belgique	BIRA	Belgisch Instituut voor Ruimte-aeronomie	-	Belgian Institute for Space Aeronomy
IBGE	IBGE	Institut Bruxellois pour la Gestion de l'Environnement	BIM	Brussels Instituut voor Milieubeheer	IBGE-BIM	Brussels Environment
ICE	CIE	Conférence interministérielle pour l'environnement	ICL	Interministeriële conferentie voor het leefmilieu	ICE	Interministerial Conference for the Environment
ICEDD	ICEDD	Institut de Conseil et d'Etudes en Développement Durable	-	-	-	Institute of council and studies in sustainable development
ICL	CIE	Conférence Interministérielle de l'Environnement	ICL	Interministeriële conferentie voor het leefmilieu	ICE	Interministerial Conference for the Environment
IDA	-	Association internationale de développement	-	Internationale ontwikkelingsassociatie	IDA	International Development Association
IDR	-	(révision en profondeur)	-	Grondige herziening	IDR	In depth review
IEA	AIE	Agence Internationale de l'Energie	IEA	Internationaal Energieagentschap	IEA	International Energy Agency
IEP	IEP	Institut d'EcoPédagogie	-	-	-	Institute of eco-learning

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IEPF	IEPF	Institut de l'énergie et de l'environnement de la Francophonie	-	Instituut voor energie en leefmilieu van de Francofonie	-	Institute of energy and environment
IFAD	FIDA	Fonds International de Développement Agricole	-	Internationaal Fonds voor Landbouwontwikkeling	IFAD	International Fund for Agricultural Development
IFI	IFI	institutions Financières Internationales	IFI	Internationale financiële instellingen	-	International Financial Institutions
IHP	PIH	Programme International en Hydrologie	IHP	Internationaal Hydrologisch Programma	IHP	International Hydrological Programme
IISN	IISN	Institut Interuniversitaire des Sciences Nucléaires	-	Interuniversitair Instituut voor Nucleaire Wetenschappen	-	Inter-University Institute for Nuclear Sciences
IITA	-	Intitut international d'agriculture tropicale	-	Internationaal instituut voor tropische landbouw	IITA	International Institute of Tropical Agriculture
ILRI	-	Institut International de Recherche sur le Bétail	-	-	ILRI	International livestock research institute
ILVO	-	Institut de Recherche de l'Agriculture et de la Pêche	ILVO	Instituut voor Landbouw en Visserijonderzoek	-	Institute for Agricultural and Fisheries Research
IMCWB	CIMPS	Conférence InterMinistérielle de la Politique Scientifique	IMCWB	Interministeriële Conferentie voor Wetenschapsbeleid	-	Interministerial Conference on Science Policy
INBO	-	Institut de Recherche sur la Nature et les Forêts	INBO	Instituut voor Natuur en Bosonderzoek	-	Research Institute for Nature and Forest
INS	INS	Institut National de Statistique	NIS	Nationaal Intituut voor de Statistiek	-	Institute of national statistics
ION	OIP	Organismes d'Intérêt Public	ION	Instellingen van Openbaar Nut	-	public interest bodies
IPCC	GIEC	Groupe d'experts Intergouvernemental sur l'Evolution du Climat	-	Intergouvernementeel Panel over klimaatverandering	IPCC	Intergovernmental Panel on Climate Change
IPF	-	Fondation polaire internationale	-	-	IPF	International Polar Foundation
IRCEL	CELINE	Cellule interrégionale de l'Environnement	IRCEL	Intergewestelijke cel voor het leefmilieu	-	Belgian Interregional Cell for the Environment
IRM	IRM	Institut Royal Météorologique	KMI	Koninklijk Metereologisch Instituut	RMI	Royal Meteorological Institute
IRScNB	IRScNB	Institut Royal des Sciences Naturelles de Belgique	KBIN	Koninklijk Belgisch Instituut voor Natuurwetenschappen	-	Royal Belgian Institute of Natural Sciences
IRSIB	IRSIB	Institut d'encouragement de la Recherche Scientifique et de l'Innovation de Bruxelles	IWOIB	Instituut ter bevordering van het Wetenschappelijk Onderzoek en de Innovatie van Brussel	ISRIB	Institute for the encouragement of Scientific Research and Innovation of Brussels
ISO	ISO	Organisation internationale de normalisation	ISO	Internationale Organisatie voor normalisatie	ISO	International Organization for Standardization
ISRIB	IRSIB	Institut d'encouragement de la Recherche Scientifique et de l'Innovation de Bruxelles	IWOIB	Instituut ter bevordering van het Wetenschappelijk Onderzoek en de Innovatie van Brussel	ISRIB	Institute for the encouragement of Scientific Research and Innovation of Brussels
ISSeP	ISSeP	Institut Scientifique de SErvice Public	-	-	-	Scientific Institute of Public Service
ITL	-	-	-	-	ITL	International transaction log
IWOIB	IRSIB	Institut d'encouragement de la Recherche Scientifique et de l'Innovation de Bruxelles	IWOIB	Instituut ter bevordering van het Wetenschappelijk Onderzoek en de Innovatie van Brussel	ISRIB	Institute for the encouragement of Scientific Research and Innovation of Brussels
IWT	-	Institut pour l'encouragement à l'innovation par la recherche scientifique et technologique en Flandre	IWT	Instituut voor de aanmoediging van innovatie door Wetenschap & Technologie in Vlaanderen	-	Institute for the Promotion of Innovation by Science and Technology in Flanders
JeROM	-	Jeunesse, Espace et Environnement	JeROM	Jeugd, Ruimte, Omgeving en Milieu	-	Youth, Space, Surroundings and Environment
JI	MOC	Mise en Oeuvre Conjointe	-	Gezamenlijke uitvoering	JI	Joint Implementation
Kx	Kx	niveau d'isolation globale	Kx	niveau van globale energieprestatie	-	Level of global insulation
KB	AR	Arrêté Royal	KB	Koninklijk besluit	-	Royal decree

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KBIN	IRScNB	Institut Royal des Sciences Naturelles de Belgique	KBIN	Koninklijk Belgisch Instituut voor Natuurwetenschappen	-	Royal Belgian Institute of Natural Sciences
KMI	IRM	Institut Royal Météorologique	KMI	Koninklijk Metereologisch Instituut	RMI	Royal Meteorological Institute
KMMA	MRAC	Musée Royal d'Afrique Centrale	KMMA	Koninklijk Museum voor Midden-Afrika	RMCA	Royal Museum for Central Africa
KMO	PME	Petites et Moyennes Entreprises	KMO	Kleine en Middelgrote Ondernemingen	SME	small and medium-sized enterprises
KP	PK	Protocole de Kyoto	PK	Protocol van Kyoto	KP	Kyoto protocol
KUL	-	Université Catholique de Louvain	KUL	Katholieke Universiteit Leuven	-	Catholic university of Leuven
kWc	kWc	kiloWatt crête	kWp	kiloWatt-piek	kWp	kiloWatt-peak
kWh	kWh	kiloWattheure	kWh	kiloWattuur	kWh	kiloWatthour
kWp	kWc	kiloWatt crête	kWp	kiloWatt-piek	kWp	kiloWatt-peak
lCER	URCE-LT	Unités de Réduction Certifiées des Emissions long terme	-	langetermijn-CER's	lCER	Long term certified emission reduction
LDC	PMA	Pays les Moins Avancés	MOL	Minst Ontwikkelde Landen	LDC	Least Developed Countries
LNE	-	Environnement, Nature et Energie	LNE	Leefmilieu, Natuur en Energie	-	Environment, Nature and energy
LPG	GPL	Gaz de Pétrole Liquéfié	-	vloeibaar petroleumgas	LPG	liquefied petroleum gas
LUCF	CATF	Changement d'Affectation des Terres et Foresterie	-	Verandering van landgebruik en bosbouw	LUCF	Land Use Change and Forestry
LULUCF	UTCATF	Utilisation des Terres, Changement d'Affectation des Terres et Foresterie	-	landgebruik, verandering in landgebruik en bosbouw	LULUCF	Land Use, Land-Use Change end Forestry
LV	-	Département de l'agriculture et de la pêche	LV	Landbouw en Visserij	-	Agriculture and Fishery Department
MDG	OMD	Objectifs du Millénaire pour le Développement	MDG	Millenniumdoelstellingen	MDG	Millennium Development Goals
MDP	MDP	Mécanisme pour un Développement Propre	-	Mechanisme voor schone ontwikkeling	CDM	Clean Development Mechanism
METAGE	-	Programme de recherche "Modelling Ecosystem TrAce Gas Emissions"	-	**Onderzoeksprogramma** "Modelling Ecosystem TrAce Gas Emissions"	METAGE	Modelling Ecosystem TrAce Gas Emissions (research program)
MIP	-	plate-forme pour l'innovation et la technologie en matière d'environnement et d'énergie	MIP	Milieu- en energietechnologie-innovatieplatform	-	Environmental and Energy Technology Innovation Platform
MIRA	-	rapport environnemental flamand	MIRA	Milieurapport Vlaanderen	-	Environmental report Flanders
MIVB	STIB	Société des Transports Intercommunaux de Bruxelles	MIVB	Maatschappij voor het Intercommunaal Vervoer in Brussel	-	Public Transport Company of Brussels
MOC	MOC	Mise en Œuvre Conjointe	-	Gezamenlijke uitvoering	JI	Joint Implementation
MOL	PMA	Pays les Moins Avancés	MOL	Minst Ontwikkelde Landen	LDC	Least Developed Countries
MOP	-	Réunion des parties	-	Meeting van de Partijen	MOP	Meeting Of the Parties
MOS	-	protection de l'environnement à l'école	MOS	Milieuzorg op school	-	Environmental protection at school
MOW	-	Département Mobilité et Travaux publics	MOW	Mobiliteit en Openbare Werken	-	Mobility and Public Works Department
MRAC	MRAC	Musée Royal d'Afrique Centrale	KMMA	Koninklijk Museum voor Midden-Afrika	RMCA	Royal Museum for Central Africa
MRG	-	Lignes directrices pour la surveillance et la déclarattion (des GES)	-	Richtsnoeren voor de monitoring en rapportage (van BKG)	MRG	Monitoring and Reporting Guidelines

	FR		NL		EN	
MTD	MTD	Meilleure Technologie Disponible	BBT	Best Beschikbare Technologie	BAT	Best Available Technology
MTB	MTB	Métro-train/tram-bus	MTB	Metro-trein/tram-bus	MTB	Metro-train/tram-bus
MUMM	UGMM	Unité de Gestion du Modèle Mathématique de la mer du Nord et de l'estuaire de l'Escaut	BMM	Beheerseenheid van het Mathematisch Model van de Noordzee en het Schelde-estuarium	MUMM	Management Unit of the North Sea Mathematical Models and the Scheldt Estuary
MVO	RSE	Responsabilité Sociétale des Entreprises	MVO	maatschappelijk verantwoord ondernemen	-	corporate social responsibility
NAIADES	NAIADES	Navigation Intérieure : Actions et Développe-ment en Europe	-	Binnenscheepvaart: advies en ontwikkeling in Europa	-	Navigation and Inland Waterway Action and Development in Europe
NATO	OTAN	Organisation du Traité de l'Atlantique Nord	NAVO	Noord-Atlantische Verdragsorganisatie	NATO	North Atlantic Treaty Organization
NAVO	OTAN	Organisation du Traité de l'Atlantique Nord	NAVO	Noord-Atlantische Verdragsorganisatie	NATO	North Atlantic Treaty Organization
NCC	CNC	Commission Nationale Climat	NKC	Nationale Klimaatcommissie	NCC	National Climate Commission
NCP	PNC	Plan National Climat	NKP	Nationaal klimaatplan	NCP	National climate plan
NCV	PCI	Pouvoir Calorifique Inférieur	COW	calorische onderwaarde	NCV	Net calorific value
NDACC	-	réseau pour la détection des changements dans la stratosphère	-	Netwerk voor de detectie van de klimaatverandering	NDACC	Network for Detection and Attribution of Climate Change
NEHAP	-	Plan national d'action environnement santé	-	Nationaal Actieplan voor Milieu en Gezondheid	NEHAP	National Environmental Health Action Plan
NFWO	FNRS	Fonds National de la Recherche Scientifique	NFWO	Nationaal Fonds voor Wetenschappelijk Onderzoek	-	National Fund for Scientific Research
NGO	ONG	Organisation Non Gouvernementale	NGO	niet gouvernementele organisatie	NGO	non-governmental organization
NIR	RNI	Rapport National d'Inventaire	NIR	Nationaal inventarisatierapport	NIR	National inventory report
NIS	INS	Institut National de Statistique	NIS	Nationaal Intituut voor de Statistiek	-	Institute of National Statistics
NOx	NOx	Oxydes d'azote	NOx	stikstofoxiden	NOx	nitrogen oxides
N_2O	N_2O	protoxyde d'azote	N_2O	distikstofmonoxide	N_2O	nitrous oxide
NKC	CNC	Commission Nationale Climat	NKC	Nationale Klimaatcommissie	NCC	National Climate Commission
NKP	PNC	Plan National Climat	NKP	Nationaal klimaatplan	NCP	National climate plan
NMBS	SNCB	Société Nationale des Chemins de fer Belge	NMBS	Nationale Maatschappij der Belgische Spoorwegen	-	National Railway Company of Belgium
NME	ErE	Education relative à l'Environnement	NME	Natuur- en Milieueducatie	-	Environmental education
NSSD	SNDD	Stratégie Nationale de Développement Durable	-	Nationale Strategie Duurzame Ontwikkeling	NSSD	National Strategy for Sustainable Development
NU	NU	Nations Unies	VN	Verenigde Naties	UN	United Nations
NV	SA	Société Anonyme	NV	naamloze vennootschap	Plc	Public company
OCDE	OCDE	Organisation de Coopération et de Développement Economiques	OESO	Organisatie voor Economische Samenwerking en Ontwikkeling	OECD	Organisation for Economic Cooperation and Development
OCMW	CPAS	Centre Public d'Action Sociale	OCMW	Openbaar Centrum voor Maatschappelijk Welzijn	-	Public Center for Social Welfare
O&O	R&D	Recherche et Développement	O&O	onderzoek en ontwikkeling	R&D	Research & Development
ODA	-	Aide officielle au développement	-	officiële ontwikkelingshulp	ODA	Official Development Assistance
ODE	-	Organisation pour l'énergie durable	ODE	Organisatie voor Duurzame Energie	-	Organization for sustainable energy

	FR		NL		EN	
OECD	OCDE	Organisation de Coopération et de Développement Economiques	OESO	Organisatie voor Economische Samenwerking en Ontwikkeling	OECD	Organisation for Economic Cooperation and Development
OESO	OCDE	Organisation de Coopération et de Développement Economiques	OESO	Organisatie voor Economische Samenwerking en Ontwikkeling	OECD	Organisation for Economic Cooperation and Development
OIP	OIP	Organismes d'Intérêt Public	ION	Instellingen van Openbaar Nut	-	public interest bodies
OMD	OMD	Objectifs du Millénaire pour le développement	MDG	Millenniumdoelstellingen	MDG	Millennium Development Goals
OMM	OMM	Organisation Météorologique Mondiale	WMO	Wereld Meteorologische Organisatie	WMO	World Meteorological Organization
ONG	ONG	Organisation Non Gouvernementale	NGO	niet gouvernementele organisatie	NGO	non-governmental organization
OTAN	OTAN	Organisation du Traité de l'Atlantique Nord	NAVO	Noord-Atlantische Verdragsorganisatie	NATO	North Atlantic Treaty Organization
OVAM	-	Société publique des déchets de la Région flamande	OVAM	Openbare Vlaamse Afvalstoffenmaatschappij	-	Flemish Public Waste Agency
OVW	PCI	Pouvoir Calorifique Inférieur	OVW	Onderverbrandingswaarde	NCV	Net calorific value
PAC	PAC	Politique Agricole Commune	GLB	Gemeenschappelijk Landbouwbeleid	CAP	Common Agricultural Policy
PAEE	PAEE	Plan d'Action Efficacité Energétique	APEE	actieplan inzake energie-effciëntie	EEAP	Energy Efficacy Action Plan
PALME	PALME	Programme d'Actions Locales pour la Maîtrise de l'Energie	-	lokaal actieprogramma voor een rationeel energiebeheer	-	Local Action Programme for Energy Management
PAMs	-	Politiques et Mesures	-	Beleid en Maatregelen	PAMs	Policies and measures
PCCE	PCCE	Production combinée de chaleur et d'électricité	WKK	Warmtekrachtkoppeling	CHP	Combined Heat and Power
PCI	PCI	Pouvoir Calorifique Inférieur	OVW	Onderverbrandingswaarde	NCV	Net calorific value
PDR	PDR	Plans de Développement Rural	PPO	Programma voor plattelandsontwikkeling	-	Rural development plans
PEB	PEB	Performance Energétique des Bâtiments	EPB	Energieprestaties en binnenklimaat van gebouwen	EPB	Energy performance of buildings
PEFC	-	Programme de Reconnaissance des Certifications Forestières (initiative forestière au niveau paneuropéen)	-	pan-Europees boscertificeringsinitiatief	PEFC	Programme for the Endorsement of Forest Certification schemes
PFC	PFC	perfluorocarbone	PFK's	Perfluorkoolwaterstoffen	PFC	Perfluorocarbon
PFK's	PFC	perfluorocarbone	PFK's	Perfluorkoolwaterstoffen	PFC	Perfluorocarbon
PGDA	PGDA	Programme de Gestion Durable de l'Azote en Agriculture	-	Programma betreffende het Duurzame Beheer van Stikstof in de Landbouw	-	Programme for the Sustainable Management of Nitrogen in Agriculture
PIB	PIB	Produit Intérieur Brut	BBP	Bruto Binnenlands Product	GDP	Gross Domestic Product
PIH	PIH	Programme International en Hydrologie	IHP	Internationaal Hydrologisch Programma	IHP	International Hydrological Programme
PK	PK	Protocole de Kyoto	PK	Protocol van Kyoto	KP	Kyoto Protocol
PLAGE	PLAGE	Programme Local d'Actions de Gestion de l'Energie	PLAGE	Plan voor Lokale Actie voor het Gebruik van Energie	-	Local Programme of Action for Energy Management
PLUIES	PLUIES	Prévention et Lutte contre les Inondations et leurs Effets sur les Sinistrés	-	Preventie en strijd tegen overstromigen en hun impact op de slachtoffers	-	Prevention and Fight against Floods and their effects on victims
PM	-	Particule fine	-	Fijnstof	PM	Particule matter
PMA	PMA	Pays les Moins Avancés	MOL	Minst Ontwikkelde Landen	LDC	Least Developed Countries
PME	PME	Petites et Moyennes Entreprises	KMO	Kleine en Middelgrote Ondernemingen	SME	Small and medium-sized enterprises

	FR		NL		EN	
PMV	-	agence de financement flamande	PMV	Participatiemaatschappij Vlaanderen	-	Flemish Participation Company
PNC	PNC	Plan National Climat	NKC	Nationale Klimaatcommissie	NCP	National Climate Plan
PNUE	PNUE	Programme des Nations Unies pour l'Environnement	-	Milieuprogramma van de Verenigde Naties	UNEP	United Nations' Environment Programme
POD	SPP	Service Public Fédéral de Programmation	POD	Programmatorische federale overheidsdienst	PPS	Federal Public Planning Service
POP	POP	Polluant Organique Persistant	-	Persistente organische verontreinigende stoffen	POP	Persistant Organic Pollutant
ppm	ppm	Partie par million	-	deeltjes per miljoen	ppm	parts per million
PPO	PDR	Plans de Développement Rural	PPO	Plannen voor Plattelandsontwikkeling	-	rural development plans
PPP	PPP	Partenariat Public-Privé	PPS	Publiek-Private Samenwerking	PPP	Public Private Partnership
PPS	PPP	Partenariat Public-Privé	PPS	Publiek-Private Samenwerking	PPP	Public Private Partnership
PPS	SPP	Service Public Fédéral de Programmation	POD	Programmatorische federale overheidsdienst	PPS	Federal Public Planning Service
PRG	PRG	Potentiel de Réchauffement Global	-	vermogen tot opwarming van de aarde	GWP	Global Warming Potential
QA/QC	AQ/CQ	Assurance Qualité / Contrôle de Qualité	-	Kwaliteitsborging/ kwaliteitscontrole	QA/QC	Quality Control / Quality Assurance
RBC	RBC	Région de Bruxelles-Capitale	BHG	Brussels Hoofdstedelijk Gewest	BCR	Brussels Capital region
R&D	R&D	Recherche et Développement	O&O	Onderzoek en Ontwikkeling	R&D	Research & Development
RDC	RDC	République Démocratique du Congo	DRC	Democratische Republiek Congo	DRC	Democratic Republic of the Congo
REG	URE	Utilisation Rationnelle de l'Energie	REG	rationeel energiegebruik	RUE	rational utilisation of energy
RER	RER	Réseau Express Régional	GEN	Gewestelijk Expresnet	-	Suburban network
RES	SER	Sources d'Energie Renouvelables	HEB	hernieuwbare energiebronnen	RES	Renewable Energy Source
RF	RF	Région flamande	VG	Vlaams Gewest	FR	Flemish region
RIB	-	Recherche à Bruxelles	-	Onderzoek in Brussel	RIB	Research in Brussels
RMCA	MRAC	Musée Royal d'Afrique Centrale	KMMA	Koninklijk Museum voor Midden-Afrika	RMCA	Royal Museum for Central Africa
RMI	IRM	Institut Royal Météorologique	KMI	Koninklijk Metereologisch Instituut	RMI	Royal Meteorological Institute
RMU	-	Unité supprimée	-	verwijderingseenheid	RMU	Removal unit
RNB	RNB	Revenu National Brut	BNI	Bruto nationaal inkomen	GNI	Gross national income
RNI	RNI	Rapport National d'Inventaire	NIR	Nationaal inventarisatierapport	NIR	National inventory report
RSE	RSE	Responsabilité Sociétale des Entreprises	MVO	maatschappelijk verantwoord ondernemen	-	corporate social responsibility
RSV	-	Plan structurel d'aménagement de la Flandre	RSV	Ruimtelijk Structuurplan Vlaanderen	-	Flanders Spatial Structure Plan
RTBF	RTBF	Radio-Télévision Belge Francophone	-	Belgische Franstalige radio en televisie	-	Belgian French-speaking radio and television
RUE	URE	Utilisation Rationnelle de l'Energie	REG	rationeel energiegebruik	RUE	rational utilisation of energy
RWO	-	Aménagement du territoire, politique du logement et du patrimoine	RWO	Ruimtelijke Ordening, Woonbeleid en Onroerend Erfgoed	-	Spatial Planning, Housing Policy and Heritage

	FR		NL		EN	
SA	SA	Société anonyme	NV	naamloze vennootschap	Plc	Public company
SDER	SDER	Schéma de Développement de l'Espace Régional	-	Schema van de ontwikkeling van de Regionale Ruimten	-	Regional Space Development Scheme
SEF	-	Format électronique standard	-	Standaard elektronisch formaat	SEF	Standard electronic format
SER	SER	Sources d'Energie Renouvelables	HEB	hernieuwbare energiebronnen	RES	Renewable Energy Sources
SF_6	SF_6	hexafluorure de soufre	SF_6	zwavelhexafluoride	SF_6	sulphur hexafluoride
SME	PME	Petites et Moyennes Entreprises	KMO	Kleine en Middelgrote Ondernemingen	SME	Small and medium-sized enterprises
SMOC	SMOC	Système Mondial d'Observation du Climat	-	Global klimaat observatie systeem	GCOS	Global climate observation system
SNCB	SNCB	Société Nationale des Chemins de fer Belge	NMBS	Nationale Maatschappij der Belgische Spoorwegen	-	National Railway Company of Belgium
SNDD	SNDD	Stratégie Nationale de Développement Durable	-	Nationale Strategie Duurzame Ontwikkeling	NSSD	National Strategy for Sustainable Development
SOFICO	SOFICO	Société wallonne de financement complémentaire des infrastructures	-	Waalse maatschappij voor de aanvullende financiering van de infrastructuren	-	Walloon company for additional financing of infrastructure
SOLWATT	SOLWATT	Plan pour le développement du solaire photovoltaïque en Région wallonne	-	actieprogramma voor de promotie van fotovoltaïsche energie in het Waals Gewest	-	Plan for the development of solar photovoltaics in the Walloon Region
SPF	SPF	Service Public Fédéral	FOD	Federale Overheidsdienst	FPS	Federal public service
SPP	SPP	Service Public Fédéral de Programmation	POD	Programmatorische federale overheidsdienst	PPS	Federal Public Planning Service
SPW	SPW	Service Public de Wallonie	-	Waalse Overheidsdienst	WPS	Walloon public service
SRWT	SRWT	Société Régionale Wallonne du Transport	-	Waalse gewestelijke vervoermaatschappij	-	Regional Walloon company for transport
SSD	SSD	Science pour un Développement Durable	WDO	Wetenschap voor een Duurzame Ontwikkeling	-	Science for a Sustainable Development
STEG	CCGN	Centrale à Cycle Combiné au Gaz naturel	STEG	Stoom- en gascentrale	CCGT	Combined-cycle gas power plant
STI	STI	Science, technologie et Innovation	_	Wetenschap, technologie en innovatie	STI	Science, technology and Innovation
STIB	STIB	Société des Transports Intercommunaux de Bruxelles	MIVB	Maatschappij voor het Intercommunaal Vervoer in Brussel	-	Brussels transport society
SUV	-	Véhicule utilitaire et de loisir	-	-	SUV	Sport utility vehicle
SWCS	SWCS	Société Wallonne du Crédit Social	-	Waalse maatschappij voor sociaal krediet	-	Walloon company for social credit
SWL	SWL	Société Wallonne du Logement	-	Waalse woningmaatschappij	-	Walloon company housing
tCER	URCE-T	Unités de Réduction Certifiées des Emissions temporaire	-	voorlopige CER's	tCER	Temporary certified emission reduction
TEC	TEC	Transport en Commun en Wallonie	-	Waalse vervoermaatschappij	-	Walloon Public transport
tep	tep	Tonne d'équivalent-pétrole	toe	Ton olie-equivalent	toe	Ton of oil equivalent
TMC	TMC	Taxe de Mise en Circulation	BIV	Belasting op de inverkeerstelling	-	Tax for bringing cars on the road
toe	tep	Tonne d'équivalent-pétrole	toe	Ton olie-equivalent	toe	Ton of oil equivalent
TPE	TPE	Très Petites Entreprises	ZKO's	Zeer Kleine Ondernemingen	-	very small enterprise
TT	TT	Transfert de Technologie	-	Technologie-overdracht	TT	Technology transfert

	FR		NL		EN	
TVA	TVA	Taxe sur la Valeur Ajoutée	BTW	Belasting op de toegevoegde waarde	-	value added tax
UCL	UCL	Université catholique de Louvain	-	Katholieke Universiteit in Louvain-la-Neuve	-	Catholic university of Louvain-la-Neuve
UCM	UCM	Union des Classes Moyennes	-	-	-	-
UE	UE	Union Européenne	EU	Europese Unie	EU	European Union
UGMM	UGMM	Unité de Gestion du Modèle Mathématique de la mer du Nord et de l'estuaire de l'Escaut	BMM	Beheerseenheid van het Mathematisch Model van de Noordzee en het Schelde-estuarium	MUMM	Management Unit of the North Sea Mathematical Models and the Scheldt estuary
UN	NU	Nations Unies	VN	Verenigde Naties	UN	United Nations
UNCBD	-	Conventions des Nations Unies sur la biodiversité	-	Verdragen van de Verenigde Naties over de biodiversiteit	UNCBD	United Nations Convention on Biological Diversity
UNCCD	-	Conventions des Nations Unies sur la lutte contre la désertification	-	Verdragen van de Verenigde Naties over de strijd tegen de verwoestijning	UNCCD	United Nations Convention to Combat Desertification
UNDP	PNUD	Programme des Nations-Unies pour le Développement	-	Ontwikkelingsprogramma van de Verenigde Naties	UNDP	United Nations Development Programme
UNEP	PNUE	Programme des Nations Unies pour l'Environnement	-	Milieuprogramma van de Verenigde Naties	UNEP	United Nations' Environment Programme
UNESCO	-	Organisation des Nations Unies pour l'éducation, la science et la culture	-	Organisatie van de Verenigde Naties voor onderwijs, wetenschap en cultuur	UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	CCNUCC	Convention-Cadre des Nations Unies sur les Changements Climatiques	-	Verdrag van de Verenigde Staten over de Klimaatverandering	UNFCCC	United Nations Framework Convention on Climate Change
UQA	UQA	Unité de Quantité Attribuée	-	toegewezen emissie-eenheid	AAU	assigned amount unit
URCE	URCE	Unités de Réduction Certifiées des Emissions	-	gecertificeerde emissiereductie	CER	certified emission reduction
URCE-LT	URCE-LT	Unités de Réduction Certifiées des Emissions long terme	-	langetermijn-CER's	lCER	Long term certified emission reduction
URCE-T	URCE-T	Unités de Réduction Certifiées des Emissions temporaire	-	voorlopige CER's	tCER	Temporary certified emission reduction
URE	URE	Utilisation Rationnelle de l'Energie	REG	rationeel energiegebruik	RUE	rational utilization of energy
URE	URE	Unité de Réduction des Emissions	-	Emissiereductie-eenheid	ERU	Emission Reduction Unit
UREBA	UREBA	Utilisation Rationnelle de l'Energie dans les BAtiments	-	Financiering van REG-projecten van het Waals Gewest	-	Rational Use of Energy in Buildings
US	-	Etats-Unis	VS	Verenigde Staten	US	United States
UTCATF	UTCATF	Utilisation des Terres, Changement d'Affectation des Terres et Foresterie	-	landgebruik, verandering in landgebruik en bosbouw	LULUCF	Land Use, Land-Use Change end Forestry
UWE	UWE	Union Wallonne des Entreprises	-	Waals verbond van Ondernemingen	-	Walloon union of companies
VDAB	-	Office flamand de l'emploi et de la formation professionnelle	VDAB	Vlaamse Dienst voor Arbeidsbemiddeling en Beroepsopleiding	-	Flemish Public Employment and vocational training Service
VEA	-	agence flamande de l'énergie	VEA	Vlaams Energieagentschap	-	Flemish Energy Agency
VG	RF	Région flamande	VG	Vlaams Gewest	FR	Flemish region
VILT	-	Centre d'Information Flamand pour l'Agriculture et l'Horticulture	VILT	Vlaams Infocentrum Land- en Tuinbouw	-	Flemish infocenter for agriculture and horticulture
VIPA	-	Fonds de l'Infrastructure affectée aux matières personnalisables	VIPA	Vlaams Infrastructuurfonds voor Persoonsgebonden Aangelegenheden	-	Flemish Infrastructure Fund for Person related matters

	FR		NL		EN	
VITO	-	Institut flamand pour la recherche technologique	VITO	Vlaamse Instelling voor Technologisch Onderzoek	-	Flemish Institute for Technological Research
VLIR	-	Conseil interuniversitaire flamand	VLIR	Vlaamse Interuniversitaire Raad	-	Flemish Interuniversity Council
VLM	-	Société Flamande Terrienne	VLM	Vlaamse Landmaatschappij	-	Flemish Land Company
VMM	-	Agence flamande de l'environnement	VMM	Vlaamse Milieumaatschappij	-	Flemish Environment agency
VMSW	-	Société flamande du Logement social – AAE	VMSW	Vlaamse Maatschappij voor Sociaal Wonen	-	Flemish Social Housing Company
VN	NU	Nations Unies	VN	Verenigde Naties	UN	United Nations
VOC	COV	Composé Organique Volatile	VOS	Vluchtige organische stoffen	VOC	Volatile Organic compound
VOS	COV	Composé Organique Volatile	VOS	Vluchtige organische stoffen	VOC	Volatile Organic compound
VREG	-	Autorité de régulation flamande pour le marché de l'électricité et du gaz	VREG	Vlaamse Reguleringsinstantie voor de Elektriciteits- en Gasmarkt	-	Flemish Electricity and Gas Regulatory Body
VRT	-	Radio et télévision flamande	VRT	Vlaamse Radio en Televisie	-	Flemisch radio and television
VRWB	-	Conseil flamand de la Politique Scientifique	VRWB	Vlaamse Raad voor Wetenschapsbeleid	-	Flemish Science Policy Council
VS	-	Etats-Unis	VS	Verenigde Staten	US	United States
VSAWSE	-	Agence flamande de subventionnement pour l'Emploi et l'Economie sociale	VSAWSE	Vlaams Subsidieagentschap voor Werk en Sociale Economie	-	Flemish Grant Agency for Work and Social Economy
VSV	-	Fondation flamande pour la sécurité routière	VSV	Vlaamse Stichting Verkeerskunde	-	Flemish foundation for road safety
VTM	-	Société de Télévision Flamande	VTM	Vlaamse Televisie Maatschappij	-	Flemisch television society
VZW	ASBL	Association Sans But Lucratif	VZW	vereniging zonder winstoogmerk	NPO	Non profit organization
WAM	-	"Avec mesures additionnelles"	-	"Met bijkomende maatregelen"	WAM	"With additional measures"
WBI	WBI	Wallonie-Bruxelles International	-	Wallonië-Brussel Internationaal	WBI	Wallonia-Brussels International
WDO	SSD	Science pour un Développement Durable	WDO	Wetenschap voor een Duurzame Ontwikkeling	-	Science for a Sustainable Development
WG	GT	Groupe de Travail	WG	werkgroep	WG	Working group
WKK	PCCE	Production Combinée de Chaleur et d'Electricité (cogénération)	WKK	Warmtekrachtkoppeling	CHP	combined heat and power
WM	-	"Avec mesures"	-	"Met maatregelen"	WM	"With measures"
WMO	OMM	Organisation Météorologique Mondiale	WMO	Wereld Meteorologische Organisatie	WMO	World Meteorological Organization
WPS	SPW	Service Public de Wallonie	-	Waalse Overheidsdienst	WPS	Walloon public service
WR	RW	Région wallonne	WG	Waals gewest	WR	Walloon region
WSE	-	Emploi et économie sociale	WSE	Werk en Sociale Economie	-	Work and Social Economy Department
WTCB	CSTC	Centre Scientifique et Technique de la Construction	WTCB	Wetenschappelijk en Technisch Centrum voor het Bouwbedrijf	BBRI	Belgian Building Research Institute
WWF	-	Fonds mondial pour la nature	-	Wereld Natuur Fonds	WWF	World Wide Fund for Nature
ZKO's	TPE	Très Petites Entreprises	ZKO's	Zeer Kleine Ondernemingen	-	very small enterprises

BELGIUM'S FIFTH NATIONAL COMMUNICATION

Under the United Nations Framework Convention on Climate Change

This report was prepared in collaboration with:

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