Summary report of the state of **the environment** 2007-2008

BRUSSELS ENVIRONMENT

IBGE-BIM

SUSTAINABLE CITY BRU

SOME NUMERICAL POINTS OF REFERENCE

The Brussels-Capital Region · Source: DGSIE & ACED, Regional Council - collected by IBSA

Surface area	**161,4**	**km²**
Developed area	73,4	km²
Expense budget (2008, initial)	**3 082,5 million**	**euro**

Population · Source: DGSIE - collected by IBSA

Population (2008)	**1 048 491**	**inhabitants**
Change compared to 1990	+ 8,7	%
Population density (2008)	6 496,9	inhabitants/km²
Average size of households (2007)	2,04	people
Average age of the population (2007)	37,72	years

Buildings · Source: DGSIE, ACED, SLRB - collected by IBSA

Number of buildings (2007)	**193 954**	**buildings**
Of which residential buildings (2007)	159 202	buildings
Number of residences (2007)	545 308	**residences**
Of which houses	40,6	%
Of which apartments	51,0	%
Of which other	8,4	%
Of which state-subsidised housing (2006)	38 364	residences

Life expectancy at birth · Source: DGSIE - collected by IBSA

Men (2006)	**76,90**	**years**
Women (2006)	**81,99**	**years**

Socio-economic situation · Source: EFT, ONEM, Actiris, DGSIE - collected by IBSA

Actively employed population (2007)	**383 000 (estimated)**	**units**
Of whom employed in Brussels (2007)	321 000	units
Unemployed seeking work (2007)	**76 652**	**units**
Average declared income (2006 financial year, 2005 income)	**22 570**	**euro**

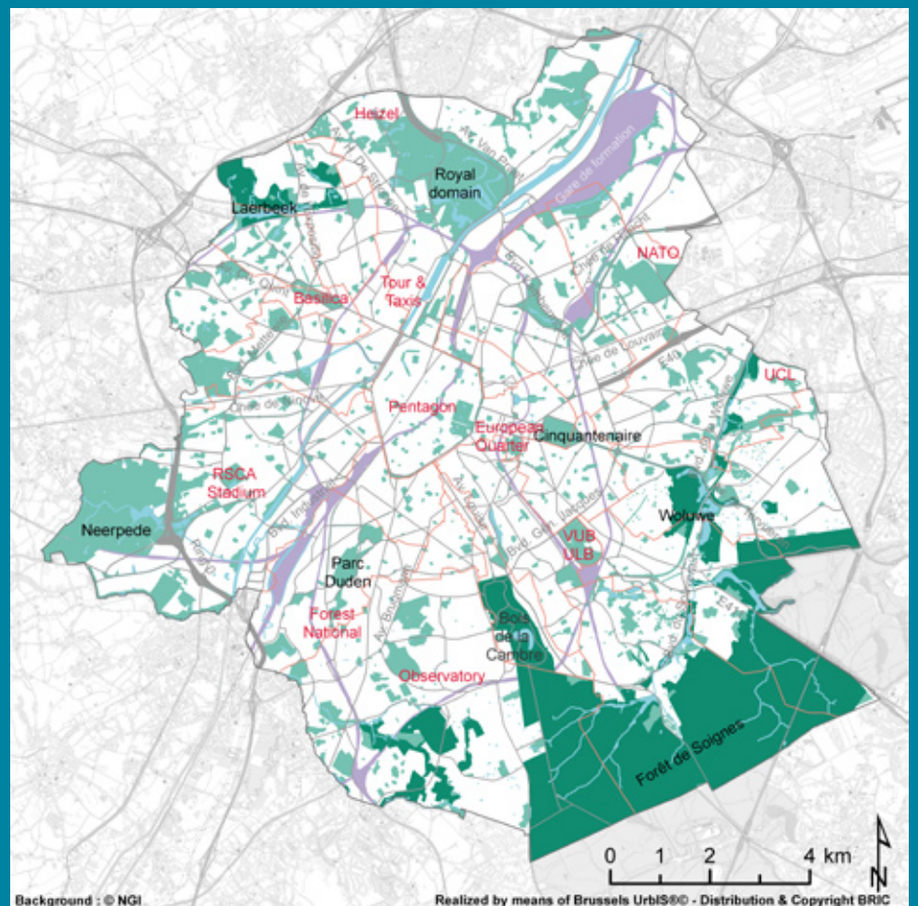
Manufacturing and businesses · Source: EFT, ONSS, DGSIE, ICN, AATL (Review of Office Property) - collected by IBSA

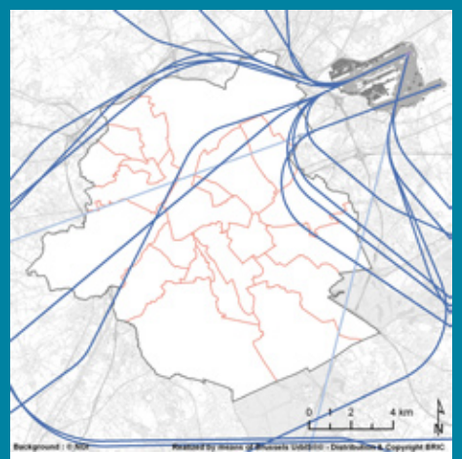
Jobs in the BCR	**680 000**	**jobs**
Of which salaried (2006)	610 700	salaried jobs
Number of businesses (2006)	**78 174**	**units**
Turnover (excl. VAT) (2007)	**237 258,25 million**	**euro**
GDP (2006)	**59 734,9 million**	**euro**
Office floor space (2004)	**12 505 948**	**m²**

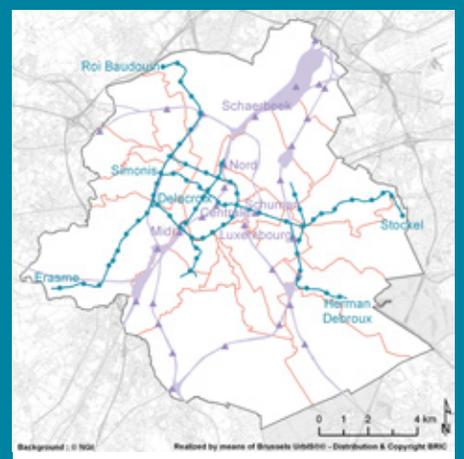
Transport · Source: DGSIE, STIB - collected by IBSA/SPF mobilité et transports and Brutrends

Length of paved road network (2005)	**1 885,1**	**km**
Distances travelled on roads (2007)	**3,86 billion**	**vehicle-km**
Number of motor vehicles (2007)	**598 594**	**vehicles**
Of which private cars (2007)	498 110	vehicles
STIB : number of trips (2007)	**277,3 million**	**trips**
Average daily number of aircraft movements (Brussels-National Airport, 2006)	**698**	**movements**

SOME CARTOGRAPHIC REFERENCE POINTS







The detailed report on the state of the Brussels environment and the summary report on the state of the Brussels environment are, along with the activity reports of Brussels Environment and environmental management plans, part of the overall environmental communication at the regional level. The present report centres on **32 key topics** which illustrate important environmental challenges. It covers the main urban environmental themes, including health impacts and links between society and environment. These subjects are presented in summary form, relying mainly on **indicators** or quantitative data and recent **assessments** and **studies** (referenced at the end of the publication).

AN A TO Z OF THE BRUSSELS ENVIRONMENT

You have in your hands a highly instructive information tool! This summary of the state of the environment allows anyone living in Brussels to learn about the state of the environment in the Brussels-Capital Region.
The European Environment Agency regularly presents reports that synthesise observations and scientific knowledge concerning the environment and its management, including the report on the state of the European environment[1]. In order to achieve a high-quality environment in Europe, each Member State, and the Regions of which it is made up, must respect a series of commitments and standards but also compile inventories.
Every four years, therefore, a detailed report is drawn up on the state of the environment in Brussels, and sent to the Parliament[2], and every two years an executive summary such as the one you are about to read.
This new publication, drawn up in 2009, concerns the years 2007 and 2008. It describes and analyses the situation of various components of the Brussels environment: the water, air, noise, green spaces, biodiversity, indoor pollution, energy, climate change, waste and ground pollution. It also takes a detailed look at the pressures exerted on the environment, the socio-economic context (demographics, economic actors, etc.) and development prospects. All these observations are based on environmental indicators, quantitative data, assessments and recent studies.
This publication also shows, for example, that the quality of air has noticeably improved over the course of recent years, or decades for certain pollutants. In contrast, concentrations of nitrogen dioxide, ozone and fine particles are close to or even in excess of the European limit values. As for the physico-chemical and ecological quality of the surface water, a larger number of parameters are at present within the objectives set by Europe. In the area of biodiversity, inventories of flora and fauna have allowed designation of Natura 2000 sites.
For all that, this summary is no programme of decisions, but rather a compilation of objective and highly valuable data that can play a pivotal role and inspire new policies to make Brussels a sustainable city!

Happy reading!

EVELYNE HUYTEBROECK
Brussels Minister for the Environment

[1] European Environment State and Outlook Report 2010 (SOER 2010).
[2] The last “State of the Environment Report” published in 2007 is based on data from 2003-2006.

FOR OUR ENGLISH SPEAKING READERS

What is « Brussels Environment » ?

Brussels Environment is the public administration that manages almost all environmental and energy matters within the boundaries of the Brussels-Capital Region (BCR). It is a public interest body created by the Royal Decree of 8 March 1989 (Belgian Official Gazette of 24 March 1989), which has been amended several times since. Designed as a body for research, planning, advice and information, it is also a body for authorisation, monitoring and control. Its cross-disciplinary approach on which its activities are based, is characteristic of a global environmental approach.

The official languages of the BCR being French and Dutch, its administration is bilingual.
The official acronyms of Brussels Environment are IBGE and BIM:

- **IBGE** stands for the French name "Institut Bruxellois pour la Gestion de l'Environnement" (in short Bruxelles Environnement) ;
- **BIM** stands for the Dutch name "Brussels Instituut voor Milieubeheer" (in short Leefmilieu Brussel).

On page 38-39 of this booklet you will find a presentation of the core business of Brussels Environment.

The state of the Brussels Environment on the internet

A section on the website of « Brussels Environment » is specifically devoted to data, studies and reporting on the state of the environment in the Brussels-Capital Region.

- **http://www.bruxellesenvironnement.be/etatdelenvironnement**
- **http://www.leefmilieubrussel.be/staatvanhetleefmilieu**

In this section you can also **download the English version** of the Summary Report of the State of the Environment by opening the links « synthèse 2009 » or « synthese 2009 ». This pdf file allows the reader to view an enlarged image of the charts and maps.

What you need to know about this English edition

For the **writing of numbers**, this publication uses the comma as the decimal marker, while thousands are separated by spaces.

The original booklet is a bilingual French-Dutch version. For technical reasons and to ensure smooth reading of the text, the English version uses only the French language for **geographical and bibliographical references**.
The acronyms of the institutes and authorities mentioned in the English edition are explained in the table.

AATL	Administration de l'Aménagement du Territoire et du Logement Observatoire des bureaux	BROH	Bestuur Ruimtelijke Ordening en Huisvesting Overzicht van het kantorenpark	Brussels Administration for land use planning and housing - Offices' Observatory http://www.aatl.irisnet.be/ (no English)
ACED	Administration du Cadastre, de l'Enregistrement et des Domaines	AKRED	Administratie van het Kadaster, de Registratie en de Domeinen	National Land registry and estates department (part of the Belgian Ministry of Finance) http://fiscus.fgov.be/interfakredfr/_bdp/datafr.htm (no English)
ACTIRIS	Services et avis pour les chercheurs d'emploi	ACTIRIS	Diensten- en adviesverlener voor werkzoekenden	Brussels regional public employment service http://www.actiris.be/ (no English)
CELINE	Cellule interrégionale de l'Environnement	IRCEL	Intergewestelijke Cel voor het Leefmilieu	Interregional Cell for the Environment http://www.irceline.be
CERAA	Centre d'étude, de Recherche et d'Action en Architecture			Architectural study, research and action centre (French community) http://www.ceraa.be/ (no English)
CPAS	Centre public d'action sociale	OCMW	Openbaar centrum voor maatschappelijk welzijn	Centre for public welfare (these centres are active at the municipal level)
DGSIE	Direction générale Statistique et Information économique	ADSEI	Algemene Directie Statistiek en Economische Informatie	General Directorate Statistics and Economic Information (part of the Belgian Ministry of Economy) http://statbel.fgov.be/ (some English)
EFT	Enquête sur les forces de travail (SPF Economie, PME, Classes moyennes et Energie)	EAK	Enquête naar de Arbeidskrachten (FOD Economie, KMO, Middenstand en Energie)	(Belgian) labour force survey (by the Belgian Ministry of Economy) http://statbel.fgov.be/fr/statistiques/collecte_donnees/enquetes/eft/index.jsp (no English)
FUSAGX	Faculté Universitaire des Sciences Agronomiques de Gembloux			Gembloux Agricultural University (French community) http://www.fusagx.be (no English)
IBSA	Institut Bruxellois de Statistique et d'Analyse	BISA	Brussels Instituut voor Statistiek en Analyse	Brussels Institute for Statistics and Analysis (is part of the Brussels Ministry) http://www.bruxelles.irisnet.be/en/region/region_de_bruxelles-capitale/n_statistiques/analyses_et_analyses.shtml

ICEDD	Institut de Conseil et d'Etudes en Développement Durable			Research centre dealing with sustainable development (French community) http://www.icedd.be (no English)
ICN	Institut des Comptes nationaux (SPF Economie)	INR	Instituut voor de Nationale Rekeningen (FOD Economie)	Institute of National Accounts (part of the Belgian ministry of Economy) http://inr-icn.fgov.be/Inr_Icn_home_fr.htm (no English)
INS	Institut national de statistiques	NIS	Nationaal Instituut voor de Statistiek	Former names of the General Directorate Statistics and Economic Information (Belgian Ministry of Economy) http://statbel.fgov.be/ (few English)
NOH	Neder-Over-Heembeek	NOH	Neder-Over-Heembeek	Neder-Over-Heembeek, the district of Brussels where the regional incineration plant is located
ONEM	Office national de l'emploi	RVA	Rijksdienst voor Arbeidsvoorziening	National Employment Office http://www.rva.fgov.be/frames/Frameset.aspx?Path=D_UK/&Items=1&Language=UK
ONSS	Office national de sécurité sociale	RSZ	Rijksdienst voor Sociale Zekerheid	National Social Security Office http://www.onss.fgov.be/en/home.html
PRAS	Plan régional d'affectation du sol	GBP	Gewestelijk Bestemmingsplan	Land use plan for the Brussels Region http://www.pras.irisnet.be/PRAS/ (maps; no English)
SLRB	Société du Logement de la Région Bruxelloise	BGHM	Brusselse Gewestelijke Huisvestingsmaatschappij	Office for social-housing in the Brussels Region http://www.slrb.irisnet.be/ (no English)
SNCB	Société nationale des chemins de fer belges	NMBS	Nationale Maatschappij der Belgische Spoorwegen	Belgian national railway company http://www.b-rail.be/
SPF	Service public fédéral	FOD	Federale Overheidsdienst	Federal Public Service, in Belgium refers to Ministries at the national level
STIB	Société des Transports Intercommunaux de Bruxelles	MIVB	Maatschappij voor het Intercommunaal Vervoer te Brussel	Brussels urban public transport company http://www.stib.be/index.htm?l=en
ULB	Université libre de Bruxelles			One of the universities in the Brussels Region (French community) http://www.ulb.be/sitemap/ulb/map-universite.html
VUB			Vrije Universiteit Brussel	One of the universities in the Brussels Region (Flemish community) http://www.vub.ac.be/english/

CONCENTRATIONS OF FINE AIRBORNE PARTICLES

Particulate matter or "PM10" (an acronym designating all particles of diameter less than 10 micrometers, without distinguishing composition) in ambient air has various origins: "primary" particles are emitted directly by a natural process (for example, soil erosion) or by human activities (traffic, industry, heating, etc.); "secondary" particles are formed in the atmosphere by chemical reactions starting from other molecules present (nitrates, sulphates, ammonium).

In the Brussels-Capital Region, according to the CORINAIR method of calculation, the transport sector represents the main source of anthropogenic emission of PM10 (71,9% in 2007). The energy consumption of buildings (tertiary and residential), industrial processes and electricity generation contribute in a less significant way (5,6% and 21,7%, 0.5% and 0,1% respectively in 2007).

Because of their small size, PM10 can be transported by air masses over large distances, and for this reason the concentrations measured in Brussels do not result from local emissions alone.

The relative importance of the various contributions (internal and external to the Region) to the measured concentrations can be understood by analysis of the time series of PM10 concentrations measured at certain representative stations:

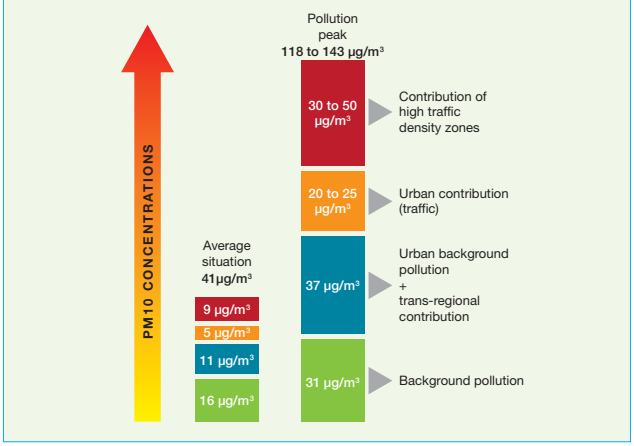
- The background pollution (station located outside the region, at Vielsalm, not affected by local sources);
- The urban background pollution combined with the trans-regional contribution (station located at Uccle, relatively distant from direct emission sources);
- The urban contribution, principally related to traffic (station located in Molenbeek).

The very local contribution of traffic in zones with high vehicle density, estimated based on modelling, must be added to that of these three sources.

The figure below presents an estimate of these four contributions, in an average situation on the one hand, and during pollution peaks on the other hand, between 2005 and 2008.

Relative contributions of background pollution, the trans-regional contribution and urban pollution to the PM concentrations measured in the urban zone and in high-traffic-density zones (1/1/2005 - 31/12/2008 period)

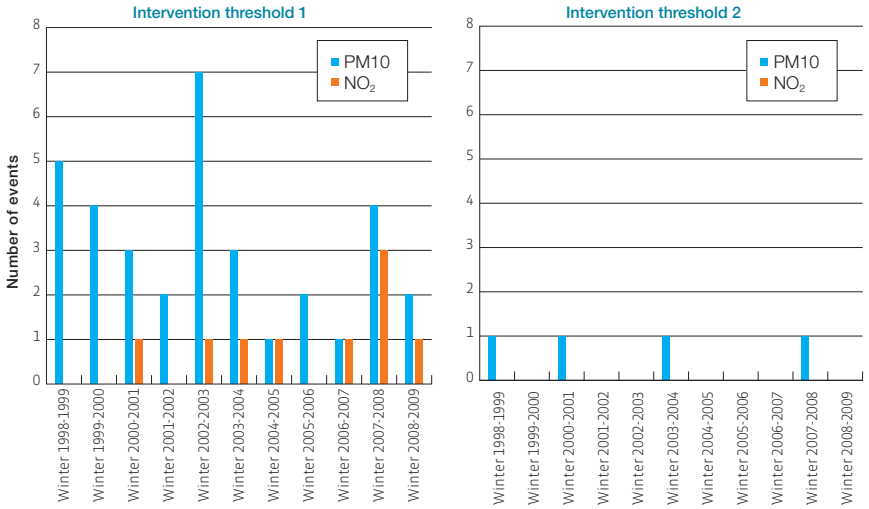
SOURCE: CELINE, CELLULE INTERRÉGIONALE DE L'ENVIRONNEMENT



This figure illustrates the fact that background pollution combined with the trans-regional contribution represents an important share (66%) of the measured concentrations of PM10. In the situation of a pollution peak due to weather conditions unfavourable to the dispersion of pollution, the contribution of traffic is proportionally more important than in the case of situations characterised by good dispersion.

In particular, in high-traffic-density zones, vehicle emission can affect PM10 concentrations by up to 52%.

OCCURRENCE OF PEAKS IN POLLUTION



The intervention thresholds defined in the "emergency plan for pollution peaks":

Intervention threshold 1:
71 to 100 µg/m³ PM10 and
151 to 200 µg/m³ NO_2

Intervention threshold 2:
101 to 200 µg/m³ PM10 and
201 to 400 µg/m³ NO_2

Intervention threshold 3:
> 200 µg/m³ PM10 and
> 400 µg/m³ NO_2

The measures implemented during peaks in pollution are progressive (depending on the threshold) and apply to the heating of buildings and traffic.

SOURCE : BRUSSELS ENVIRONMENT, LABORATOIRE DE RECHERCHE EN ENVIRONNEMENT (AIR)

The occurrence of the winter peaks in pollution indicated above has been calculated only taking into account the months October to March, the period during which the Brussels emergency plan is in effect. On average, the lowest PM intervention threshold is reached 3 times per year, and that for nitrogen dioxide (NO_2), once. The second PM intervention threshold is only reached once every 3 years (on average). It has never yet been reached for NO_2, nor has the highest intervention threshold (not for PM or NO_2).

CONCENTRATIONS OF TROPOSPHERIC OZONE

Tropospheric ozone is a secondary pollutant; that is, it is not emitted directly into the ambient air. It is formed by chemical reactions in the atmosphere following irradiation of primary pollutants (including NO_2) by ultraviolet (UV) light in the presence of oxygen:

$$NO_2 + O_2 + \text{UV energy} <-> O_3 + NO$$

A dynamic equilibrium develops between formation of ozone (a process of several hours) and its destruction (process lasting one to a few minutes).

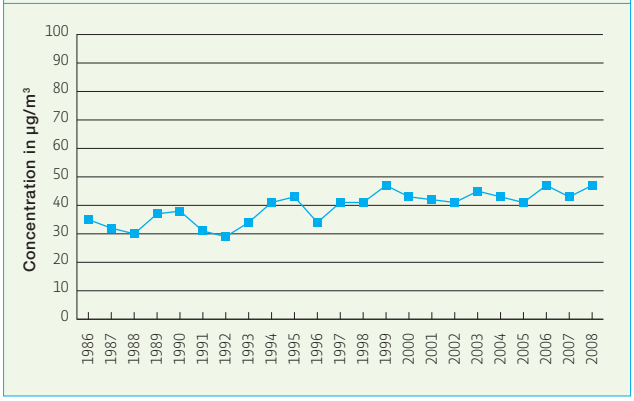
In a situation where there is a peak in pollution, this balance is disturbed by the presence of ozone precursors (NO_2 or Volatile Organic Compounds, VOCs). Some reactive products like VOCs react with nitrogen monoxide (NO) to oxidise it to NO_2, displacing the dynamic equilibrium in favour of ozone production.

Even if ozone is not a typically urban pollutant, it appears in first place among the air quality indicators because of its impact on health (decrease in respiratory function) and on the environment. Its toxicity varies depending on its concentration.

As the figure below shows, the average annual concentration of tropospheric ozone in the region has increased since the beginning of the 1990s. This rise can be explained by a general decrease in NO concentrations, which moves the dynamic equilibrium towards ozone production.

Average annual ozone concentration in Uccle (twice-hourly values; years 1986-2008)

SOURCE : BRUSSELS ENVIRONMENT, LABORATOIRE DE RECHERCHE EN ENVIRONNEMENT (AIR)



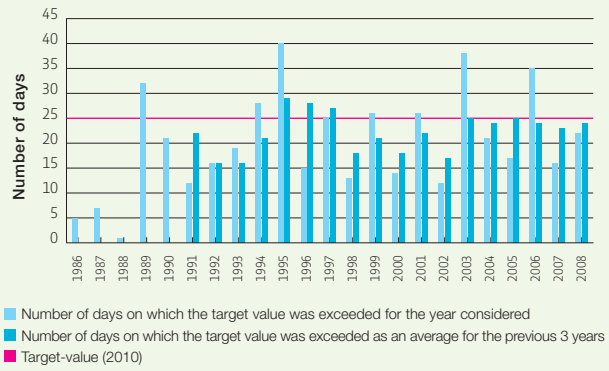
To avoid long-term harmful effects on human health or the environment as a whole, European directive 2008/50/EC on ambient air quality defines, for ozone in particular, the following "target value" to be attained as of 2010:

- 120 µg/m³ as a daily maximum of the rolling averages over 8 hours.
- a maximum of 25 exceedances (days) per year, averaged over 3 years.

The second figure shows the number of days upon which the target value is exceeded in Uccle. The ozone pollution in this monitoring point (residential area with little traffic) is greater than in the other stations of the Region: since it is located away from main roads, ozone formation processes predominate over destructive processes which occur when NO (emitted by traffic) is present.

Number of days upon which the target value of 120 µg/m³ for average ozone concentration over 8 hours was exceeded, between 1986 and 2008 (Uccle station)

SOURCE : BRUSSELS ENVIRONMENT, LABORATOIRE DE RECHERCHE EN ENVIRONNEMENT (AIR)



All the years in which there was sunny and hot weather during July or August are characterised by more than 25 days in which the target was exceeded on the regional level for the year under consideration. This was for example the case for the years 2003 and 2006. As a result, since the standard is based on a 3-year average, a very hot summer period is likely to lead to non-observance of the standard over several years.

Given the ozone formation mechanisms and the tendency to slight increase in the average annual concentration, it is difficult to ensure observance of the European standard. Weather conditions will eventually determine whether ozone standards as of 2010 will ultimately be observed.

It is important to note that NOx (=NO + NO_2) leads to both formation and destruction of ozone. This duality means that some measures aiming to reduce NOx concentrations could decrease destruction of ozone more than its formation, leading to a result contrary to that anticipated. It is generally accepted that a decrease in ozone pollution cannot occur unless drastic (approximately 50%), large-scale (in large parts of Western Europe), long-term reductions are made in precursor emissions (VOCs and NO_2).

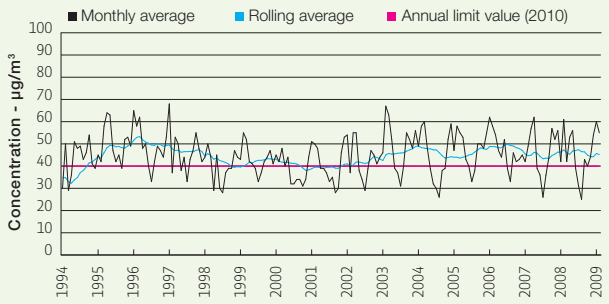
CONCENTRATIONS OF NITROGEN DIOXIDE IN THE AIR

NO_2 is a pollutant harmful to human health but also to the environment (contribution to ozone formation and acidification). Its concentration in the ambient air is related in particular to emissions of nitrogen oxides produced in high-temperature combustion processes (see page on NOx Emissions).

With the aim of protecting public health, European directive 2008/50/EC requires that as from 2010, the average annual concentrations of NO_2 do not exceed 40 µg/m³; this value also corresponds to the guideline value recommended by the WHO.

The figure below shows the time variation of the NO_2 concentration at the Molenbeek station which is representative of an urban environment affected by road traffic.
The graph shows that NO_2 concentrations stay at a relatively high level over time and often lie above the future European standard (horizontal red line).

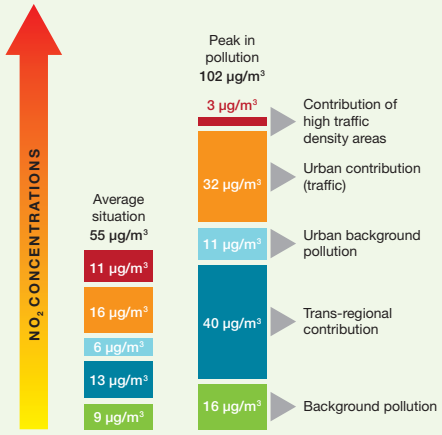
Trend of average NO_2 concentrations relative to the European standard - Molenbeek station (1994-2008)
SOURCE : BRUSSELS ENVIRONMENT, LABORATOIRE DE RECHERCHE EN ENVIRONNEMENT (AIR)



Observance of this standard, applicable as of 2010, will require drastic changes in various sectors at various levels.
The measured concentrations can be explained by different contributions: background pollution (measured in the Ardennes), the trans-regional (imported) contribution, urban background pollution, the urban contribution principally linked to traffic and the additional contribution of the traffic found in areas with high vehicle density (see the page on Fine Particles for more details).

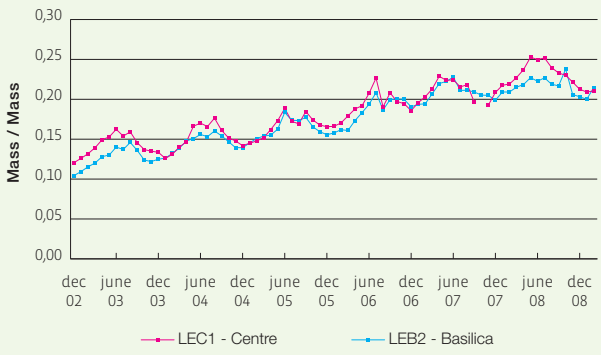
Thus, as an annual average, 40% of the measured NO_2 concentration is related to a contribution which is external to the Brussels-Capital Region (background pollution and trans-regional contribution), 13% corresponds to urban background pollution and 47% is traffic-related. In a peak pollution situation, these values are 57%, 9% and 34% respectively.

Relative contributions of background pollution, the trans-regional contribution and urban pollution to the average daily NO_2 concentrations measured in an urban area and in areas of high traffic density (1998-2008 period)
SOURCE : CELINE, CELLULE INTERRÉGIONALE DE L'ENVIRONNEMENT



In areas affected by traffic, the share of NO_2 in the total emissions of nitrogen oxides (NOx = NO + NO_2) increases:

Monthly evolution of the NO_2/NOx ratio in both traffic directions of the Leopold II Tunnel
SOURCE : BRUSSELS ENVIRONMENT, LABORATOIRE DE RECHERCHE EN ENVIRONNEMENT (AIR)



The increase in the NO_2 fraction in road traffic emissions, and therefore in NO_2 concentrations measured in the environment, is related to, among other factors:

- dieselisation of the automobile stock (diesel emits relatively more NO_2);
- oxidising catalysers imposed by the EURO 3 standard, increasing the proportion of NO_2 compared to NO in emissions;
- the particulate filters on heavy goods vehicles, which indirectly increase NO_2 emissions.

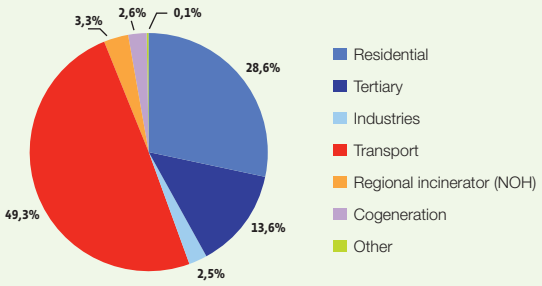
This phenomenon has been observed in all Belgian urban areas as well as in Germany, the Netherlands and London.

EMISSIONS OF NITROGEN OXIDES INTO THE AIR

Nitrogen oxides (which include the monoxide NO and the dioxide NO_2) are produced by oxidation of the nitrogen in the air during any combustion process. Due to the combustion temperature, small quantities of nitrogen and oxygen combine to form NO. A portion of this NO is immediately oxidised to NO_2.
NO is not toxic to humans but nevertheless poses a problem, given that it is one of the precursors of certain photochemical processes (formation of tropospheric ozone). As for NO_2, it is toxic to the respiratory system. It can lead to changes in respiratory function, bronchial hyperreactivity in asthmatics, and increased bronchial sensitivity to infections in children.
NOx also contributes to the acidification of the environment. Acidifying emissions change the composition of air, surface water and soil. Therefore they harm ecosystems (deforestation, acidification of freshwater lakes, damage to freshwater and marine aquatic food chains, etc.) and damage buildings and monuments.

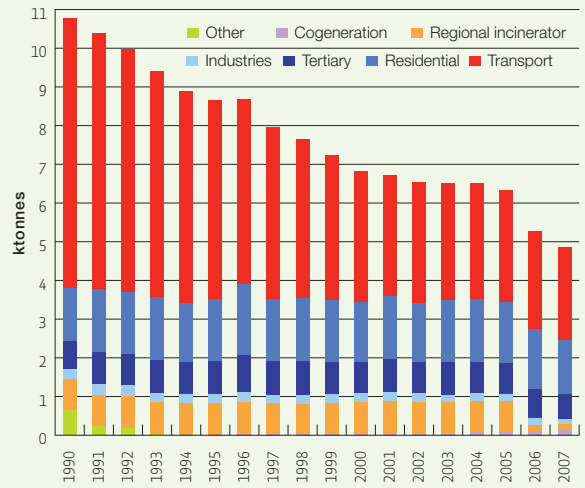
For 2007, the high-temperature combustion processes leading to nitrogen oxides emissions are shared among transport (49%), residential (29%) and tertiary (14%) energy consumption, waste incineration (3%), cogeneration plants for combined heat and power (3%) and industrial activities (2,5%).

Distribution of the nitrogen oxides (NOx) emissions by activity area in the Brussels-Capital Region, based on the 2007 emissions inventory
SOURCE : BRUSSELS ENVIRONMENT, DPT PLAN AIR, CLIMAT ET ÉNERGIE



NOx emissions show a significant tendency toward decrease since 1990. The reduction recorded in the 1990s was realised for the most part in the transport sector (catalytic converters, EURO standards, etc.). A global reduction in emissions of 37% was observed between 1990 and 2000 (-53% for road transport).
Between 2000 and 2005, the decrease in NOx emissions was distinctly less as was the case for the emission levels in the transport sector: emissions decreased by just 7% between 2000 and 2005.
In 2006, a facility for treatment of incinerator gases (selective catalytic denitrification or DeNOX) was installed, allowing NOx emissions related to the incinerator to be reduced by 80% compared with the initial level (2005). Between 2005 and 2007, due to reduced energy consumption (see page on Energy situation in Brussels), the emissions of the other sectors of the economy - with the exception of cogeneration (+43%) - also decreased, but to a lesser degree: -30% for industries, -17% for tertiary and transport and -13% for residential. As a result total NOx emissions in 2007 decreased by 55% compared to 1990.

Nitrogen oxides (NOx) emissions by activity area in Brussels between 1990 and 2007 (data based on the emissions inventories)
SOURCE : BRUSSELS ENVIRONMENT, DPT PLAN AIR, CLIMAT ET ÉNERGIE



The European directive 2001/81/EC sets the national emissions ceilings (NEC) to be observed as from 2010 for SO_2, NOx, VOCs and NH_3. In Belgium, the national NOx ceiling for point sources has been split into three regional ceilings. The ceiling for transport (diffuse sources) has remained at the Belgian level. In the Brussels-Capital Region, the ceiling for fixed NOx emissions (excluding transport) is set at 3 kilotonnes. As the figure above shows, the NOx emissions for fixed sources remained relatively stable: since 1990 they have been systematically above the ceiling up until 2005 and have fallen below the ceiling since 2006. With regard to NOx emissions by the transport sector, Belgium will not observe the 2010 ceiling set by the NEC directive. Moreover the ongoing negotiations for a revision of this NEC directive envisage setting stricter ceilings for emissions.

However the apparent decrease in NOx emissions does not mean that NO_2 emissions are decreasing in all sectors. For several years, the NO_2 fraction in NOx transport emissions has in fact been increasing (see page on Concentrations of NO_2 in the Air).

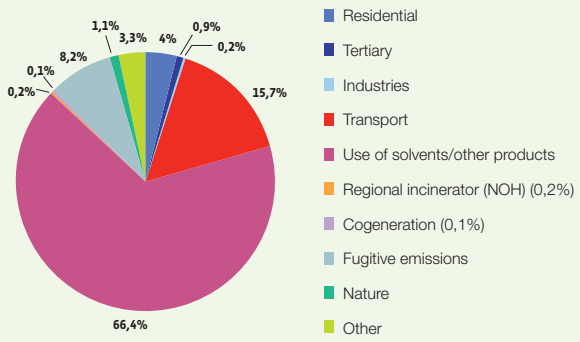
EMISSIONS OF VOLATILE ORGANIC COMPOUNDS INTO THE AIR

Volatile Organic Compounds (VOCs) are molecules formed principally of bonds between carbon and hydrogen atoms, VOC molecules are volatile under normal temperature and pressure conditions.

VOCs are gaseous and have several origins. Some sources are natural (forests, vegetation, etc.); others are related to human activities, such as road traffic (losses during refuelling, petrol combustion, evaporation), use and production of solvents and paints, or combustion processes. Although methane is a VOC, it is not counted in this category of pollutants; as it contributes to a great extent to boosting the greenhouse effect, it is treated in a separate category.

The effects of VOCs on health vary according to their type and the intensity of exposure; they range from simple olfactory disturbance and irritation to reduction in respiratory capacity. Some, such as benzene, are carcinogenic.
VOCs are also involved in the processes of tropospheric ozone formation. The dynamic equilibrium between formation and destruction of ozone is perturbed by VOCs; they interact with the nitrogen monoxide (NO) in the air, which is then not available for ozone destruction (see page on Concentrations of tropospheric Ozone).

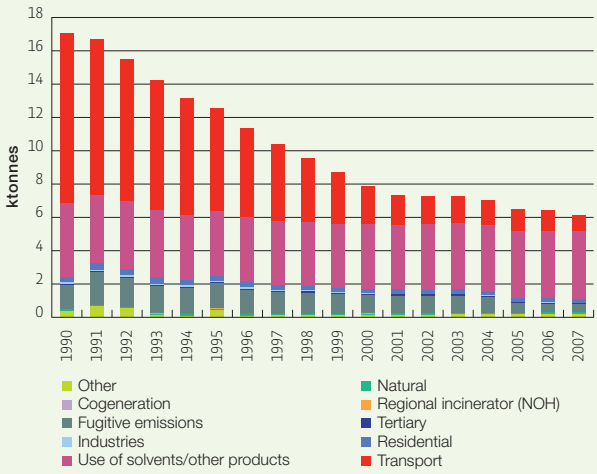
Distribution of the emissions of volatile organic compounds (VOCs) (excluding methane) by activity area in the Brussels-Capital Region, based on the 2007 emissions inventory
SOURCE : BRUSSELS ENVIRONMENT, DPT PLAN AIR, CLIMAT ET ÉNERGIE



VOC emission sources in 2007 were essentially the use of solvents and other products (domestic use, industrial paint, printing, dry cleaning - 66%), transport (principally road, 16%), fugitive emissions (8%) and residential energy consumption (heating, 4%).

Since 1990, VOC emissions have tended to decrease. An emissions reduction by a factor of 3 has been observed between 1990 and 2007. The decrease recorded in the 1990s involved in large part emissions from transportation and industries which, in application of a European directive, were subject to regulation aiming to reduce their VOC emissions (emissions reduction equipment, substitution products, etc.).
However, since 2000, the decrease in VOC emissions has been distinctly less. Emissions have however decreased by almost 22% between 2000 and 2007. This can be explained in particular by a reduction in road transport emissions per km travelled (catalytic converters, EURO standards, etc.).

Trend of volatile organic compound emissions (excluding methane) between 1990 and 2007, by activity area in Brussels, based on the emissions inventories
SOURCE : BRUSSELS ENVIRONMENT, DPT PLAN AIR, CLIMAT ET ÉNERGIE



A similar reduction is not visible in the sector “use of solvents and other products”.

The European directive 2001/81/EC sets the national emissions ceilings (NEC) for SO_2, NOx, VOCs and NH_3, to be observed starting in 2010. In Belgium, the national VOC ceiling for point sources has been split into three regional ceilings. The ceiling for transport (diffuse sources) has remained at the Belgian level. In the Brussels-Capital Region, the ceiling for VOC emissions from non mobile sources (thus excluding transport) is set at 4 kilotonnes. As the figure above shows, the VOC emissions from fixed sources have remained relatively stable since 2000 and were systematically above the allotted ceiling. For the non mobile sources, chances are that the Brussels-Capital Region will not be able to observe its 2010 ceiling. For mobile sources, on the other hand, the Belgian VOC emissions by transport already observed the NEC objective in 2007.

AIR TRAFFIC NOISE

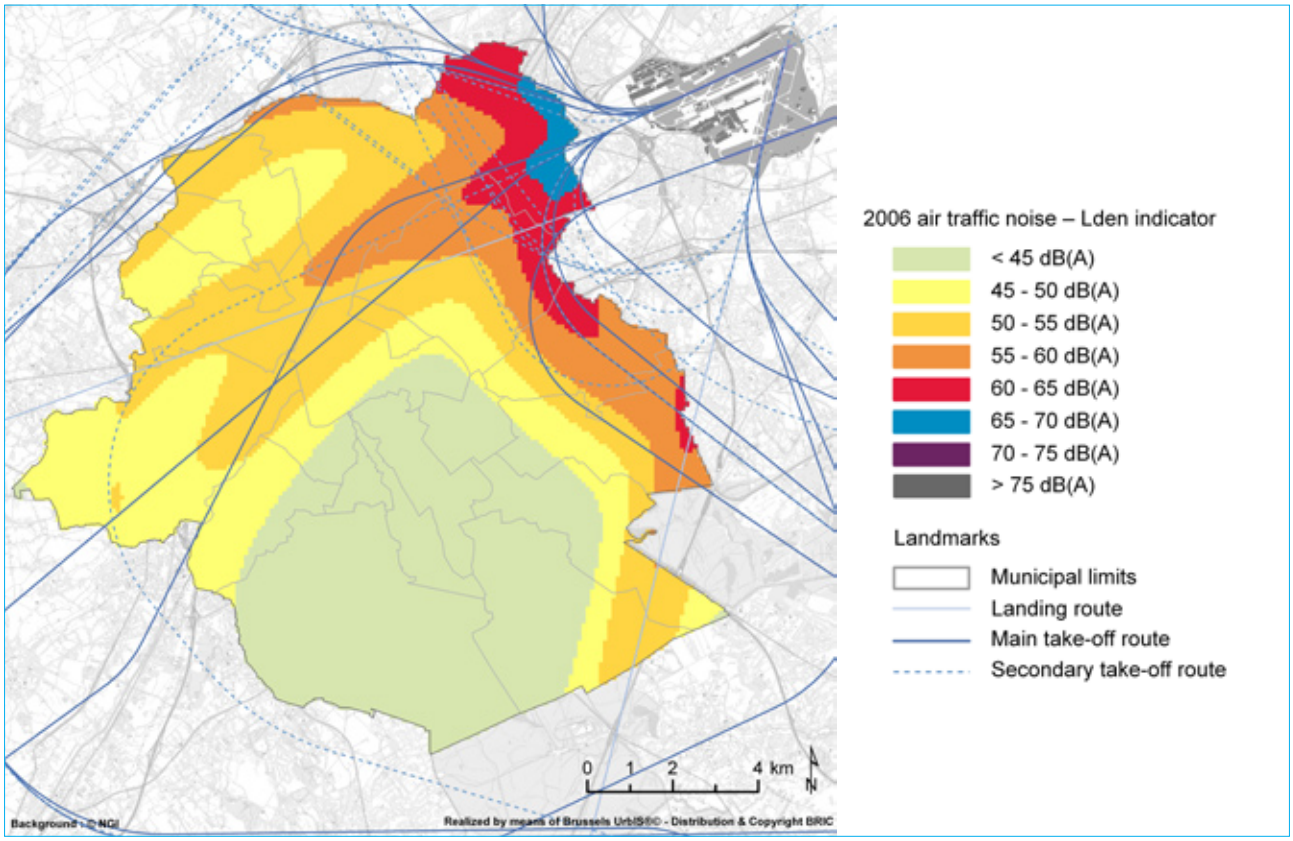
The land-survey register of air traffic noise relies on an analysis of the acoustic nuisances which is realised with the help of a mathematical model involving:

- the air traffic characteristics (traffic flow, type of aircraft and corresponding noise emission, etc.);
- the characteristics of the take-off and landing procedures used;
- the geometric characteristics of the air routes taken;
- the weather conditions.

This model complies with the specifications of the European directive 2002/49/EC on evaluation of environmental noise, now applicable in the Brussels-Capital Region.

The acoustic indicators L_{den} and L_n defined in the directive have been calculated at each point of a grid with a mesh size of 100m x 100m using 2006 data. The L_{den} (or Day-Evening-Night) indicator represents the weighted noise level over 24 hours, evaluated from the daytime (7 am - 7 pm, L_d), evening (7 pm -11 pm, L_e) and night-time (11 pm - 7 am, L_n) levels. The evening (L_e) and night-time (L_n) levels are increased by 5 and 10 dB(A) respectively, as they are experienced as more disruptive by those exposed to them. The values obtained on the basis of the model were compared to the measurements performed by the noise monitoring network stations of Brussels Environment: the modelled values (L_{den}) differ in a range of -0,7 to 4,6 dB(A) depending on the station considered.

Land survey of air traffic noise 2006 - L_{den} indicator (ECAC.CEAC method, IMMI software)
SOURCE: WÖLFEL 2007, FOR BRUSSELS ENVIRONMENT

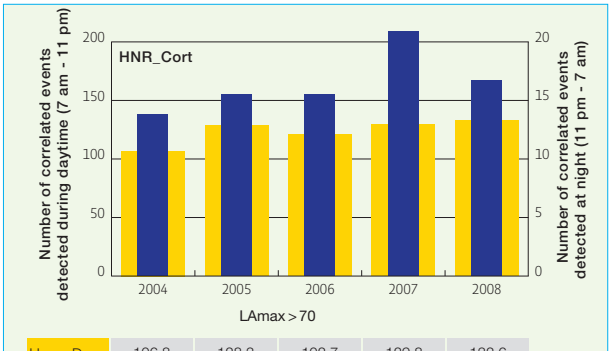


DAILY DISTRIBUTION OF THE NOISIEST EVENTS

The noise measurements taken at the Haren station (close to the 25R take-off strip) allow the noisiest events (passage of an aircraft) to be analysed. The value of 70 dB(A) is used as a limit as it corresponds to the regional regulatory value above which an infringement is reported, and it approaches the value recommended by the WHO (LAmax = 45 dB(A) during the night with doors and windows closed, the acoustic effect of standard insulation being estimated at 25 dB(A)).

As a yearly average, in 2008, 132 noisy events were observed by day (between 7am and 11pm) and almost 17 at night. A significant number of the night time noisy events occurred between 6 and 7am (65% in 2008).

SOURCE : BRUSSELS ENVIRONMENT, LABORATOIRE DE RECHERCHE EN ENVIRONNEMENT (BRUIT)



	2004	2005	2006	2007	2008
Haren Day	106,8	128,3	102,7	129,8	132,6
Haren Night	13,8	15,5	15,5	20,9	16,7

ROAD TRAFFIC NOISE

The land-survey register of road traffic noise relies on an analysis of noise nuisances performed on the basis of a mathematical model involving:

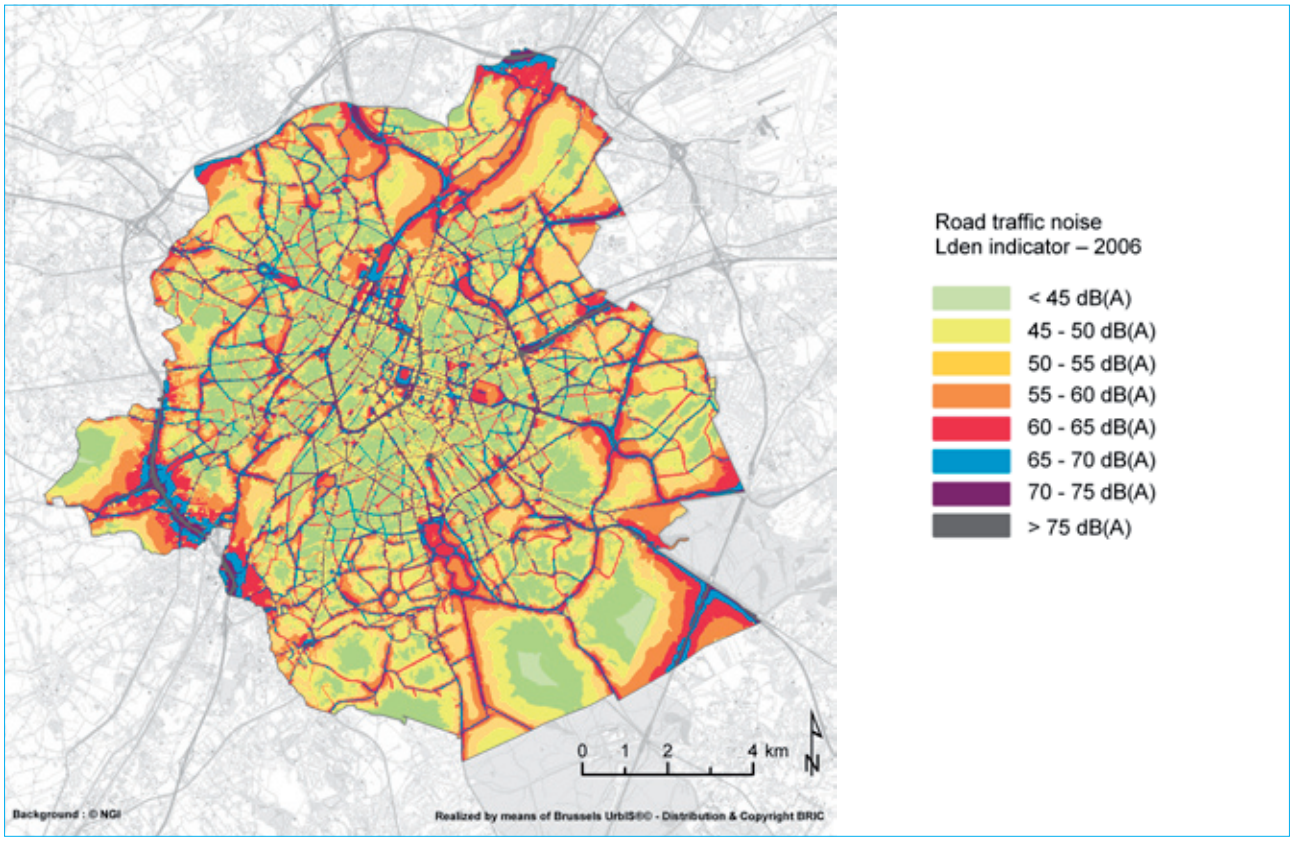
- the characteristics of the road traffic (traffic flow, type of vehicles and corresponding noise emission, etc.);
- the geometric characteristics of the principal roads;
- the location of the buildings and the topography of the Region.

This model complies with the specifications of the European directive 2002/49/EC on evaluation of environmental noise, now applicable in the Brussels-Capital Region.

The noise maps have been drawn up by calculating various indicators at each point of a calculation grid with a mesh size of 10 m x 10 m using data from 2006.

The map below shows the result of this modelling for the L_{den} (or Day-Evening-Night) indicator, which represents the weighted noise level over 24 hours (see the page on Air Traffic Noise for more detail).
This map highlights the fact that a significant portion of the Brussels territory is subject to road traffic noise, especially near the ring and the main roads serving the city. In contrast, it is calm in many inner courtyards, which are closed to traffic.

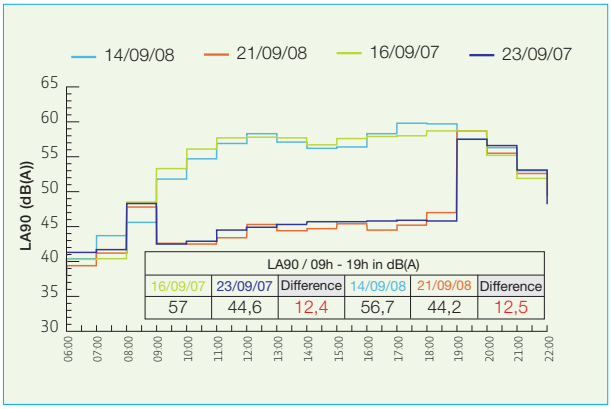
Land survey of road traffic noise for 2006 - L_{den} indicator (NMPB method, CadnaA software)
SOURCE: ACOUPHEN 2009, FOR BRUSSELS ENVIRONMENT



NOISE LEVELS MEASURED DURING CAR-FREE SUNDAYS

Throughout the noise measurement network of Brussels Environment, noise levels recorded between 9 am and 7 pm on car-free Sundays are lower than those on other Sundays.
The greatest reductions appear at the Auderghem, Laeken and Woluwe-Saint-Lambert stations, normally characterised by intense sustained traffic. Depending on the station, background noise reduction (LA90) varied between 7,6 and 22,9 dB(A). The Saint-Gilles station, affected by moderate or local traffic, shows a less significant but still perceptible difference of 4,5 dB(A).

SOURCE : BRUSSELS ENVIRONMENT, LABORATOIRE DE RECHERCHE EN ENVIRONNEMENT (BRUIT)



LA90 / 09h - 19h in dB(A)					
16/09/07	23/09/07	Difference	14/09/08	21/09/08	Difference
57	44,6	12,4	56,7	44,2	12,5

RAILWAY TRAFFIC NOISE

The land survey register of railway traffic noise relies on an analysis of noise nuisances performed on the basis of a mathematical model involving:

- the characteristics of the rail traffic (traffic flux, type of engine and corresponding noise emission, etc.);
- the geometric characteristics of the railway routes taken;
- the location of the buildings and the topography of the Region.

This model complies with the specifications of the European directive 2002/49/EC on evaluation of environmental noise, now applicable in the Brussels-Capital Region.

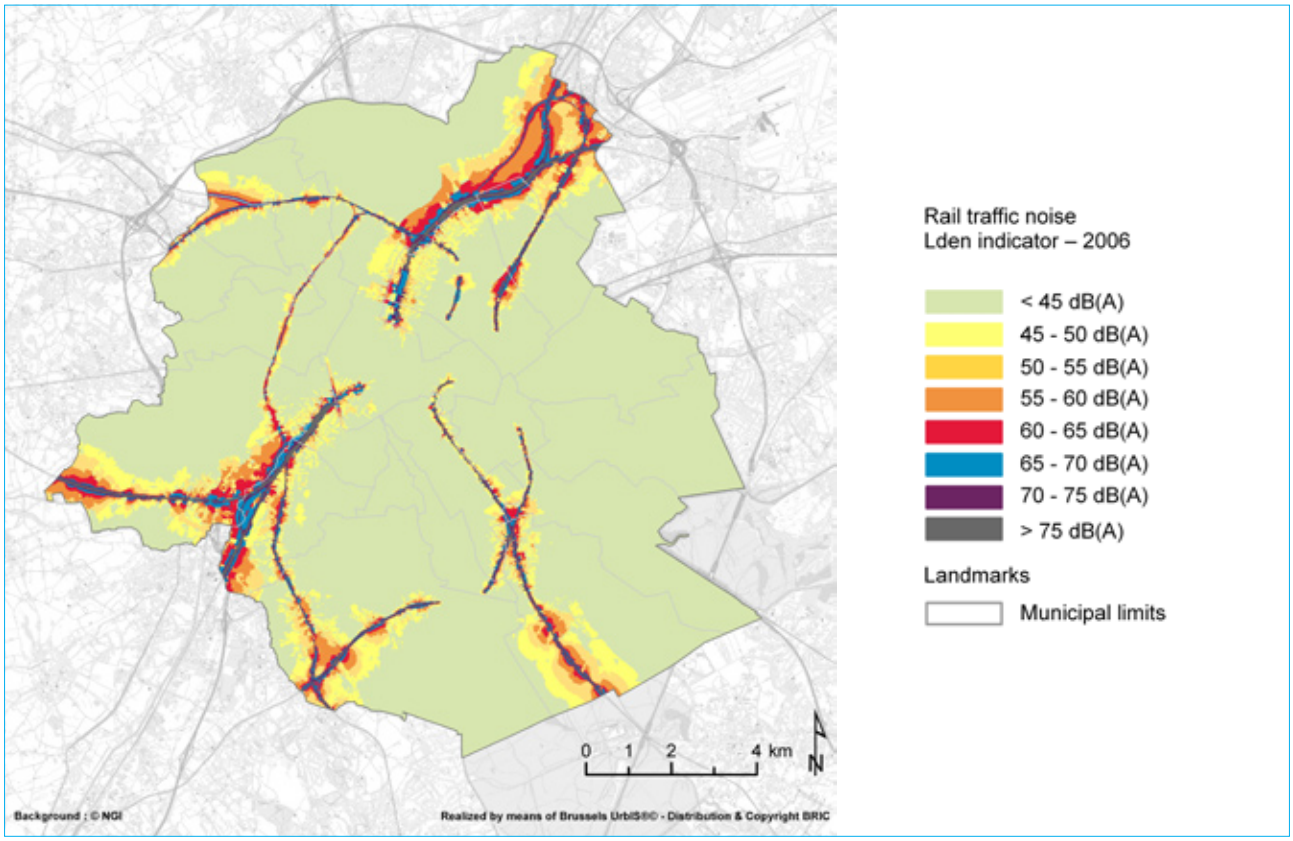
The noise maps have been drawn up by calculating various indicators at each point of a calculation grid with a mesh size of 10 m x 10 m, based on SNCB data for 2006. To check the values obtained from this model, they have been compared to measurements taken on site.

The map below shows the result of this modelling for the L_{den} (or Day-Evening-Night) indicator, which represents the weighted noise level over 24 hours (see the page on Air Traffic Noise for more detail).

We note that railway noise affects especially the Northeast and Southwest parts of the Region. During the night, the lines most affected are those taken by freight transport.

Land survey of railway traffic noise for 2006 - L_{den} indicator (RMR96 method, CadnaA software)

SOURCE: ACOUPHEN 2009, FOR BRUSSELS ENVIRONMENT



EXPOSURE OF THE POPULATION TO ROAD, AIR AND RAILWAY NOISE

Using data from the various noise mappings, an estimate of exposure of the population of Brussels at their places of residence can be made. The table opposite lists the number of persons potentially exposed to a L_{den} greater than 55 dB(A) (the threshold above which a nuisance is perceived) for the various sources of noise according to the modelling carried out. This estimate reveals that road traffic is the noise source affecting the greatest number of Brussels residents, followed by air traffic.

According to studies carried out by the European Commission, for equal noise levels, aircraft noise is considered to be the most bothersome by the population, followed by road noise and finally railway noise.

Number of persons potentially exposed to noise (L_{den}) greater than 55 dB(A) at their residences, according to noise mapping (2006) of the Brussels-Capital Region

SOURCE: WÖLFEL, 2007 AND ACOUPHEN, 2009, FOR BRUSSELS ENVIRONMENT

Noise source	55 to 60 dB(A)	60 to 65 dB(A)	Over 65 dB(A)
Road	173 900	141 900	106 600
Air	106 700	14 800	1 800
Rail	16 300	10 000	9 000

GREEN SPACES: PUBLIC ACCESSIBILITY

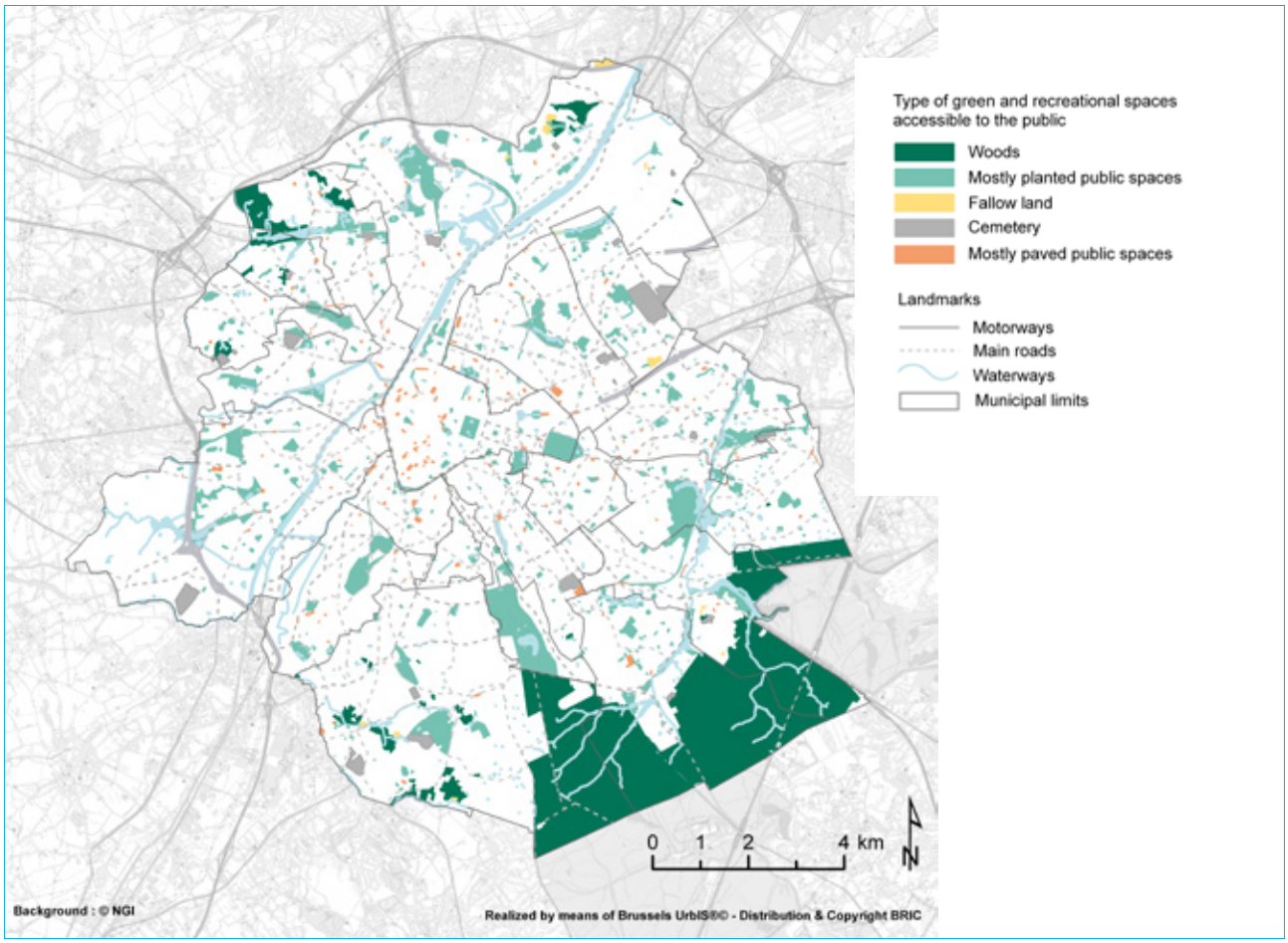
Brussels the green city... According to various sources (land survey, Brussels Environment), almost half of the surface of the regional area are green spaces. These are of various types: parks, wetlands and bodies of water, woods, forests, fallow land, fields, prairies, private gardens or large private estates. While they are all vitally important for the regional fauna and flora, only the green spaces accessible to the public play an important social role in terms of quality of life, as spaces for play, meeting and relaxation. This role is especially important on the scale of a city like Brussels, where over 63% of the population does not have access to a private garden (DGSIE, 2001).
However, a study conducted recently to identify green spaces and recreational spaces accessible to the public showed that most of the green surface area in Brussels corresponds to areas (private or public) not accessible by law or de facto to the public.

The study listed accessible green spaces and recreational spaces according to a simple typology related essentially to the functionality of the space:

- The "Woods" category corresponds to heavily planted spaces where trees predominate. The most common activity there is walking. They form the most significant category in terms of area (58%), which is explained by the size of the Forêt de Soignes;
- The "Mostly planted public spaces" category corresponds to landscaped spaces where "greenery" is predominant and potentially varied (trees, shrubbery, flowers, lawns, etc.). The possible activities are diverse: walking, playing, reading, meeting with friends, etc.). They represent 34% of the surface area (64% of the number);
- One category deals exclusively with "cemeteries", which often constitute real green spaces, of a nonetheless special nature. They represent 5% of the surface area;
- The remaining spaces are divided between the categories "fallow" (1% of the surface area) and "mostly paved public spaces" (2% of the surface area). The first include public spaces not laid out to accommodate the public but accessible in reality. The second include squares, plazas, forecourts, etc., where recreational activity is possible and which therefore have a role comparable to green spaces in terms of recreation and socialisation.

Eight hundred and two of these spaces, covering a surface area of approximately 3 000 hectares (any roadways and buildings included, almost 18,5% of the surface area of the Region), have been identified. The largest (in surface area) are located in the outer suburbs of the Region. Thirty-five percent of these include a play and/or sports area.
These figures should nevertheless be attenuated because several private spaces that have not been considered here, are sometimes actually accessible to everyone (university campuses, housing complexes or housing estates including green spaces and play areas).

Green spaces and recreational spaces accessible to the public: location and type
SOURCE : BRAT, 2009



BIODIVERSITY: BUTTERFLIES

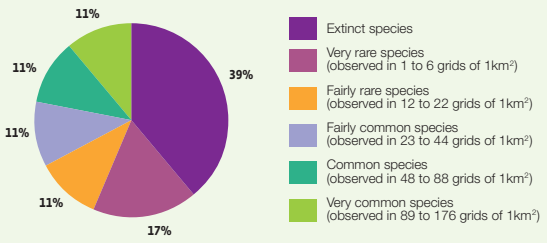
Despite its urban nature, the Brussels-Capital Region harbours a significant wealth of fauna and flora. Over 14% of its area has been listed as “Special areas of conservation” in the context of the European network Natura 2000. These areas harbour natural habitats and animal species especially rare on the European scale: certain species of bats (barbastelle, mouse-eared bat, etc.), the stag beetle (the largest insect in Europe), some forest habitats (alluvial forests with alders and ashes, for example), etc.

Biodiversity relies on a delicate ecological balance and is subject to many severe stresses. In the Brussels-Capital Region, these come essentially from continuing urbanisation to the detriment of often lush green spaces (fallow land, semi-natural spaces), recreational pressure and the presence of invasive exotic species (see the page on Invasive Exotic Species).

To manage this natural heritage, Brussels Environment relies, among other things, on data collected in the framework of thematic studies which tackle the systematic scientific follow-up of the local fauna, flora and ecosystems. An inventory of day-flying butterflies was carried out during the 2006-2008 period. The resulting database includes over 6 600 observations covering the period 1830-2008, it draws on field observations (71%), private and museum collections (21%) and scientific literature (8%). The participation of the public in the data collecting was especially encouraged by the publication and distribution of a butterfly identification guide and the organisation of walks and census weekends. The database contains sixty-nine day-flying butterfly species, including 46 which are known to have been reproducing for a long period in the Brussels-Capital Region (“resident” butterflies). Based on observations made since 1997, it is estimated that among these 46 species, 18 (39%) are presently extinct on the regional level and 8 (17%) have become very rare.

Distribution of 46 “resident” day-flying butterfly species according to their degree of rarity in the Brussels-Capital Region (1997-2008 period)

SOURCE : BRUSSELS ENVIRONMENT, DÉPARTEMENT BIODIVERSITÉ



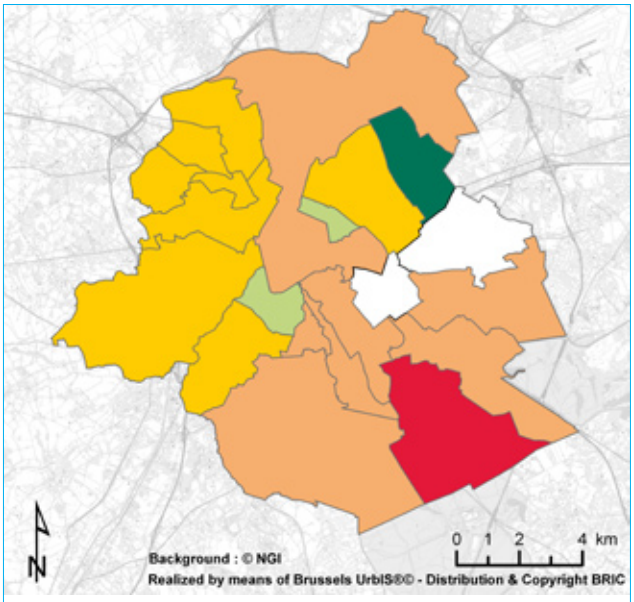
The Region now has 28 different “resident” butterflies, including the Common Blue, Common Brimstone, Map, Cabbage Butterfly, Common Yellow Swallowtail, Small Tortoiseshell and Peacock. Three species are categorized as endangered species (the Purple Emperor, Brown Hairstreak and White-letter Hairstreak).

Formerly, 5 municipalities (Uccle, Watermael-Boitsfort, Auderghem, Brussels City and Anderlecht) had over 25 species of “resident” butterflies each. Presently such diversity only occurs in the municipality of Uccle.

In comparison to other taxonomic groups, day-flying butterfly populations seem to have suffered more from the modification of biotopes (shortage of open spaces and wetlands, subdivision, etc.) caused by the massive urbanisation of the Region over the past decades. Some other groups that are restricted to wet areas, such as amphibians and dragonflies, are also extremely endangered.

Evolution by municipality of the diversity of day-flying butterfly species (comparison of observations made in the periods 1830-1996 and 1997-2008)

SOURCE : BRUSSELS ENVIRONMENT, DÉPARTEMENT BIODIVERSITÉ



* The apparent increase in the number of species could result from a bias related to insufficient observations in the 1830-1996 period.

INVENTORY OF BRUSSELS BIRD FAUNA

A recent inventory of Brussels bird fauna defined the tendencies during the 1992-2008 period for 38 common bird species. Among these, 14 are increasing, 15 are declining and 9 are stable on the regional scale (Weiserbs, 2008). The general global evolution of the Brussels bird fauna highlights the increasing rarity, and even disappearance, of sensitive species restricted to certain habitats (in particular those restricted to forests and semi-open environments), while the species on the increase are generally undemanding opportunists. The spread of non-indigenous species is also apparent, both in terms of abundance and number of species. On the other hand, we should not forget to mention that some of the protected species (peregrine falcon, house martin, etc.) have actually increased in numbers.

INVASIVE EXOTIC SPECIES

For centuries, humans have voluntarily or accidentally introduced animal and vegetable species outside their natural distribution area. Some of them acclimatise to the local conditions, manage to reproduce and disperse, sometimes widely, by colonising semi-natural habitats. These species, characterised as "invasive exotic species", are more and more numerous due to increasing globalisation of the economy and the explosion of tourism.

Invasive exotic species, deterioration and fragmentation of habitats and climate change are the most important causes of species extinction on the global scale. These invasions are likely to lead to the disappearance of some indigenous species and to strongly alter the functioning of ecosystems (competition with local species for food or reproductive sites, invasive behaviour in the absence or reduced presence of natural enemies, excessive predation, invasion of bodies of water, etc.). They can also affect the economy (restriction of activities such as navigation or aquatic recreation, costs related for example to the search for regulatory actions and measures to restore biodiversity, etc.) and health (infectious diseases, allergies, skin irritations, etc.).

For all those reasons, invasive exotic species have for several years been at the centre of studies that observe their presence and their encroachment in order to characterise their ecology and possible impact and determine the limiting measures to be implemented. The objective of the Belgian platform on invasive species consists in collecting this information and in establishing a database ("Harmonia") on exotic species that threaten the local biodiversity.

At the national level, 90 invasive exotic species are presently reported in this database, either at the "black list" (high environmental impact) or the "watch list" (moderate environmental impact) level or on the "alert list" (moderate or high environmental impact, but species still only present in neighbouring regions). Sixty-one of the species appearing in the database have established populations in the biogeographical area that includes the Brussels-Capital Region and 36 of them belong to the "black list".

These invasive species include mostly plants (according to the inventory of regional flora, 27% of the present Brussels flora is made up of "neophyte" plants arriving in our area after 1500 due to human intervention) but also animals belonging to various taxonomic groups. The administrators in charge of biodiversity preservation in Brussels closely monitor these invasive plants and animals and establish preventive and managing measures (public information, revision of legislation, elimination of invasive plant species in public spaces, etc.).

Number of reported invasive exotic species whose distribution area includes the Brussels-Capital Region (2009)

SOURCE : PLATE-FORME BELGE BIODIVERSITÉ (DATABASE HARMONIA, SEPTEMBER 2009)

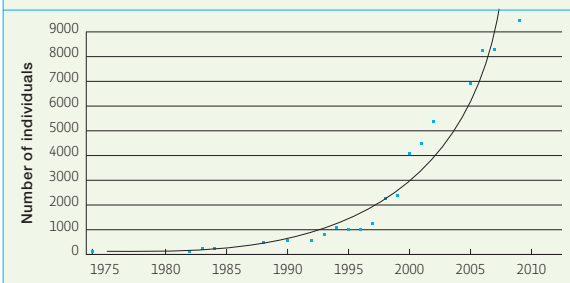
	Black list	Watch list	Total	Species (common names)
Vascular plants	27	17	44	Examples: Japanese knotweed, giant hogweed, Himalayan balsam, black cherry, narrow-leaved ragwort, Canada goldenrod, etc.
Fish	2	4	6	Gibel carp, topmouth gudgeon, pike perch, channel catfish, pumpkinseed, fathead minnow
Birds	1	3	4	Mandarin duck, Egyptian goose, Canada goose, ring-necked parakeet
Mammals	3	1	4	Muskrat, brown rat, coypu, Siberian chipmunk
Amphibians/ reptiles	2	0	2	Marsh frog, bullfrog
Arthropods	1	0	1	Harlequin ladybird
Total	**36**	**25**	**61**	

THE EXPONENTIAL INCREASE IN RING-NECKED PARAKEETS

Three species of parakeet reproduce in the Brussels-Capital Region. Among these, the ring-necked parakeet (Psittacula krameri) is by far the most frequent. Its presence in the Region is due to the release of forty birds from the small "Meli" zoo in 1974. The exponential increase in this species started in the 1990s and is now subject to close monitoring. The greatest fear of specialists is that this highly invasive and cavity nesting species will create excessive competition with local cavity nesting bird species and probably also bats, thus increasing their vulnerability. The excessive presence of parakeets has still other negative consequences such as noise nuisance, accumulation of droppings, defoliation of sleeping areas and damage to orchards.

Increase of the number of ring-necked parakeets in sleeping areas (NATO site in Evere and Elisabeth Park in Koekelberg)

SOURCE : WEISERBS, 2009



The number of ring-necked parakeets is presently estimated at more than 8 000 individuals in two sleeping areas in Brussels where these birds gather at nightfall.

A study commissioned by Brussels Environment has served as a basis for developing a plan of action aiming to regulate the various populations of parakeets in the Region. Similar research is underway to identify actions to be taken to regulate certain species of exotic birds and domestic birds returned to the wild.

FORÊT DE SOIGNES AND RISKS ASSOCIATED WITH CLIMATE CHANGE

Trees generally live for from several decades (poplars, etc.) to several centuries (beeches, oaks, etc.). Forest management therefore involves a long-term vision anticipating the changes likely to occur, in particular as regards the surrounding environment.

The Forêt de Soignes is presently composed mostly of uniform plantings of beeches, often ageing. The particular landscape formed by this "cathedral of beeches" has a great significance for a good number of Brussels residents. This beech grove is however fragile due to a number of factors: relative dryness of part of the soil of the hillsides, surface compaction, frequent presence of a soil horizon almost impermeable to roots at a shallow depth (fragipan), uniformity of plantings resulting in poor resistance to bad weather (violent winds) and disease.

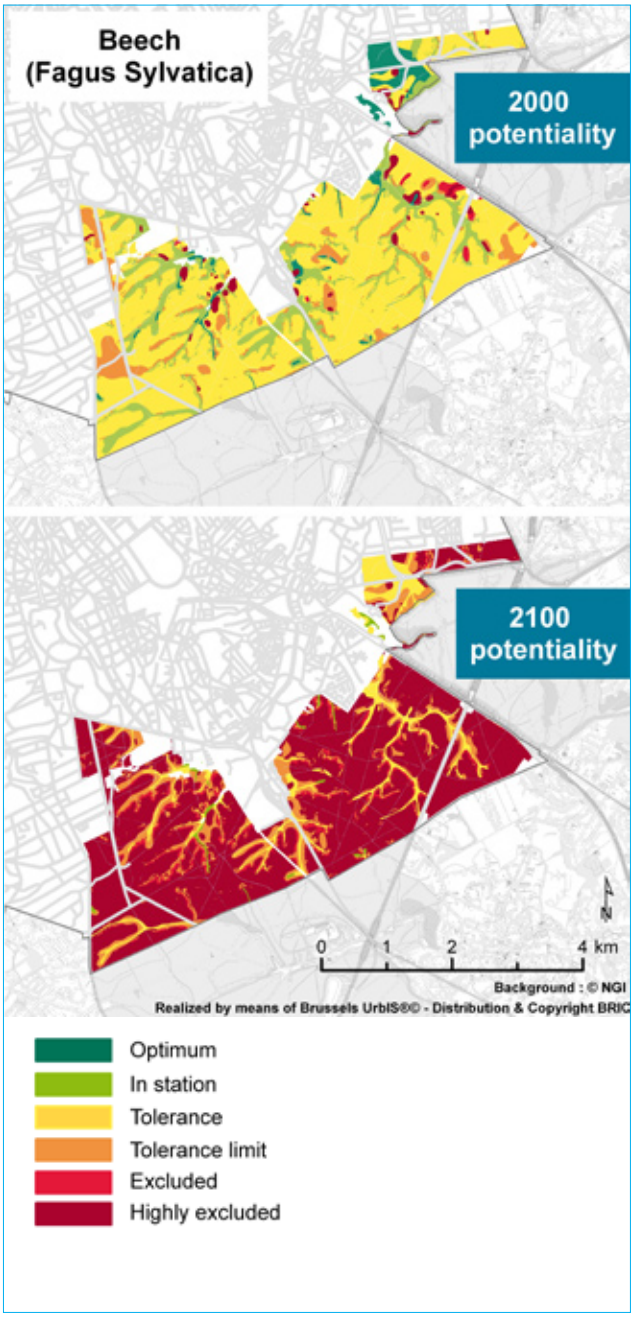
The question of the impact of global warming on these already fragile Sonian ecosystems has recently emerged. Various university studies have tried or are trying to answer this question. Among these, a study conducted by the Unit for Forest and Nature Management (FuSAGx) on request of Brussels Environment modelled the change in the potential distribution area of 26 species (present or conceivable in a future reforestation) in the Forêt de Soignes in the context of climate change. The scenario used for the climate simulations was an intermediate scenario (A1B) among those developed by the Intergovernmental Panel on Climate Change (IPCC). It predicts, by 2100, a climate comparable to that of the lower Loire for the area of the Forêt de Soignes; this means:

- an increase in the annual average temperature of 3°C and in the average summer temperature of almost 4°C;
- a decrease in precipitation of approximately 15% in the growing season and of approximately 25% in the summer;
- an increase in winter precipitation of almost 20%;
- an increase both in frequency and intensity of winter storms (lower degree of certainty).

The study highlights the fact that in the Forêt de Soignes the species that will be most affected by such climate alterations is the beech. The maps provided show the greater or lesser ability of the beech to thrive in present conditions (the "tolerance" classification corresponds to the presence of a tolerated limiting factor) as well as those projected for 2100, at the various stations (i.e. a homogeneous parcel with regard to climate, topography, geology, soil, and spontaneous flora) in the study area (the Brussels part of the Forêt de Soignes). According to these projections, the only stations where the beech will be more or less adapted to its environment ("good" or "tolerance" in the figure) correspond to small valleys or the Rouge-Cloître area. These projections may call into question the very objective adopted in 2003 by the Brussels Region in its management plan for the Forêt de Soignes, as it intends to maintain the appearance of the landscape of the beech cathedral over 50% of the area of the forest. A review of the management plan seems inevitable if the requirements for the announced changes are to be met.

Forest management measures have long since been taken to deal with the challenge of climate change: development of a monitoring system for the trees (health condition, pest infestations), development of the strategy for regeneration of the beech grove (method of cutting, choice of species, etc.), development of a "fire plan", etc.

Current forestry potentiality and how things might look in 2100, for the beech in the Forêt de Soignes in the event of climate change
SOURCE : DAISE & CLAESSENS, 2009



EXPOSURE TO ELECTROMAGNETIC FIELDS

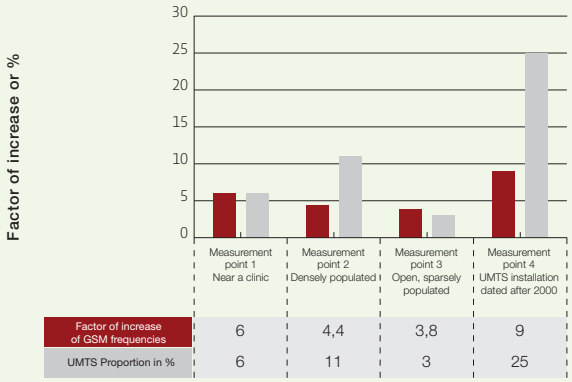
We are exposed to electromagnetic fields all the time and everywhere in our daily lives. Among the natural sources of radiation, we can cite among others the sun, lightning and high-energy cosmic particles. This summary is devoted to anthropogenic sources of non-ionising radiation, and more particularly to sources to which the population is exposed without having consciously chosen to do so. This article presents what is known about the exposure of Brussels residents to electromagnetic fields of radio and microwave frequencies (100 kHz - 300 GHz) and their variation.

The main sources of involuntary exposure to radio and microwave frequencies in the Brussels-Capital Region are the GSM antennas (Global System for Mobile Communications, covering frequencies between 900 MHz and 1 800 MHz) which support voice communications, and UMTS antennas (Universal Mobile Telecommunication System, covering frequencies between 1 900 and 2 170 MHz), fit for supporting high-speed transmission and high-quality multimedia services. In a society where the mobile telephone is used more and more often, telephones generally constitute the principal source of direct radiation for the user. The effect of this radiation consists of heating living tissues (ear and nearby brain). A thermal effect can be observed after GSM use for a radiation intensity that is 3 to 4 times greater than that measured during exposure to an antenna. In addition, literature does not exclude the possibility of biological or health effects for exposure levels less than those capable of causing thermal effects. But the uncertainty has still not been resolved by existing studies.

Several measurement campaigns were carried out in 2000 and 2006 in various locations in the Brussels-Capital Region. The results give an idea of the evolution of exposure of Brussels residents to electromagnetic fields. Exposure to GSM frequencies has increased on average by a factor of 6 between 2000 and 2006, which corresponds to an increase in the electric field by a factor of approximately 2,4. The increased exposure to this radiation is principally due to the increased capacity of the standard GSM networks as a result of its commercial success. The more recent UMTS system is secondarily responsible for the increased radiation level. In fact, this technology is the source of an average increase of 11% in these frequency ranges. Other radio communications systems for specific uses, such as emergency and security services (TETRA, used by the police services, the federal police, fire-fighters, civil defence, emergency services and the 100 service), and others for which coverage is still being developed, such as base stations for high-speed wireless (WiMax), or for commercial purposes, such as digital television (DVB-T and DVB-H), contribute to a much lesser degree to the general radiation level. The number of installations is increasing, but in terms of exposure, the increase in the electromagnetic field is not proportional to the number of installations.

Exposure to GSM frequencies in 2000 and 2006 and proportion of UMTS in this variation (averages for 4 measurement points)

SOURCE: STOCKBRŒCKX, HUYSMANS, 2007



Due to the increase in involuntary exposure to electromagnetic radiation, the Brussels-Capital Region established a ruling ('ordonnance') on environmental protection against possible harmful effects and nuisances caused by non-ionising radiation (1 March 2007).
The ruling imposes observance of a maximum standard of 3 volts/metre for a reference frequency of 900 MHz which emitting antennas in this range may not exceed. This standard affects principally mobile telephone antennas. The standard is applicable as of 14 March 2009.
This standard corresponds to the limit value for exposure recommended by the Superior Health Council. It is based on the practical application of the principle of precaution and takes account of the uncertainties as to the effect of electromagnetic radiation on potentially sensitive and genetically fragile persons (children, foetuses, etc.).
The Brussels standard is stricter than the Belgian standard that it replaces and aims to protect the Brussels population from possible harmful health effects.
The judicial ruling of 1 March 2007 on environmental protection from possible harmful effects and nuisances caused by non-ionising radiation constitutes a new regional legislation in the matter.

This issue previously came under federal public health jurisdiction; it is henceforth handled at the regional level with the aim of protecting the environment and human health. Indeed, the responsibility on exposure to electromagnetic fields is henceforth defined as a competency related to the environment, and as a result it comes under the jurisdiction of the Regions.

IMPACT OF EXPOSURE TO ATMOSPHERIC POLLUTANTS

The health impact of atmospheric pollution in the Brussels-Capital Region has been assessed within the framework of the European APHEIS and ENHIS projects. This assessment dealt with the years 2001 and 2004. The same methodology was applied for 3 Belgian cities (Antwerp, Brussels-Capital and Liège), for the year 2004.

Several scenarios for reduction of exposure to particulate matter and tropospheric ozone were tested. The scenarios allow the researchers to calculate the health benefits that are associated with a reduction in exposure.

The following scenarios were chosen with regard to exposure to particulate matter (PM10 and PM2,5):

- a progressive reduction - compared to the observed value - of the daily and annual average by increments of 5 µg/m³;
- a reduction of the daily and annual average down to a value of 20 µg/m³. This corresponds to the target value - in terms of annual average - defined by the European directive 1999/30/EC.

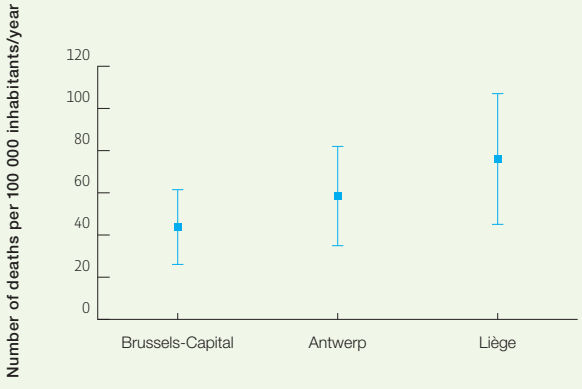
With regard to ozone:

- the reference value was 120 µg/m³;
- furthermore the scenarios considered a progressive reduction by increments of 10 µg/m³ of the 8 hour average of the highest concentrations, starting from the observed values.

The avoidable mortality for the 2004 data for the 3 cities of Antwerp, Brussels-Capital and Liège is approximately 5,6% of the total mortality if exposure to PM10 is reduced to an average annual concentration that does not exceed 20 µg/m³.

Chronic exposure to particles - assessment of the impact on total mortality of a reduction in average annual PM10 concentration to a value of 20 µg/m³: avoidable mortality

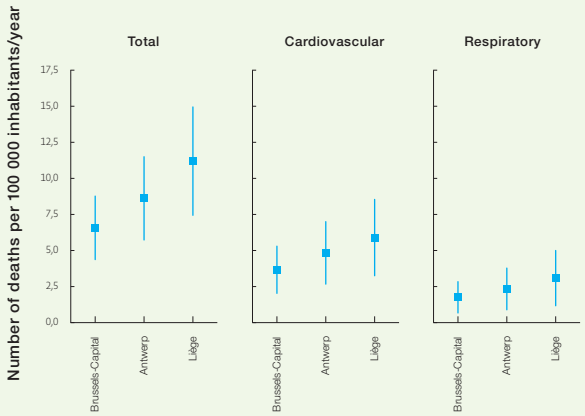
SOURCE: BOULAND ET AL., 2009, WHO NEWSLETTER



The assessed health benefits linked to a reduced sub-acute (1 month) exposure are twice those linked to acute (1 day) exposure; a reduction in chronic exposure (1 year) leads to still greater health benefits.

Acute exposure to particulate matter - assessment of the impact on total, cardiovascular and respiratory mortality of a reduction in average daily PM10 concentration to a value of 20 µg/m³: avoidable mortality

SOURCE: BOULAND ET AL., 2009, WHO NEWSLETTER



The assessments of the health benefits resulting from a reduction in PM10 exposure are similar for the years 2001 and 2004.

The risk groups are primarily newborns and the elderly. A reduction in the daily concentration of PM10 to a value of 20 µg/m³ would be associated with a health benefit in post-neonatal mortality of 11,8/100 000 and 7/100 000 newborns per year based on the data for 2001 and 2004 respectively. This large variation can be explained by the very low number of post-neonatal mortalities.

With regard to ozone exposure, a reduction of 10 µg/m³ in the 8 hour average of the highest concentrations could avoid 1,5 deaths per 100 000 inhabitants when all causes are combined (of these deaths 0,8 are due to cardiovascular reasons and 0,6 to respiratory reasons.

INDOOR POLLUTION IN BRUSSELS CHILD-CARE CENTRES

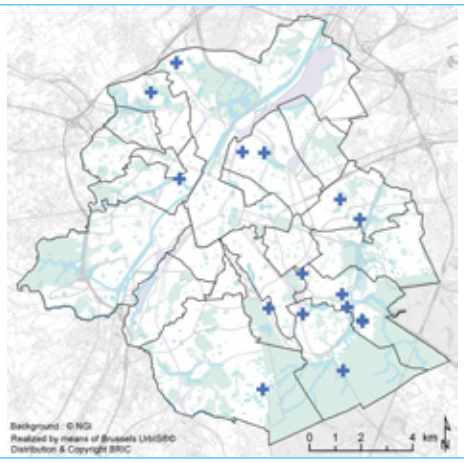
CRIPI (the Regional Indoor Pollution Intervention Unit) most often intervenes following medical diagnoses concerning children.

A pilot project for diagnosing indoor pollution in environments accommodating young children allowed 15 child-care centres to be studied. Analysed on a voluntary basis between 2006 and 2009, the centres differed in type and period of construction, proximity to traffic and parks, surrounding environment, and size.

Chemical and biological samples were collected and noise levels were measured in the children's play areas, sleeping quarters, bathrooms and kitchen.

A questionnaire on the organisation of the child-care centre (personnel, number of children per section, etc.) and general data on the building, cleaning products and disinfectants, renovation work, etc. was completed with the help of the director or the nurse of the child care centre.

Location of the investigated child care centres in the BCR (2006-2008)



The investigated parameters were: volatile organic compounds (VOCs), formaldehyde, pesticides, particulates, carbon monoxide, carbon dioxide (CO_2) and nitrogen oxides in the ambient air, lead (Pb) in the paint (walls, doors, play modules, lockers, etc.), and ambient temperature and relative humidity in each room.

Chemical contamination (15 child-care centres)
SOURCE: BRUSSELS ENVIRONMENT, CRIPI, 2009

Parameters measured	Results	Comments
CO_2 >1000ppm	24/41 premises	Lack of aeration > other contaminations to be monitored
Total VOCs >70µg/m³	3/15 child-care centres Limonene and pinene prepon-derant everywher	Use of maintenance products and ambient fragrances > irritant and sensitising contamination
Pb>1000µg/cm² of « substrate »	2/15 child-care centres	Danger : contaminated peeling paint accessible to children

In the event of a musty odour or visible mould, bacteriological assessment of the air and the surfaces (floor, changing tables, work surfaces, etc.) was carried out.

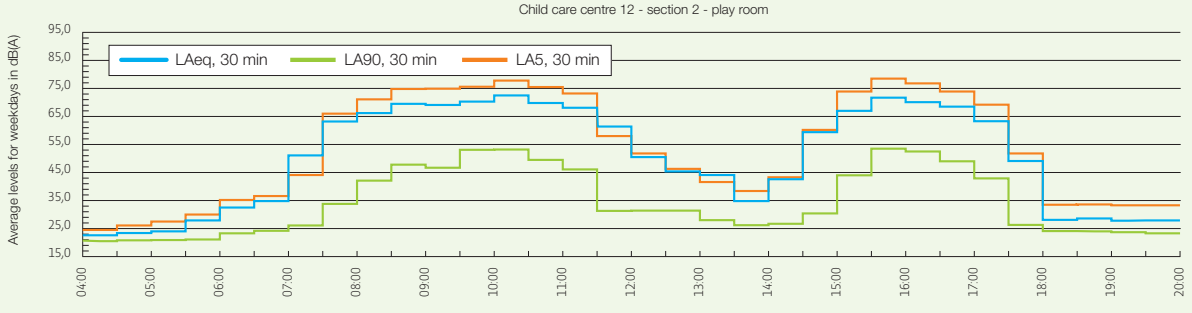
Biological contamination (15 child-care centres)
SOURCE: BRUSSELS ENVIRONMENT, CRIPI, 2009

Parameters measured	Results	Comments
Visible humidity	8/15 child-care centres	
Visible mould	5/15 child-care centres	
Germs on floor N.B. Staphylococci are the most highly represented	13/15 child-care centres have various degrees of contamination 4/15 child-care centres have a contamination < the median of observations 1/102 observations has identified Staphylococcus aureus	Differences observed between areas with and without overshoes Efficiency of floor cleaning - not a function of product choice
Germs on other surfaces (total coliforms and/or Staphylococci)	3/15 child-care centres	Suspected microbial contamination of the washcloth

NOISE IN CHILD-CARE CENTRES

The noise levels substantially exceed the values recommended by the WHO for schools and kindergartens (L_{Aeq}(A) = 35 dB(A) when the children are present and 30 dB(A) during naptime). Reference values adapted to child-care centres could be justified. Noise levels measured in the sleeping areas are clearly lower than those in the play areas.

Results of noise measurements in the play room of a child care centre · SOURCE: BRUSSELS ENVIRONMENT, CRIPI, 2009



MULTIPLE EXPOSURE TO VOLATILE ORGANIC COMPOUNDS

The health condition of us all is determined by a combination of situations, predispositions and complicating factors. Exposure to pollutants and environmental parameters contributes to this health condition. It is rare for health conditions to correlate to a single substance, such as carbon monoxide (CO) poisoning or lead poisoning.

The noxious substances which are mainly emitted by combustion, dissolution or evaporation are found in the air and in the water; they can accumulate in the soil and groundwater.
There are times of life during which the individual is especially sensitive to substances or factors present in the environment. These are "windows of sensitivity"; the best-studied coincide with developmental phases (foetus, childhood, adolescence, menopause (in both women and men), etc.).

Work surroundings are a major component of the environment. Total exposure also includes the exposure inside dwellings, at recreational sites, schools, child-care centres, etc. as well as the outdoor environment.

It is possible to prevent isolated risks related to exposure mechanisms in the workplace thanks to the applying standard values for intervention. For the outdoor environment, there are limit values (mandatory) as well as guidelines (recommended). For a given substance, the values that apply to the outdoor environment are significantly stricter than the values that apply in the workplace, as the former take into account the continuous exposure of a more diverse mixture of populations. In the absence of guidelines for numerous substances present in the environment, a value corresponding to 1/1000 of the standards for protection of workers is recommended as a precautionary measure. All these values (standards, limit values and guidelines) nevertheless relate to a single substance and rarely take into account the possible synergistic effects due to the presence of other substances.

Concentrations of volatile organic compounds (BTX) in outdoor and indoor air
SOURCE: BRUSSELS ENVIRONMENT, ENVIRONMENT RESEARCH LAB (AIR), 2009

	Outdoor air 2000-2008 1002 investigations P50 in µg/m³	Indoor air 2000-2008 1002 investigations P50 & P95; children's room in µg/m³	Guidelines and reference values in µg/m³
Benzene	1,7	3,4 & 21,2	3,25[1] 5[2] or 2[3]
Toluene	7,5	16,0 & 95,6	192[1] 260[4]
Xylene (meta-para)	2,49	4,28 & 20,03	221[1] 870[5]
Xylene (ortho)	0,96	1,66 & 7,03	221[1]
Limonene	4,7	8,7 & 57,2	150[6]

1 workplace standard (8h) Belgium/1000

2 limit value (annual average), directive 2000/69/EC

3 guideline (daily average/1 year), French Superior Public Health Council (CSHPF)

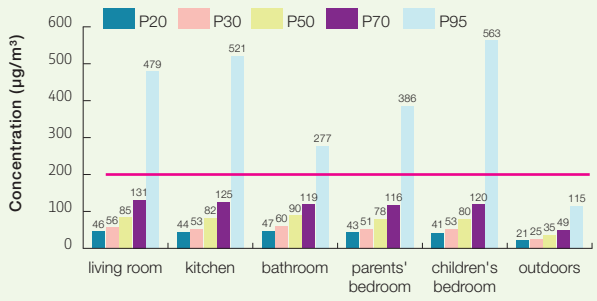
4 guideline (over 1 week) (WHO)

5 guideline (over 1 year) (WHO)

6 workplace standard (8h), Sweden/1000

Special attention is paid to the total VOCs exposure (sum of volatile organic compounds). Forty VOCs were analysed in the air samples that were collected outdoors and in the 1002 Brussels residences analysed by CRIPI from 2000 to 2008 (method TO15/17 of the Environmental Protection Agency, USA). The median concentrations (P50) of the total VOCs are of the order of 35 µg/m³ outdoors, compared to 80 µg/m³ inside children's rooms. In 5% of the observations (P95) the concentrations exceed 115 µg/m³ outdoors and 563 µg/m³ inside children's rooms. Based on the observed medical symptoms, 200 µg/m³ has been identified as being the limit value for comfort.

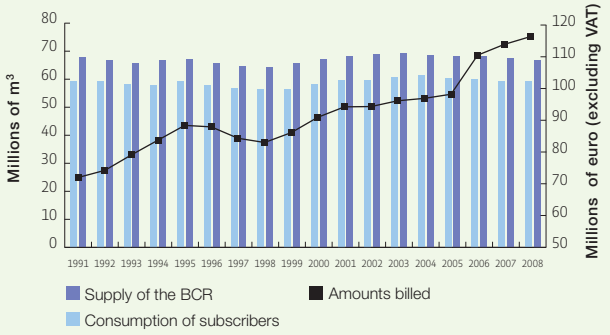
Percentiles of total volatile organic compound (VOC) concentrations in the various residential premises (CRIPI) and outdoors
SOURCE: BRUSSELS ENVIRONMENT, CRIPI, 2000-2008



CONSUMPTION OF TAP WATER

In 2008, VIVAQUA supplied 66,9 million m³ of tap water in the Brussels-Capital Region. This water is mostly collected in Wallonia, either from aquifers (approximately 70%) or from surface water. This year, 1,8 million m³, or 17 to 30% less than in preceding years, was collected in the Brusselian aquifer from the Bois de la Cambre and the Forêt de Soignes catchments.

Tap water supply to the Brussels-Capital Region, consumption and amounts billed (1991-2008)
SOURCE: BRUSSELS ENVIRONMENT AND VIVAQUA, VARIOUS YEARS



While billed consumption has decreased since 2004 (-3,5%), amounts billed to Brussels subscribers have increased by 23% during this same period.

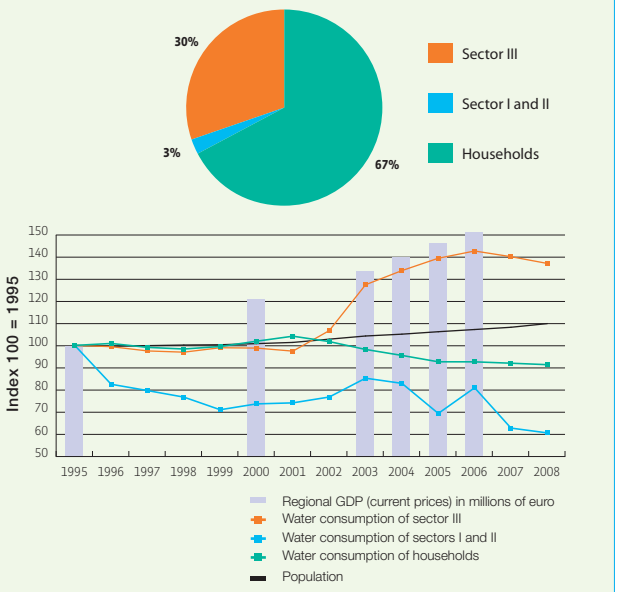
RECOVERY OF SERVICE COSTS RELATED TO WATER USE

In application of the directive 2000/60/EC which establishes a framework for a community policy in the area of water (water framework directive or WFD), Member States are bound to implement, by 2010:

- water billing rate policies that encourage users to use water resources efficiently;
- policies such that each economic sector using services related to water utilisation (catchment, distribution, purification, etc.) contributes in an appropriate way to recovering the costs of these services, based on an economic analysis and taking account of the principle of "the polluter pays".

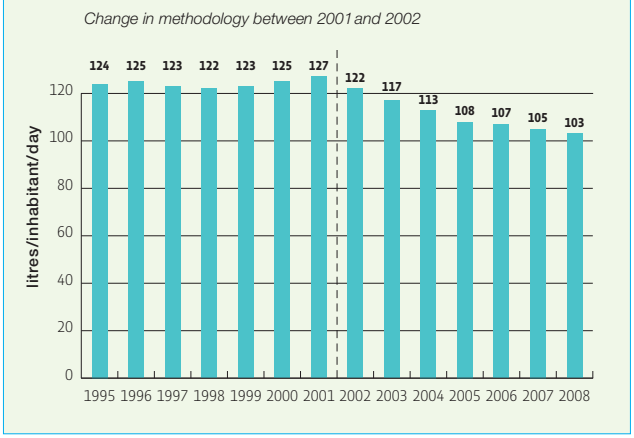
In this framework, a study is underway dealing with the status of implementation of the principle of cost recovery for services related to utilisation of water in the Brussels-Capital Region. It appears already that the rates of recovery of these costs vary significantly, on the one hand, according to the utilising economic sectors (households, industries, tertiary), and on the other hand, according to the services supplied (production and distribution of drinking water, draining and purification of waste water).

Tap water consumption of the primary and secondary sectors, the tertiary sector and households, and trends relative to regional GDP and Brussels population (1995-2008)
SOURCE: BRUSSELS ENVIRONMENT BASED ON FIGURES FROM VIVAQUA (2009) AND IBSA (VARIOUS YEARS)



The greatest consumers of tap water in the Brussels-Capital Region are households (67%) and the tertiary sector (30%), which include in particular, the hospitality industry (5,9%), social work and health activities (3,6%), retail commerce (2,9%), education (2,8%), public administration (2,2%), and recreational, cultural and sport activities (2%).

Trends of daily water consumption per inhabitant in the Brussels-Capital Region (1995-2008)
SOURCE: BRUSSELS ENVIRONMENT BASED ON FIGURES FROM VIVAQUA (2009) AND IBSA (VARIOUS YEARS)



The average tap water consumption of Brussels residents in 2008 is 103 litres per day per person. As is also the case in the two other regions of the country, a tendency to decrease seems to appear (-16% between 2002 and 2008). Tap water is subject to strict quality controls. They show that the tap water in the Brussels-Capital Region is perfectly fit for consumption.

PHYSICO-CHEMICAL QUALITY OF THE SENNE

Up until relatively recently, waste water from the Brussels-Capital Region was ultimately discharged, without purification, into surface water, principally into the river Senne. Initial progress was made with the commissioning in August 2000 of the South water-purifying plant located at the borders of the Forest and Anderlecht municipalities. It purifies the waste water produced by the inhabitants and economic activities (businesses, offices, etc.) located in the municipalities of Uccle, Saint-Gilles, Forest and Anderlecht (a polluting load equivalent to that produced by 310 078 inhabitants) and, partially, of 3 Flemish municipalities (23 922 Inhabitant Equivalents or IE). Work to adapt the South purification plant is scheduled in order to equip it with so-called "tertiary" treatment that will improve its performance with regard to removal of nitrogen and phosphorus in order to comply with the prevailing European legislation.
The second regional purification plant, which has tertiary treatment equipment, went into service in March 2007. Located to the north of Brussels, on the right bank of the canal and the left bank of the Senne, it purifies waste water from the remaining regional territory (954 889 IE) and, wholly or partially, from 6 Flemish municipalities (145 111 IE).

Ninety-eight percent of the waste water (expressed in inhabitant equivalents) discharged in the Brussels-Capital Region is presently collected and treated. This level will reach 100% after construction (planned for the end of 2009 and beginning of 2010) and connection of two additional collectors at the South plant.

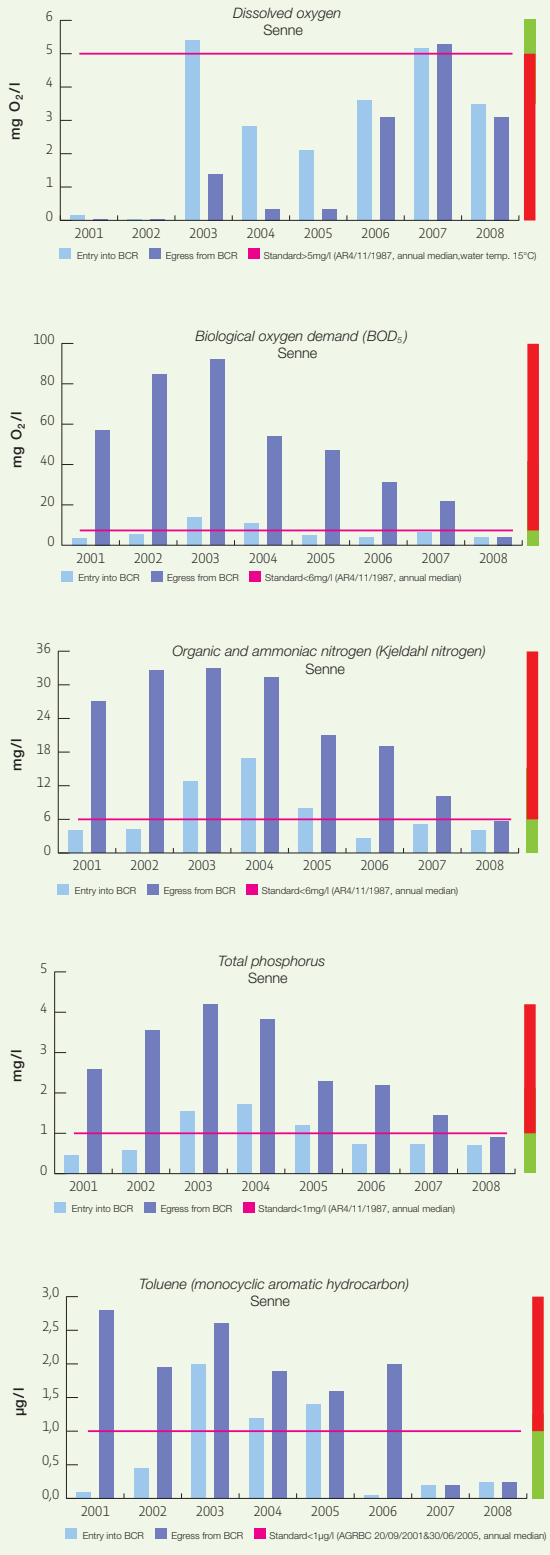
The physico-chemical and chemical quality of Brussels surface water is subject to regular monitoring. While the waters of the Woluwe watercourse and, to a lesser degree, the canal are relatively unpolluted, the same cannot be said for the river Senne. Analyses reveal however an appreciable overall improvement in the physico-chemical and chemical quality of the Senne at its egress from the regional territory. This tendency is reflected in the change in several parameters, in particular:

- since 2006, improvement in the average levels of dissolved oxygen (essential for aquatic life and self-purification processes of waterways);
- since 2004, reduction in the biological oxygen demand (indicator of pollution by organic matter);
- since 2004, reduction in nitrogen and phosphorus concentrations (pollutants responsible for eutrophication of the waterways and the North Sea).

This positive development is also reflected in increased observance of the water quality standards (represented by red lines on the graphs). Total observance of all the prevailing standards is however difficult for the Senne. This waterway, with a very limited flow rate, is the receiving environment for the effluent - purified to 80 to 90% as imposed by the ruling legislation - of the North and South purification plants (1 460 000 IE in total) as well as numerous similar plants located upstream. It is estimated that in a dry period approximately two-thirds of its flow rate consist of the effluents from purification plants. The fact that it is almost entirely covered in its course through Brussels and the often artificial nature of its banks are also important limiting factors for the development of aquatic life and oxygenation.

The recent improvement in the quality of the waters of the Senne is already reflected in its aquatic life upstream and downstream of the Region. In the Brussels-Capital Region, a slight positive tendency seems to be emerging, but this should still be confirmed in the future (see page on Ecological Quality of Waterways and Ponds).

Variation of the physico-chemical quality of the Senne (dissolved oxygen, biological oxygen demand, nitrogen, phosphorus and toluene)
SOURCE : BRUSSELS ENVIRONMENT, SOUS-DIVISION EAU



ECOLOGICAL QUALITY OF WATERWAYS AND PONDS

In application of the European Water Framework Directive (WFD), every Member State must take the necessary measures to attain "good status" for all surface water and groundwater by 2015. This involves design and establishment of a measurement network for the physico-chemical and chemical quality of the water and also its ecological quality with regard to surface water.

Two pilot studies that aim to test and develop a method for sampling and evaluating the ecological quality of the Brussels waterways have been commissioned by Brussels Environment (VAN TENDELOO et al., 2004, and TRIEST et al., 2008). The present page summarises the results of their evaluations.

With regard to surface water in the Brussels-Capital Region, only the Senne, the canal and the Woluwe are subject to monitoring in the context of the WFD. Given their small size, this obligation does not apply to the ponds but they are nonetheless monitored to facilitate management.

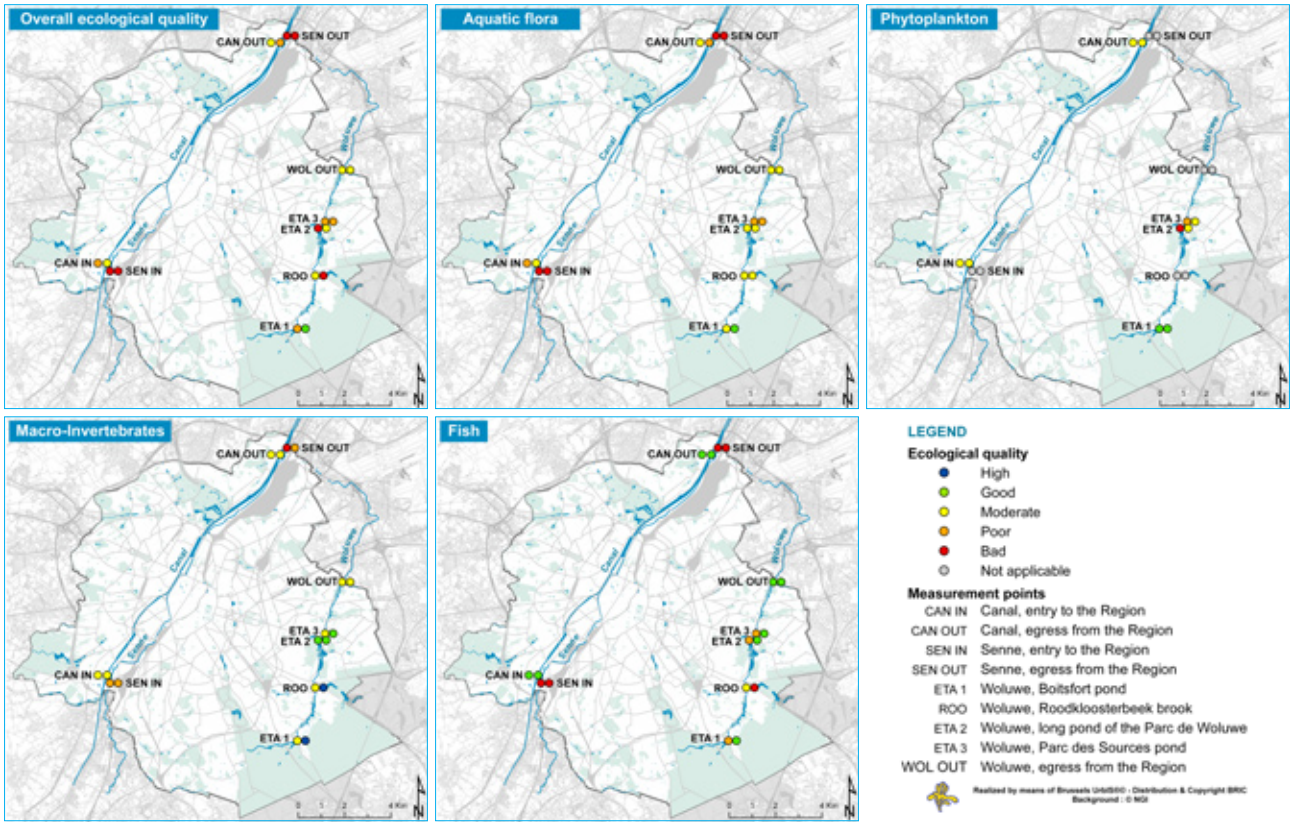
Evaluation of the ecological quality of waterways relies on analysis of the composition and abundance of various groups of biological indicators compared to reference conditions. These correspond to the natural status or, for severely modified (the Senne and Woluwe) or artificial (the canal) waterways, to the optimal situation given the alterations made by human activities in the natural physical conditions.

Four large groupings of biological indicators are taken into account: the aquatic flora including the macrophytes (higher-level plants such as reeds) and the phytobenthos (vegetable plankton living on the waterway bed, such as diatoms), the phytoplankton (aquatic plants, generally microscopic, suspended in the water), macro-invertebrates (insects and larvae, worms, crustaceans, etc.) and fish.

Between 2004 and 2007, the number of sites where the overall ecological quality of the water is good, has gone from 3 to 4 (for 9 measurement points). The evaluation principle used is however very strict as it is based on the group of biological indicators which attain the lowest score. Considering the variation by group of indicators, it is found that for most of the measurement points the ecological quality has remained identical or improved, sometimes very appreciably, in particular for the large Boitsfort pond. With regard to the Senne, the slight improvement observed in the phytobenthos and macro-invertebrates indicates a possible positive tendency (see also the page on Physico-chemical quality of the Senne).

A number of measures taken with regard to purification, regulation or in-situ management (cf. the "blue network" programme) are contributing to improvement of the ecological quality of the waterways crossing the Region.

Evaluation of the ecological quality of the main Brussels waterways and ponds of the Woluwe: overall evaluation, aquatic flora, phytoplankton, macro-invertebrates and fish (2004 to the left, 2007 to the right)
SOURCE: BASED ON TENDELOO ET AL., 2004 AND TRIEST ET AL., 2008



QUANTITATIVE AND QUALITATIVE STATUS OF GROUNDWATER

Groundwater is subject to qualitative and quantitative monitoring performed in accordance with the European Water Framework Directive (WFD). This follow-up involves 5 water bodies which have been distinguished on the basis of hydrogeological and operational (management) criteria in coordination with the regions forming part of the same hydrographic basin (the Scheldt):

- the water body of the recharge zone for the Basement water body located to the south of the Region (51 km²);
- the Basement and Cretaceous water body extending over the central portion and north of the Region (111 km²);
- the Landenian water body found beneath all the regional territory (162 km²);
- the Ypresian water body, in the hill country to the northwest of the Region (21 km²);
- the Brussellian and Ypresian water body to the east of the Senne valley (89 km²);

These water bodies have been limited to the regional borders but belong to trans-border aquifers. There are also superficial aquifers located more particularly in the alluvia of the Senne valley and adjacent valleys as well as in the Quaternary deposits.

Monitoring network for the quantitative status

This monitoring is mainly based on measurement of the water levels in wells and piezometers and includes 52 measurement points distributed in the various water bodies. Some measurements go back to the 1990s.

The WFD requires that a quantitative "good status" for the groundwater be reached by 2015. This involves a balance between water catchment and recharge.

The groundwater collected in the Brussels-Capital Region is mainly intended for production of tap water (see page on Consumption of tap water) and water for industrial use. Water is also pumped to allow dry construction of foundations, to prevent flooding in the subterranean infrastructure of the metro, or in clean-up work on polluted soils. About one hundred catchments distributed throughout the regional territory are subject to authorisation. A volume of 2,5 million m³ was collected in 2008 in the various aquifers. Brusselian and Ypresian sands supply approximately 80% of the volume of groundwater collected in the Brussels-Capital Region. In particular, they feed the Vivaqua catchments.

Presently, taking into account the variation of the piezometric levels, the 5 water bodies are considered to be quantitatively in a good status. They will probably remain so in 2015 insofar as the trends related to the present collection and the influxes of water feeding the aquifers remain the same.

Monitoring network for the qualitative status

At the qualitative level, the objectives set by the WFD for 2015 involve attaining a good chemical status of the water bodies (observance of the quality objectives and absence of negative effects on the dependent aquatic and terrestrial ecosystems). Monitoring of the chemical status, started in 2004, comprises two types of inspections mainly carried out at active catchments and some sources:

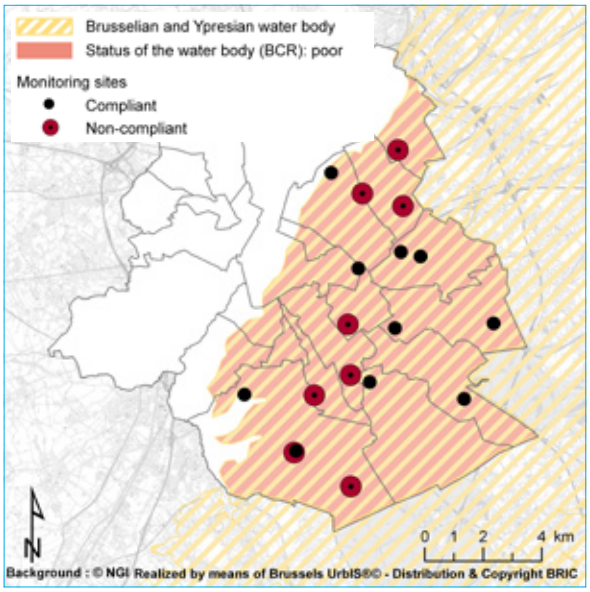
- monitoring checks, including 12 measurement points, intended to reflect the general status of each water body and to detect any long-term trends;
- operational checks, comprising 10 measurement points located in the Brusselian water body, intended to follow the water bodies at risk of not attaining a good chemical status in 2015.

NITRATES AND PESTICIDES

Based on analyses of data for 2004-2009, the deep Basement and Cretaceous water bodies, the Basement water body in the recharge zone, and the Landenian and Ypresian (hill region) water bodies have been assessed to be in a good chemical status. These 4 water bodies are therefore likely to attain the objective of a good status in 2015 for the nitrate and pesticide parameters for which quality standards have been set by the WFD.

Qualitative status of the Brusselian and Ypresian water body - total pesticides (2004 - 2009 period)

SOURCE : BRUSSELS ENVIRONMENT, SOUS-DIVISION EAU



The Brusselian and Ypresian water body has been assessed to be in a poor chemical status (according to the European terminology): levels are frequently exceeded, both for nitrates and for some pesticides (atrazine, desethyl atrazine, diuron, etc.), which involves operational supervision by the Region. For nitrates, the exceeding of these levels is primarily observed at inspection points located in highly urbanised areas. Pesticide levels exceeding the standards are observed in the western half of the water body, notably at the drinking water catchments of the Bois de la Cambre and the Forêt de Soignes, but also in a fairly undeveloped area of Uccle.

In application of the WFD, an action programme aiming to attain a good status of the water body evaluated to be in a poor status is underway. This undertaking is especially difficult, in particular because of the number of potential - both specific and diffuse - sources of pollution, the complexity of the transfer dynamics of pollutants into the soil and subsoil, the inertia of the water bodies, and the trans-border nature of the groundwater.

ENERGY SITUATION IN BRUSSELS

The flow diagram known as «bilan énergétique» allows the reader to understand the energy situation of the Region. This type of diagram consists of 3 parts: to the left, the energy supply coming from outside the Region (other regions or other countries) and the one produced locally; in the centre, the transformation of the energy within the Brussels-Capital Region and the losses (related to transformation or distribution); to the right, the final consumption.

The flow diagram for 2006 shows that a major share of the energy supply of the Region consists of natural gas and electricity. Several electricity generation units are nonetheless located in its territory, the principal one being the Schaerbeek Electrabel power plant, which uses steam produced by the incinerator for household and similar wastes in Neder-over-Heembeek. The Region is nonetheless very dependent on imported energy, which makes sense in an urban environment.

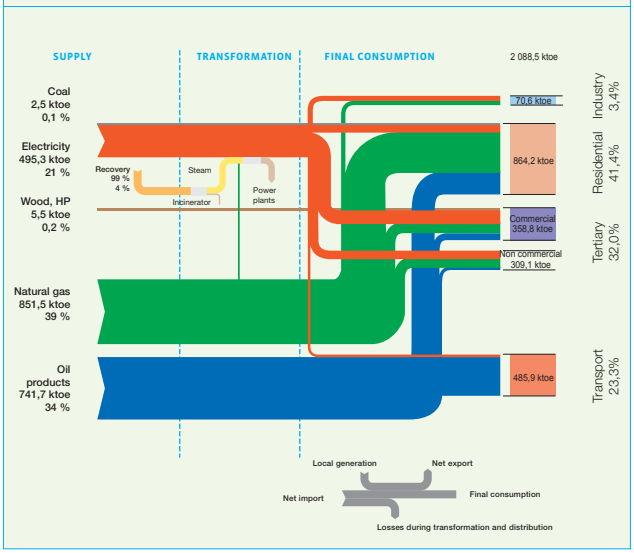
The total energy supply in 2006 has increased by 11% compared to 1990 (the reference year for the Kyoto protocol), but has slightly decreased since 2004.

At the level of final consumption, the main consumer is the residential sector (housing) followed by the tertiary sector and the transport sector.

Energy flows (2006) in the Brussels-Capital Region (BCR)

SOURCE: 'BILAN ENERGETIQUE' OF BCR 2006 (ICEDD, FOR BRUSSELS ENVIRONMENT)

KTOE = KILO TONNES OF OIL EQUIVALENT



Energy consumption characteristics of the Brussels-Capital Region between 1990 and 2006 (in ktoe)

SOURCE: BILANS ÉNERGÉTIQUES OF THE BRUSSELS-CAPITAL REGION, YEARS 1990 TILL 2006

	1990	2003	2004	2005	2006	2006 vs 1990
Total supply	**1 979,5**	**2 278,3**	**2 300,1**	**2 257,7**	**2 202,9**	**+ 11,3%**
Share of electricity	346,6	470,5	485,2	493,7	495,3	+ 42,9%
Share of natural gas	659,6	843,5	867,1	844,0	851,5	+ 29,1%
Share of oil products	739,7	843,8	841,1	814,7	741,7	+ 0,3%
Residential consumption	**735,6**	**887,9**	**898,5**	**883,4**	**864,2**	**+ 17,5%**
Share of electricity	83,8	124,0	125,7	126,6	126,6	+ 51,1%
Share of fuels	651,8	763,5	772,2	756,1	732,1	+ 12,3%
Tertiary consumption	**552,5**	**667,7**	**673,7**	**671,4**	**667,9**	**+ 20,9%**
Share of electricity	214,3	286,9	299,8	307,4	318,3	+ 48,5%
Consumption by transport	**458,9**	**509,2**	**536,3**	**514,5**	**467,9**	**+ 1,9%**
Consumption by the industry	**82,1**	**80,1**	**78,3**	**75,0**	**70,6**	**- 14,1%**

The residential consumption can be divided into two components:

1/ Fuels (mainly natural gas, but also fuel oil), which are used for heating, hot water production and cooking. Their consumption depends on weather conditions, the size of the housing stock (number of houses and apartments) and the quality of the stock (centrally heated or not, level of thermal insulation, etc.).

2/ Electricity, which is used for lighting, household appliances, and to a lesser degree for heating and air conditioning the buildings. Its consumption has increased by 51% compared to 1990.

In the tertiary sector, the increasing demand in offices where the amount of electrical and electronic equipment is constantly growing compared with 1990, is driving electricity consumption.

With regard to transport, the consumption by public and private road transport (estimation based on the sales of the engine fuels diesel oil, petrol and LPG) represents 94% of the total energy consumption of this sector.

Finally, the consumption related to industry is of little importance in Brussels. The metals manufacturing sector - which includes the Audi factory (ex-Volkswagen being still important in 2006) - has the major share, followed by the food and printing sectors.

The estimations for 2007 and 2008 seem to indicate that the tendency of the total supply to decline persists (-7% in 2008 compared to 2004).

USE OF RENEWABLE ENERGIES

The objective of the European Union is to cover 20% of the fundamental energy need with renewable energies by 2020 (Directive 2009/28/EC). To achieve this joint objective, each Member State will have to observe its own renewable energy quota, according to its capacity and potential for development in this area. The Belgian objective for 2020 is a 13% proportion of renewable energies in the final gross energy consumption. The advantages of renewable energies are numerous and well-known: limitation of CO_2 emissions, energy autonomy, reduction in fossil fuel use, etc.

In Brussels, according to the 2006 'Bilan énergétique', renewable energies (photovoltaic solar, thermal solar and heat pumps) were roughly estimated to represent 1% of the total primary production of the Region, itself very minor compared to the imported energy (see page on Energy situation in Brussels).

Unfortunately the data presently available do not allow an estimate to be made of the share of renewable energies in the external energy supply (e.g. via the specific contracts that the inhabitants or businesses subscribe with the electricity suppliers).
However it is clear that the use of solar energy (thermal and photovoltaic) has expanded significantly in the past few years, not in the least due to regional subsidies. The surface area of photovoltaic solar panelling has multiplied by a factor of 17 in two years, and that of thermal solar panelling has doubled.

Surface area of photovoltaic and thermal solar panels in the Brussels-Capital Region
SOURCE: BRUSSELS ENVIRONMENT, DEP. PROMOTION DE L'EFFICACITE ENERGETIQUE (FIGURES ARE BASED ON THE ALLOTTED PREMIUMS)

Year	Photovoltaïc solar	Thermal solar
2006	301 m² (37,68 kWp)	1 997 m²
2007	589 m² (77,97 kWp)	2 870 m²
2008	5 144 m² (709,12 kWp)	4 287 m²

In the Brussels-Capital Region (a dense urban area of limited size), solar energy is the main source of local renewable energy.
Other potential sources of renewable energies are:

➔Geothermal energy

Geothermy uses the heat stored in the ground as a source of energy for heating. A study performed in 2007 in order to identify the potential in the Brussels-Capital Region showed that, given the hydrogeological characteristics of the Brussels subsoil, certain techniques can only be implemented in the eastern part of Brussels. However, in general, the use of geothermal techniques seems to be a very good option for the tertiary sector.

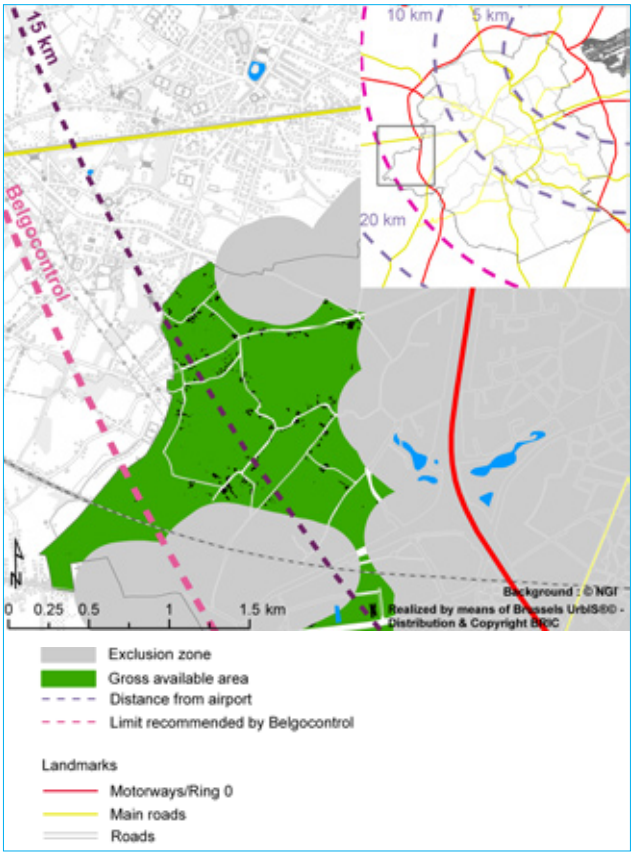
➔Biomass

This is a generic word for the various organic materials that serve as energy sources. They can be exploited in various forms: directly (use of wood for heating, for example), in the form of biogas after methanisation, or in the form of agrofuel (agrodiesel) after chemical transformation.
According to estimates, the use of wood for heating will remain presumably marginal in the Region, given the widespread use of natural gas. Natural gas does not require a special room for its storage and emits less fine particles. The establishment of a biomethanisation centre in Brussels is presently being studied.

➔Wind energy

The wind energy potential of the Brussels-Capital Region was the subject of a 2009 study that considered the high-power wind turbines (large wind turbines with 3 blades) as well as the so-called urban wind turbines (low-power).
In the case of high-power wind turbines (1 MW and more), the major limiting factor is the proximity of Zaventem airport. Wind turbines are namely capable of interfering with air surveillance and navigation systems. As a precautionary measure, the Brussels-Capital Region is considered to be located in the air control zone (the so-called exclusion zone). As a result only some areas to the southwest of the city are of potential use for the large wind turbine, if one considers the exclusion mapping according to city-planning criteria (Regional Land Allocation Plan) and aeronautic constraints. A feasibility study will be conducted in 2010: it will have to consider the adaptation of the Brussels regulations and the clashes with constraints related to air traffic and to the preservation of the architectural and natural heritage.
The theoretical potential of the "urban" wind turbine has also been assessed on the basis of, among other things, the height of the existing buildings. The study showed however that this technology is not yet sufficiently mature to be implemented in a dense and complex urban environment such as that of the Brussels-Capital Region.

Areas of wind energy potential for large wind turbines
SOURCE: AFTER CERAA, ICEDD, ULB/ATM, ULB/BEAMS, 2009 FOR BRUSSELS ENVIRONMENT



GREENHOUSE GAS EMISSIONS

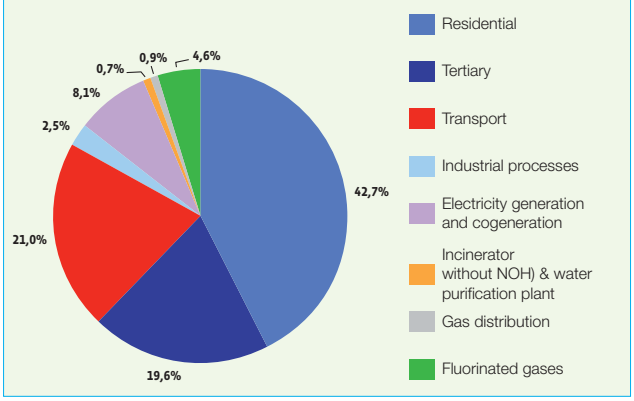
The six greenhouse gases (GHGs) targeted by the Kyoto Protocol are carbon dioxide (CO_2), methane (CH4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulphur hexafluoride (SF6). Other gases participate in the greenhouse effect, but are not taken into account in calculating reduction objectives. In specific terms, these six gases are combined in a "common pot", weighting each gas by its global warming potential (GWP) expressed in "CO_2 equivalents".

Only GHGs directly emitted in the territory (direct emissions) are targeted by the Kyoto Protocol. The direct GHG emissions in the Brussels Region are principally the result of combustion processes that use fossil fuels (coal, gas, oil). CO_2 is by far the principal GHG emitted in the Region (almost 92%).

Buildings (residential and tertiary) alone totalled 62,3% of the direct GHG emissions in 2007. Together, buildings and transport represent over 83% of the direct emissions for the same year.

Direct GHG emissions in the Brussels-Capital Region by source in 2007

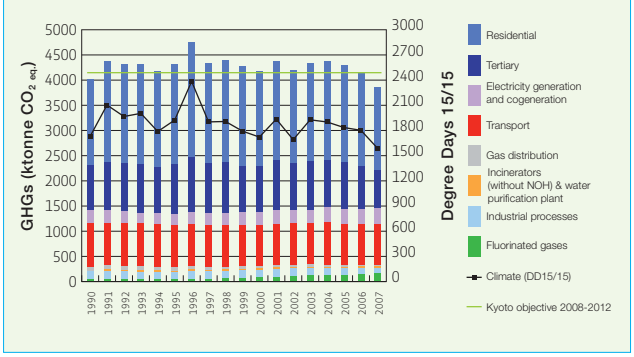
SOURCE: BRUSSELS ENVIRONMENT, DPT PLAN AIR, CLIMAT ET ÉNERGIE



Since 2005, the emissions by buildings have tended to decline, whereas, according to estimates, the entire stock of occupied dwellings grew between 2005 and 2007 (+2,4% for the population) and the stock of offices increased in the same period. This could be an indication that the regional GHG emissions and the population are getting disconnected. This development is also related to milder weather conditions during the same time period. Those estimates, which are based on the regional energy balance, do not allow a clear identification of the decisive reasons for this development.

Direct GHG emissions in the Brussels-Capital Region from 1990 to 2007

SOURCE : BRUSSELS ENVIRONMENT, DPT PLAN AIR, CLIMAT ET ÉNERGIE

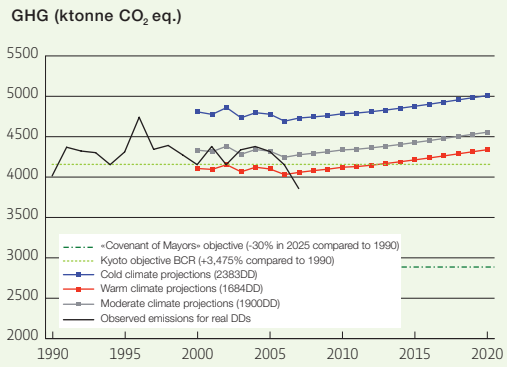


As a signatory to the Kyoto Protocol, Belgium must reduce its GHG emissions by 7,5% over the 2008-2012 period compared to 1990. According to the burden sharing between the 3 Regions and the federal state (2004), the Brussels-Capital Region, where agricultural and industrial activity is limited, may not increase its GHGs emission by more than 3,475% over the same period. Mobility problems and energy use for the heating of buildings, which are difficult to correct in the short run, were recognised as specific for the Region.

The GHG emissions have been estimated until 2020 by taking into account the policies and measures that have already been implemented or planned and considering various climate scenarios. Modelling is however always complex, as a result of the numerous hypotheses that have to be considered to reflect the specific circumstances prevalent in Brussels.

Direct GHG emissions in the Brussels-Capital Region (1990-2007) and projections until 2020

SOURCE : BRUSSELS ENVIRONMENT, DPT PLAN AIR, CLIMAT ET ÉNERGIE (2009)



We can learn form the modelling that for unchanged policies, and given the impending expiry, the observance of the regional obligation with respect to the Kyoto Protocol risks depending on the temperature between 2008 and 2012.

Also worthy of note is the Region's commitment to reduce its GHG emissions by 30% in 2025, compared to 1990 (Covenant of the Mayors).

Aside from the GHGs emitted in the Brussels territory ("direct emissions"), the Region is also responsible for "indirect" emissions related to the generation beyond its borders of the electricity it consumes (i.e. almost 95% of the consumed electricity; see page on Energy situation in Brussels), and to the production of imported consumer goods (foodstuffs, household appliances, construction materials, textiles, etc.).

In 2006, the indirect emissions that were related to the generation of imported electricity alone, represented a mass equivalent of 36% of all the direct emissions.

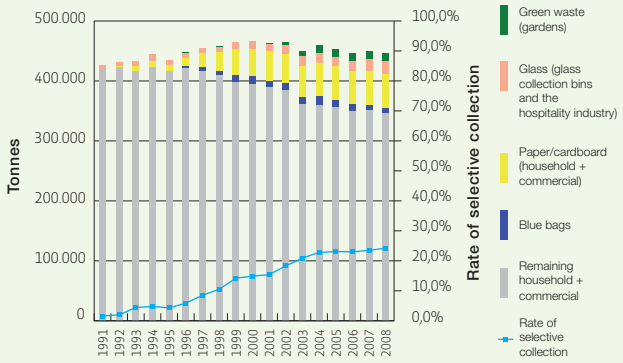
WASTE PRODUCED IN THE BRUSSELS-CAPITAL REGION

In the Brussels-Capital Region, the Agence Régionale pour la Propreté (ARP, or "Bruxelles-Propreté") is the main operator collecting household waste and "equivalent" waste (obtained from shops, self-employed persons, companies and non-profit organisations that have subscribed a contract with ARP).
As the figure below shows, the quantities of waste collected by the ARP have been relatively unchanged since 2003 (~450 000 tonnes). This does not necessarily mean that the waste production in the Region is stable or declining, because part of the "equivalent" waste previously collected by the ARP can now be collected by private operators.

On the other hand, the quantities of household waste and equivalent waste that are collected in a selective way increased constantly and regularly up to 2004. They have since stabilised at near 23%.

The quantity of non-household waste produced each year in the BCR is estimated at 1,5 to 2 million tonnes. This waste comes mostly from the construction/demolition sector and the industrial sector.

Quantities of waste collected by the ARP via door-to-door and glass collectors (in tonnes of waste) and rate of selective collection (1991-2008)
SOURCE : AGENCE RÉGIONALE POUR LA PROPRETÉ



Comment: until 1995, the selective collection of plastic, metal and drink cartons (blue bag) and that of paper/cardboard (yellow bag) were put together.

Estimated quantities of non-household waste produced in the BCR (in tonnes)
SOURCE: ESTIMATION BY BRUSSELS ENVIRONMENT BASED ON THE STUDIES "ESTIMATION DES DÉCHETS NON MÉNAGERS - 2005" AND "EVALUATION DES FLUX DE DÉCHETS POUR LE SECTEUR DES BUREAUX - 2008", AND ON THE REPORT "RAPPORT ADMINISTRATIF 2007" OF THE ARP (INCINERATION RESIDUES)

Construction and demolition waste	650 000
Industrial waste	500 000
Office waste	100 000
Incineration residue	137 000
Dredging and cleanup waste	123 000
Commercial waste	80 000
Transport sector waste	40 000
Waste form health care activity	40 000
Waste from the hospitality industry	35 000
School waste	35 000
Cleaning waste	10 000
Total in tonnes	**Approximately 1 750 000**

REMEDIATION FOR THE OLFACTORY NUISANCE GENERATED BY THE COMPOSTING PLANT

Comparison between the range of odorous fumes before and after installation of a dome over the Brussels composting site, under various weather conditions
SOURCE: GROUPE D'EXPERTISE DES NUISANCES ENVIRONNEMENTALES ET SANTÉ, 2006

Wind direction	Before installation of the dome				After installation of the dome			
	Wind speed (m/s)	Temp (°C)	Date	Distance (m)	Wind speed (m/s)	Temp (°C)	Date	Distance (m)
Southwest	3,2	18	12/05/05	1 356	3,2	25	03/05/07	860
	3,0	23	12/07/05	1 444	3,8	24	04/05/07	615
Northeast	1,9	20	13/06/05	1 311	3,8	19	22/06/07	996
East/ Southeast			19/07/05	1 756			30/08/07	860
							31/08/07	830
Average over the summer			**2005**	**1 522**			**2006 2007**	**928 845**

"Brussels-Compost", the composting plant for garden waste (located at the Bempt in Forest) has been in use since 2001. Initially operating in open-air, it generated complaints from the residents as to the olfactory nuisance created. In 2006, the centre was equipped with a dome ("tunnelling" principle) which, combined with a biofilter, reduced the odorous emissions.
The olfactory analysis laboratory "GENES" (Groupe d'Expertise des Nuisances Environnementales et Santé) walked olfactory trajectories in this area before and after the installation of the dome to determine the extreme distances for the perception of the odorous nuisances.
It was indeed possible for a difference in the range of odours to be established by the analyses: under similar weather conditions, odorous fumes from the composting plant were reduced significantly after the dome was put in place.

TAKE BACK OBLIGATIONS

The principle of making manufacturers aware of their responsibilities obliges the manufacturer or importer of a product to take back the waste resulting from the products he has put on the market and ensure adequate management of this waste, in particular via the obligation to reach objectives in terms of re-use, recycling and recovery.

This principle is implemented for 10 specific waste streams. The table below gives an overview of the streams involved, the organisations that are responsible, the objectives of the various agreements and the results (for the most recent available year).

Status of the environmental agreements concluded with the waste producers
SOURCES: THE INVOLVED ORGANISATIONS (ANNUAL REPORTS OR WEBSITES)

Subject	Organisation	Objectives	Results
Packaging	FOST Plus (household) and VAL-I-PAC (industries)	Agreement of 29/12/2008 *FOST Plus:* Recycling: 80% Recovery other than recycling: 10% *VAL-I-PAC:* Recycling: 75% Recovery other than recycling: 5%	*FOST Plus: 2007 (Belgium):* stock: 730 000 tonnes recycling: 82% recovery other than recycling: 12% *VAL-I-PAC: 2007 (Belgium)* stock: 670 000 tonnes recycling: 83% recovery other than recycling: 6%
Tyres	Recytyre	"take back obligation" decree Collection: 100% Retreading: 25% Recycling: 20% Energy recovery: 55%	*2007 (BCR):* Collection: 2 844 tonnes (collection rate of 92,31%) *2007 (Belgium):* Collection 79 882 tonnes (collection rate of 92,3%) Of this, re-use: 2,6% retreading: 7,8% recycling: 47,53% energy recovery: 42,1%
Disused vehicles	FEBELAUTO	1/1/2006: Re-use: 85% Thermal recovery: max. 5%	*2006 (Belgium):* Re-use: 19% Recycling: 61% Energy recovery: 1% or 81% useful application
Used food oils	Valorfrit	Increase in quantities collected of at least 20% in 2012 compared to 2007	*2007 (BCR):* Collection from households: 100 tonnes Collection from professionals: 1 400 tonnes
Used non-food oils		No agreement. Decree 18/7/2002: Collection rate: 100% (1/1/2005) Regeneration or other re-use: minimum 60%; Principal use as fuel or other means of energy generation: maximum 40%	*2008 (BCR):* Collection (by ARP): 7 865 l
Batteries & accumulators without lead	BEBAT	Collection: 75% for the replacement market Recycling: 65% batteries, 75% accumulators without lead	*2007 (Belgium):* Collection: 2 562 tonnes (=50%)
Lead batteries	Recybat	Agreement of 12/12/2002 Collection rate: over 95% (1/1/2005) For waste from treatment: Lead: 95% recycling; Electrolyte: complete recovery or neutralisation; Synthetic materials: 100% recovery (of this, at least 30% recycled)	*2007 (Belgium):* 17 724 tonnes put on the market. Collection rate of used batteries: 137% Lead: 100% recycled (of this, 5% loss); Acids (12 to 16% of weight): 100% neutralised; Raw materials (8% of weight):40% useful application, 36% recycled and 24% put in a safe landfill site
Electrical & electronic equipment	Recupel	* Total recycling: 85% for white goods 85% for refrigerating and freezing appliances, 70% for TVs and computer screens, 75% for others 80% for discharge lamps * Materials: 95% metal & 20% plastic	*2007 (Belgium):* * Collection: 81 414 tonnes * Total recycling: 85% for white goods 93% for refrigerating and freezing appliances, 89% for TVs and computer screens, 81% for others 96% for discharge lamps * Materials: 100% metals, 88% synthetics & 55% others
Paper- press sector		Recycling: since 01/01/2007: 85%	*2006 (BCR):* 11 000 tonnes put on the market
Expired medicines	Pharmacies affiliated with the APB and OPHACO	Take care of selective collection of, and energy recovery from, expired unused medicines returned by the patient to a Brussels pharmacy.	*2007 (BCR):* Collection: 63 tonnes
Photographic waste	Fotini	Implement the take back obligation (individuals and professionals) according to the methods that the members of the managing non-profit organisation believe to correspond best to the specific nature of photographic waste	*2007 (BCR):* Collection: 462 tonnes

INVENTORY OF POTENTIALLY POLLUTED AND POLLUTED SOIL

In 2002, Brussels Environment carried out an inventory of sites with polluted or potentially polluted soil. This inventory was drawn up from information on present and past activities taking place on these sites. It offers no guarantee as to the degree of actual pollution of the soil, but maps sites for which it would be prudent to perform a more in-depth study of the groundwater and soil quality.

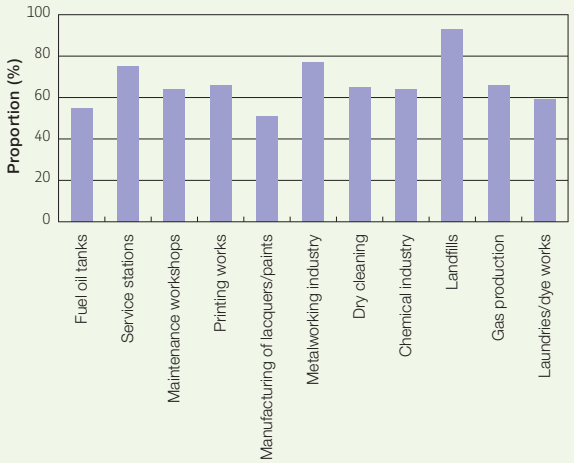
This inventory is presently being validated through personalised contacts with the landowners and operators. On the occasion of in situ economic and legal events (sale, cessation of activities, start of a hazardous activity, etc.) a survey of the soil pollution status examines whether the site exceeds the limit values for pollution. These studies were for the most part performed on the potentially polluted sites, i.e. those which harbour fuel oil tanks of over 10 000 litres (housing, office or business) or those used for certain hazardous activities: fuel stations, workshops for vehicle maintenance and printing works.

In 2008, the overall percentage of the sites that were actually polluted among the sites studied was 66%.
The industrial sectors with the highest proven percentage of pollution are landfills, metalworking industries and service stations.
The most frequent pollutants are:

- in the soil: hydrocarbons (82%) and heavy metals (14%);
- in groundwater: hydrocarbons (84%), heavy metals (7%) and volatile organic compounds (5%).

Proportion of sites proven to be polluted among sites studied, by industrial sector - 2008

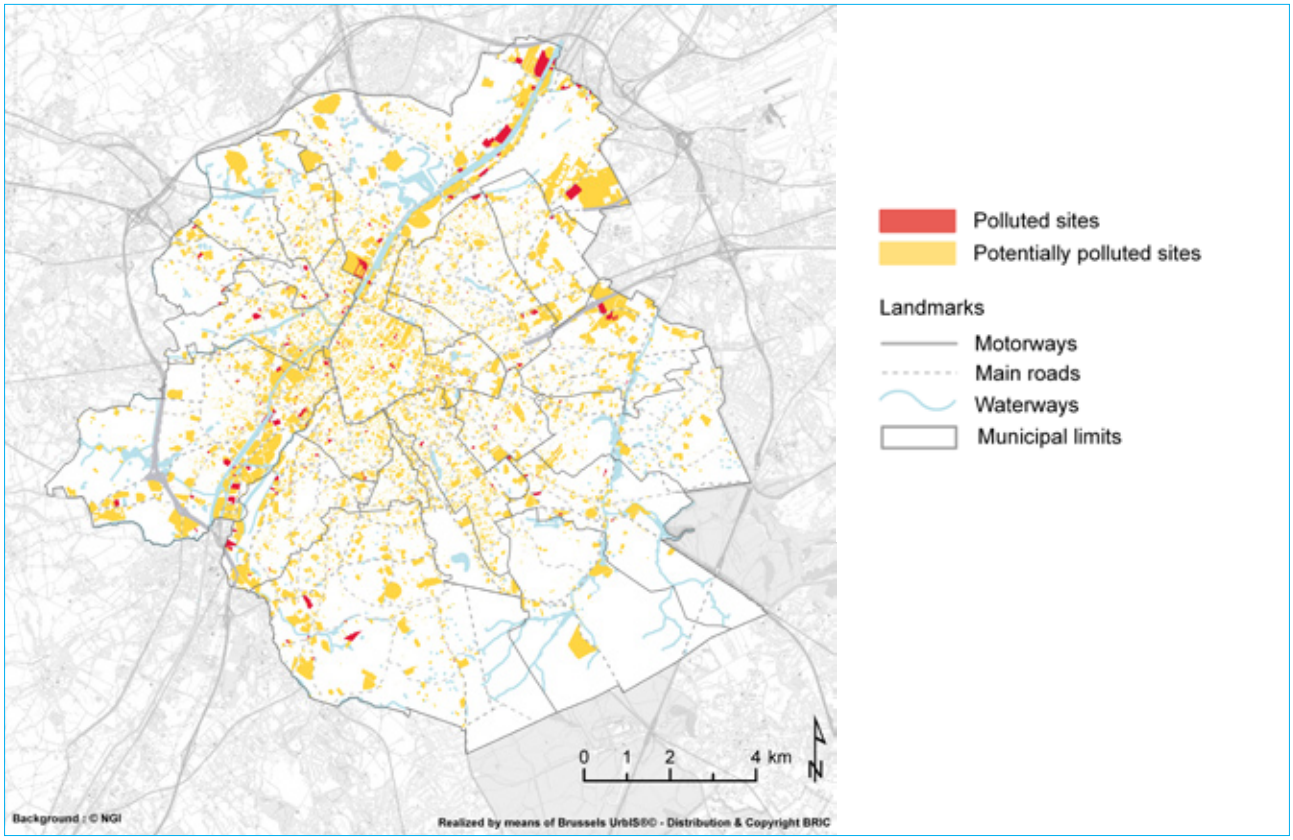
SOURCE : BRUSSELS ENVIRONMENT, SOUS-DIV. SOLS, 2009



In September 2009, this inventory included 17 000 polluted or potentially contaminated plots of the cadastral register, which covered a surface equivalent to 16% of the regional territory. The largest surface areas of polluted or potentially polluted soil are concentrated near the canal and the North - South railway junction. The municipalities of Schaerbeek, Anderlecht and Molenbeek-Saint-Jean also account for a significant share.

Location of polluted and potentially polluted sites - Situation as of September 2009

SOURCE : BRUSSELS ENVIRONMENT, SOUS-DIV. SOLS, 2009



ASSESSMENT OF MOBILITY PLANS

Establishment of a mobility plan for the workplace ("plan de déplacements" or PDE) is obligatory for companies employing more than 200 workers at the same site in the Brussels-Capital Region. The PDE is established in two phases: a mobility diagnosis followed by a specific action plan.
In this framework, 260 mobility diagnoses have presently been carried out. These represent a total of 220 000 workers, or one-third of those employed in the Brussels-Capital Region. Only 30% of these live within the Region.

With regard to the principal transport mode (that is, the type of transport used over the longest distance), on average 47% of these workers use the car to get to work (45% as driver and 2% as passenger), 32% the train and 15% the bus, tram or metro. A little over 3% walk and fewer than 2% cycle.
Analysis of the data collected reveals a spatially uneven distribution in the choices of transport modes (see map).

The distribution of the transport modes of the workers is strongly influenced by accessibility of the workplace via public transport. By way of illustration, along the axis of the North - Central - South railway stations the share of the car is 25% on average, versus 70% in the less well served areas.

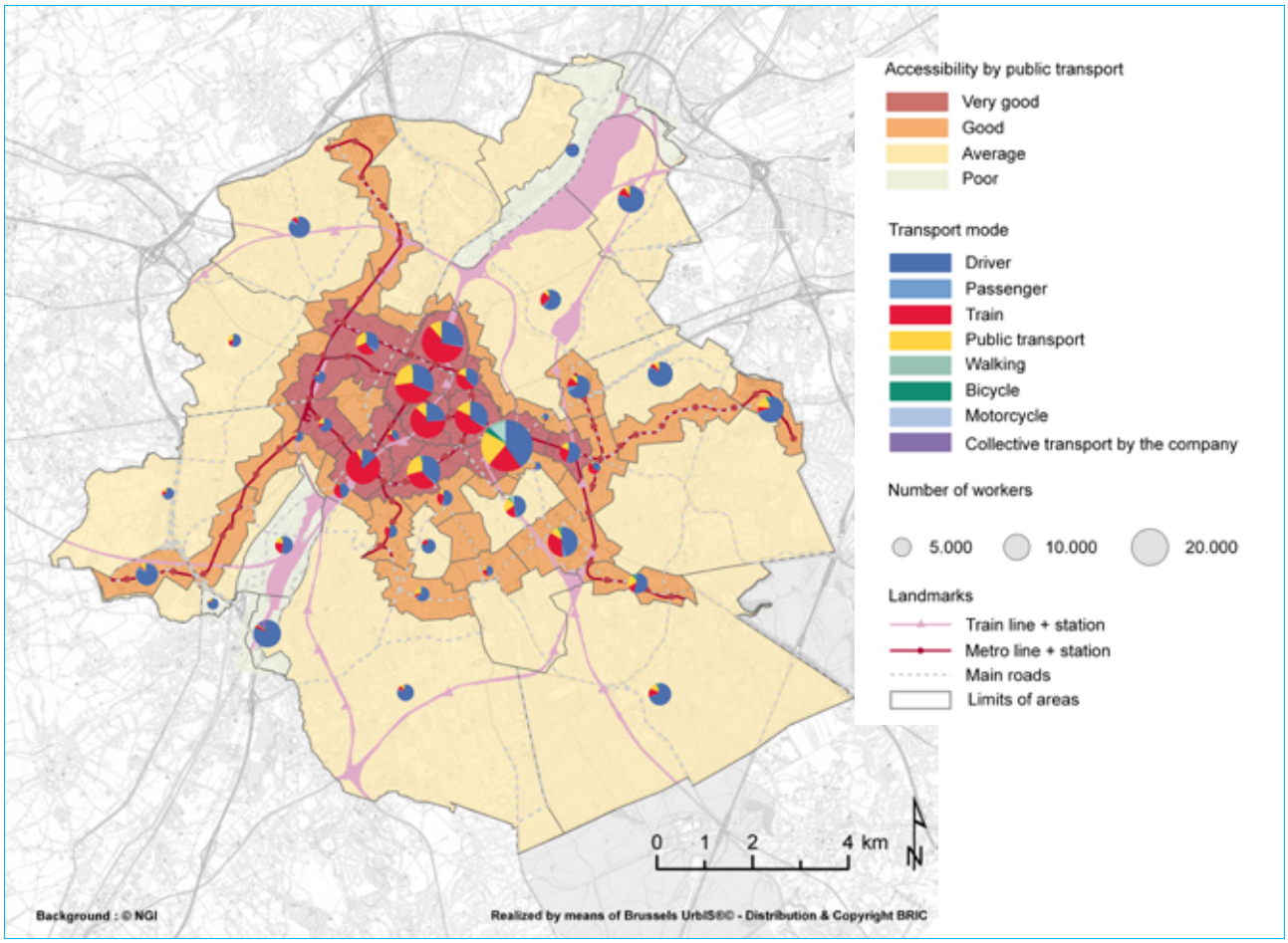
Analysis (also carried out by sector of activity) also showed other factors affecting the modal distribution, such as:

- the location of the residence of the workers (or labour market area): hospitals, municipal administrations, hotels and shops recruit primarily locally, while federal administrations and the telecommunications sector have the largest labour market area;
- parking possibilities: for a constant number of workers, the larger the number of parking places available, the larger the number of drivers;
- provision of company cars, which constitutes an incentive to use the car and which is essentially the case in the private sector;
- the mobility policy of the company (such as subsidizing the expenses for commuting): this is generally set by sectoral agreements.

As a result, the sectors combining the most "favourable" factors are characterised on average by less recourse to the car for home to work travel.

Principal mode of transportation used by the workers (workplaces over 200 persons on one site) combined with the accessibility zones

SOURCE: BRUSSELS ENVIRONMENT, UNITE STATIONNEMENTS ET DEPLACEMENTS, IN COLLABORATION WITH BRUSSELS MOBILITY, 2008



ENVIRONMENTAL PRESSURES OF THE ACTIVITIES

Comparison of socioeconomic and environmental data allow the environmental pressure exerted by economic activities to be estimated, taking account of the significance of each activity (in terms of employment, production, etc.) and its change over time.

To this end, precise data are necessary by sector of activity:

- For the socioeconomic data: employment, added value, area occupied, number of students, etc.;
- For the environmental data: data on consumption (of water, energy, land surface, etc.), production (of waste for example), and on emissions (of pollutants).

A study analysed the environmental pressure of the various sectors of economic activity in the Brussels-Capital Region, in relation to the number of jobs. Due to lack of data for the Region, only a partial analysis (for certain environmental pressures) has been possible.

One should be aware that the quality of the final result will depend directly on the quality of the data used, the latter being often of limited significance for detailed approaches such as sectoral or spatial breakdown. In these cases, the interpretation of the results requires certain precautions.

The table classifies the various sectors of activity according to the magnitude (per job generated) of their impact in terms of water and energy consumption, and according to their workers' preferred transportation mode. The sectors of activity with the lowest impact (i.e. limited consumption per job or low automobile use) are listed first.

Classification of various activity sectors as a function of water and energy consumption per job created, and as a function of car use in home-work transport for the Brussels-Capital Region in 2005

SOURCE: RDC ENVIRONMENT, 2008, BASED ON REGIONAL ACCOUNTS, VIVAQUA AND BRUSSELS ENVIRONMENT / **GREEN**: RELIABLE DATA (BUT MAY CONTAIN SOME INACCURACIES) / **AMBER**: MODERATE QUALITY DATA / **RED**: DATA NOT REPRESENTATIVE OF THE WHOLE SECTOR

Economic sectors (NACE - BEL)	Water consumption (m^3/job)	Energy consumption (ktoe/job)	Use of car for home-work transport (% of car)
Construction	1 ●	1 ●	no data ●
Public administration	2 ●	2 ●	1 ●
Business services, real estate	3 ●	6 ●	6 ●
Transport, storage and communications	4 ●	5 ●	5 ●
Financial activities	5 ●	3 ●	3 ●
Generation and distribution of electricity, gas and water	5 ●	9 ●	9 ●
Wholesale/retail commerce, vehicle repair	6 ●	11 ●	8 ●
Education	7 ●	8 ●	4 ●
Manufacturing industries	8 ●	12 ●	11 ●
Health and social work	9 ●	7 ●	10 ●
Collective, social and personal services	10 ●	10 ●	7 ●
Hospitality industry	11 ●	4 ●	2 ●

Particularly varying situations in terms of environmental impacts can be observed in the same sector of activity depending on specific features (activity, integration into the urban fabric, etc.). We cite the example of the hospitality sector, which seems to be characterised by a low proportion of workers using the car (see page on Mobility Workplace Plans) but also by a very important water consumption per worker.

Unexpected differences can also be observed between sectors that should a priori have relatively similar needs. We refer to the sectors of public administration, business services/ real estate and financial activities: their situation reveals important differences although all three are essentially office activities.

As a consequence such integration of data seems to be of interest for inter-sector comparison, in particular for the tertiary sector, strongly represented in Brussels. It also allows supplementary studies to be pinpointed which could reveal the explanatory factors or be useful to orient the awareness-raising policies.

DEMONSTRATION PROJECTS BY PUBLIC AUTHORITIES: PLAGE

In the Brussels-Capital Region, buildings are responsible for 73% of energy consumption (see page on Energy situation in Brussels). In 2005, the Brussels government adopted a support mechanism called "Local Plan of Action for Energy Management", which allows the development of trials in energy savings over 3 to 4 years, with major proprietors of public real estate through calls for proposals. The program is part of the first Air plan. By mid-2009, about thirty managers had already signed an agreement to implement a "PLAGE".

A PLAGE involves a coherent coordinated ensemble of actions and methods applied to buildings of the same estate and the subsidized employment of an energy staff member (responsable énergie, RE), under the guidance of Brussels Environment. The tasks of the RE consist of keeping the energy accounting of the PLAGE buildings up to date (monthly reading to reveal results or shifts), taking a series of small, quick, inexpensive measures (adjusting boilers, insulating pipes), planning larger investments depending on the audits and communicating the results to raise awareness. There is no maturity guarantee but a best efforts obligation. The annual reporting to Brussels Environment guarantees transparency of information on efforts made and results obtained.

Given the diversity in building stock within a municipality and between municipalities, the same methodology can lead to very different results. The PLAGE 1 reports are unanimous in affirming that creation of an "energy reflex" among the participants in the various municipal services is one of the principal benefits of the programme. This positive development is already perceptible in the facilities management (granting a bonus to maintenance companies when consumption is reduced), as well as in the maintenance and renovation of buildings (insertion of "energy" clauses, use of eco-construction techniques).

Survey of PLAGEs underway (as of Sept. 2009)

SOURCE: BRUXELLES ENVIRONMENT, SOUS-DIV. ENERGIE, DPT PROMOTION DE L'EFFICACITÉ ÉNERGÉTIQUE

No.	Call launched in	Type of Brussels public real estate Proprietor and manager	Number	Duration of the PLAGE
1	Sept. 2005	Municipalities excl. CPAS (i)	7	2006-2009 (vi)
2	August 2006	Hospitals (ii)	5	2007-2009
3	May 2007	Municipalities (iii)	8	2008-2010
4	May 2007	Collective housing (iv)	2	2008-2010
5	Dec. 2008	School network (v)	6	2009-2013

(i) Watermael-Boitsfort, Schaerbeek, Saint-Gilles, Molenbeek, Ixelles, Anderlecht, Berchem-Sainte-Agathe
(ii) Comprising the public hospitals: Saint-Luc, Erasme, Bracops, Brugmann Horta, and Brugmann Brien
(iii) Auderghem, Brussels, Etterbeek, Jette, Koekelberg, Forest, Uccle, Woluwe-Saint-Lambert
(iv) Public Centre for Social Welfare in Brussels City and Logements communaux in Molenbeek
(v) The 6 networks for compulsory education: French Community, CPEONS, CECP, SeGEC-SIEC, FELSI and the SIT
(vi) The duration of the PLAGE 1 "municipalities" was extended by one year until Dec. 2009 and the ceiling of the subsidy raised by one-third.

Some intermediate results of the PLAGE 1 project for municipalities initiated in 2006

SOURCE : BRUSSELS ENVIRONMENT, SOUS-DIV. ENERGIE, DPT PROMOTION DE L'EFFICACITÉ ÉNERGÉTIQUE

Municipality enrolled in PLAGE (1)	Number of buildings (2007)			PLAGE consumption in % of total 2007 consumption (2006 for Ixelles)		RE=Energy Manager, GT=Interservice energy team	Change in 2007 energy consumption compared to 2002 ★, 2004 + or 2005 ✱		
	Municipal	in energy cadastre (2)	in PLAGE (including schools) (3)	Gas	Electricity		Buildings Concerned	Fuel (normalised)	Electricity
Anderlecht	94	84	26 (17)	74,30	72,00	1 RE	Municipal ✱	-18,6%	+2,8%
Berchem	20	20	4 (1)	71,00	82,00	GT	PLAGE +	-11,7%	-8%
Ixelles	60	27	3 (1)	11,00	11,00	GT	23 cadastred ✱	-15,07%	+4,49%
Molenbeek	~100	~100	10 (3)	59,00	73,00	1 RE	PLAGE ✱	-4%	+4,8%
Schaerbeek	160	25	19 (15?)	?	?	1 RE + GT	25 cadastred ★	-8,46%	-7,47%
St Gilles	50	48	10 (6)	71,14	50,37	0,33 RE + GT	PLAGE ✱	-12,59%	-7,81%
Wat.-Boits.	35	35	14 (8)	79,00	80,00	1 RE + GT	Municipal +	-10%	-1%

(1) Very varied estates (admin. buildings, sports centres, swimming pools, schools, academies, warehouses, libraries, etc.)
(2) Energy cadastre = inventory and classification of its own buildings depending on their occupation, size, consumption and energy costs. The use of a standardised calculation method allows first priorities to be determined.
(3) To take part in a PLAGE, the energy consumption of the building must be above the regional average and be important as compared to the total consumption of the municipality.

BRUSSELS RESIDENTS' PERCEPTION OF THEIR ENVIRONMENT

The last socioeconomic survey (or census, 2001) included a series of questions to assess the environment near the dwelling (aesthetic appearance of the buildings, cleanliness, air quality and noise pollution) and the neighbourhood facilities (pavements, bicycle paths, presence of green spaces and public transport available, for example). A census covers in principle the whole population, which distinguishes it from a standard survey, for which a group is selected. The examination of the answers given in the census allows the opinions of households to be analysed on a fine scale. The analysis of the personal characteristics of the respondents such as age, gender, education, etc., and the comparison with the responses to the questions also allows any impact of these characteristics on the responses to be identified.

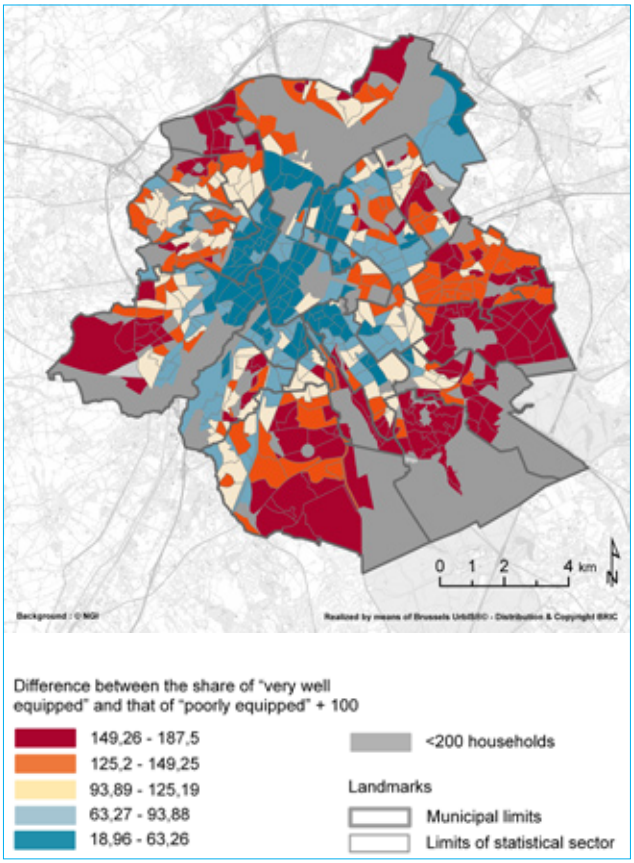
The census results indicate that, overall, in comparable neighbourhoods, the composition of the population in terms of gender, age, origin or educational level has only a slight impact on the way of responding to questions on the appraisal of the immediate environment and its facilities. When slight effects have been detected, they are always on a limited scale.

This tends to show that insofar as they involve a sufficient number of respondents, such surveys supply data on a fine scale that reliably reflect the assessment of the inhabitants of various aspects of the environment on a local scale.

The spatial analysis of the responses has in addition highlighted the links that exist between the spatial distribution of the judgements of the immediate environment and facilities of a neighbourhood and its urban or environmental characteristics. For example, the evaluation of the green spaces faithfully reflects the real inequalities in access to these (see page on Accessible Green Spaces).

Spatial distribution of the appraisal of the existence of nearby green spaces

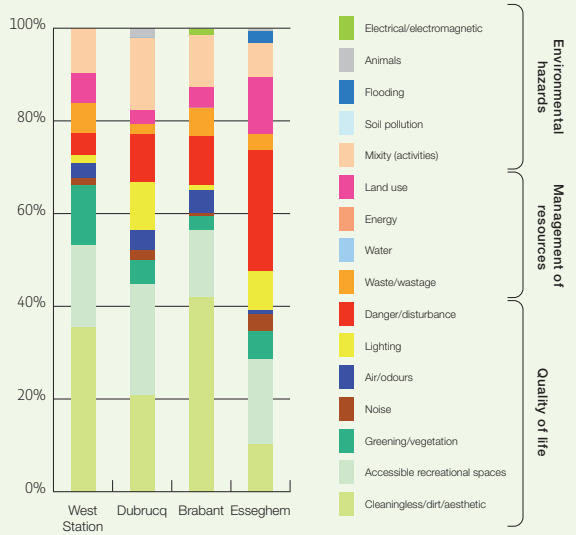
SOURCE: DGSIE, 2001, AFTER IGEAT-ULB AND INTERFACE DEMOGRAPHY-VUB, 2009



INFORMATION OBTAINED VIA "WALKING DIAGNOSES"

Classification of observations made during walking diagnoses according to environmental themes

SOURCE: BRUXELLES VILLE - REGION EN SANTÉ, 2009



Since 2003, the non-profit organisation "Bruxelles Ville-Région en Santé" has guided local projects resulting from calls for initiatives. A new method has been developed to try to objectivise the perceptions of inhabitants based on their participation; this is the walking diagnosis. The 'West Station", "Molenbeek-Dubrucq", "Brabant" and "Jette-Esseghem" projects have used walking diagnoses to identify with the inhabitants the improvements they perceive as high-priority. These diagnoses involve a guided visit of the neighbourhood with voluntary inhabitants, during which objective observations are made, which are then classified according to a grid (equipment vs. behaviour and positive vs. negative).

In collaboration with Brussels Environment, a complementary analysis of the information collected during these diagnoses has been performed to identify the environmental themes judged to be important and high-priority in the daily life of Brussels residents.

The "quality of life" aspects (in particular cleanliness, accessible recreational spaces, greening /vegetation and dangers/disturbances) stand out in the diagnoses as a whole (almost 75% of observations). The inhabitants are particularly aware of greening, even partial: floral decorations have an immediate effect on the perception of the neighbourhood and its quality of life, in particular in the highly urbanised neighbourhoods of the city centre.

BEHAVIOUR AND ENERGY CONSUMPTION

According to surveys performed since 2007 in a sample of households (representative of the average Brussels population in terms of distribution by municipalities, age, gender, socioeconomic class and language), the average temperature to which the living room of the residence is heated is 20°C during the day and 16° at night.

On the other hand, only fifty percent of those questioned were aware that households are the principal consumers of energy in the Brussels-Capital Region. This result is striking in a context of climate change, given the characteristics of the energy consumption in the Region (73% of the total energy consumption is due to the buildings - see page on the Energy situation in Brussels).

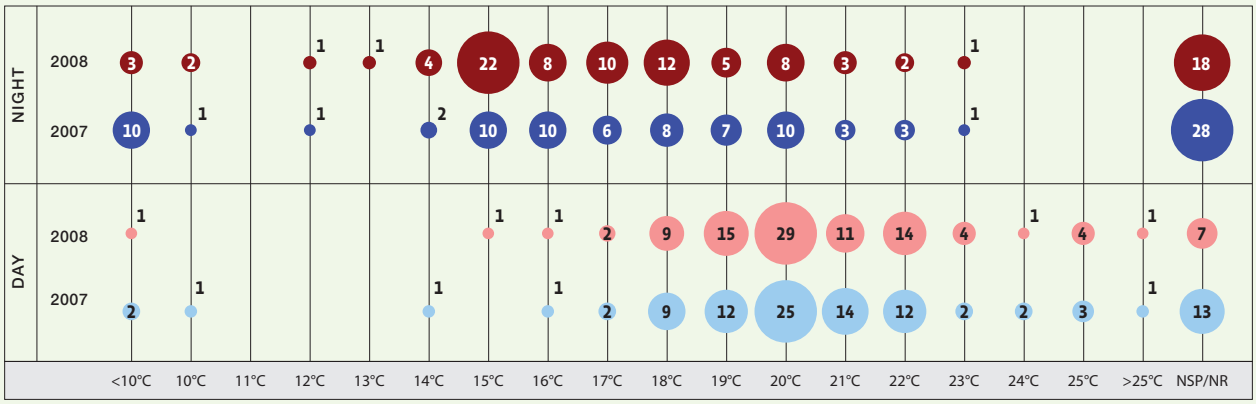
In 2008, 97% of those questioned were however convinced that small actions allow energy savings and 85% were aware of the impact of heating on air quality. Seventy percent also put on an additional sweater first when they are cold.

However, 84% of those questioned have the impression that they already do a great deal to save energy...

Responses (in percentage) to the question: to which temperature do you usually heat your living room when you are at home?

SOURCES: BAROMÈTRES DE LA CONSOMMATION D'ÉNERGIE DES BRUXELLOIS 2007 AND 2008

NSP/NR: DON'T KNOW/NO RESPONSE



IMPACT OF OUR BEHAVIOUR: RESULTS OF THE "ENERGY CHALLENGE"

Over 2 000 Brussels households have already taken up the Brussels "energy challenge". It proposes that families - with follow-up, and without investment and loss of comfort - change certain daily actions and adopt simple habits to save energy. The measures chosen are, for example: decreasing the heating temperature and/or adjusting the thermostat valves, closing curtains or shutters when the sun has set, taking quick showers, regularly defrosting the refrigerator, eliminating stand-by consumption, using the "eco" programme on washing machines and dishwashers more often, putting a cover on saucepans, avoiding using the car for short trips, driving at a steady slow speed.

Result of "Energy Challenges"

SOURCE : BASED ON THE "DEFI ENERGIE" (ENERGY CHALLENGE) REPORTS

Winter	Estimate of average annual energy savings related to these measures	Estimate of average annual financial savings per household	Estimate average annual reduction in CO_2 emission per household	Total no. of participating households	Proportion of households for which numerical information is available
2005-2006	-13,5%	~ 335 €	950 kg **	201	41,3%
2006-2007	-20%	from 400 € to 575 € *	1 250 kg to 1 650 kg *	1 435	7,8%
2008	-18%	from 380 € to 540 € *	950 kg to 1 200 kg *	1 995 (new + follow-up of previous challenges)	27%

* FOR HOUSEHOLDS WITH VEHICLE(S) ** 715 KG OF WHICH THANKS TO THE DWELLING

Conclusion: per household, the savings in energy, money and CO_2 emissions related to changes in behaviour of participants whose awareness has been raised, are sizable.

The proportion of households for which numerical information is available varies greatly between the campaigns. We note in this regard that for the Winter 2005-2006 challenge, a larger share of participating households already had an energy-saving approach to energy use.

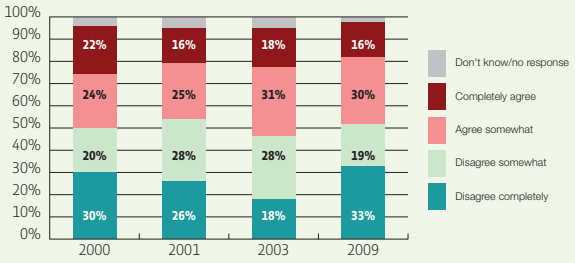
PURCHASING BEHAVIOUR

According to surveys performed since 2000 in a sample of consumers (representative of the Brussels population distribution in terms of age, gender and number of inhabitants in each of the 19 municipalities), a little over half of Brussels consumers are aware that their purchasing behaviour has an impact on the environment. This proportion, relatively low given the result of the detailed study below, seems to be constant over time, but the share of consumers fully convinced was greater in 2009.

However, over half of consumers questioned find that "environmentally friendly" products are difficult to identify... This proportion seems however to be progressively decreasing since 2000.

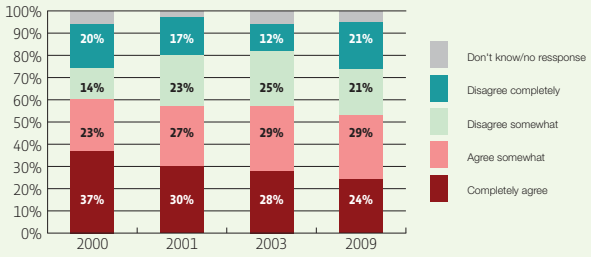
Responses to the statement: my purchasing behaviour has little environmental impact

SOURCE: ENQUÊTES SUR L'ÉCO-COMPORTEMENT OF THE YEARS 2000, 2001, 2003 AND BAROMÈTRE SUR LA RÉDUCTION DES DÉCHETS, 2009



Responses to the statement: "ecological" products are difficult to identify

SOURCE: ENQUÊTES SUR L'ÉCO-COMPORTEMENT OF THE YEARS 2000, 2001, 2003 AND BAROMÈTRE SUR LA RÉDUCTION DES DÉCHETS, 2009



IMPACT OF OUR PURCHASING BEHAVIOUR: DOMESTIC PACKAGING

Purchases were made in October and November 2007 at 3 major chains, starting from the same shopping list. This list involved a limited number of common consumer products (a list established from figures for consumption in Belgium), for one week, for a single-person and for a 4-person household. The purchases were made according to a "minimum waste" or "maximum waste" criterion, following a predefined methodology that also involved the possibility of recycling the packaging (Brussels' rules).

Waste assessment of shopping baskets

SOURCE: OBSERVATOIRE BRUXELLOIS DE LA CONSOMMATION DURABLE, 2008, STUDY REALISED FOR BRUSSELS ENVIRONMENT

Characteristics of the shopping list	Weight of packaging corresponding to quantities consumed in 1 week (g)	Weight of the non-recyclable fraction of this packaging (g)	Price of the shopping list (corresponding to quantities consumed in 1 week) (€)
1 person - "minimum waste"	133,2	46,0	17,9
1 person - "minimum non-recyclable waste"	381,0	29,3	20,6
1 person - "maximum waste"	1 057,7	325,9	30,7
1 person - "maximum non-recyclable waste"	986,1	335,3	33,6
4 persons - "minimum waste"	359,0	130,9	62,1
4 persons - "minimum non-recyclable waste"	617,8	68,5	59,6
4 persons - "maximum waste"	3 862,7	1 029,5	107,2
4 persons - "maximum non-recyclable waste"	3 635,1	1 114,8	110,7

Conclusions: for the same shopping list, through enlightened choice, the consumer can reduce the quantity of packaging waste by a factor of 7,9 to 10,7 or reduce the non-recyclable waste produced by a factor of 11,4 to 16,2 (household of 1 or 4 persons respectively)... What 's more there is a clear financial advantage (average savings of 40 to 45% by choosing less "overpackaged" products).

TO FIND OUT MORE

The documents can be downloaded according to the following categories via the documentation centre of the internet site devoted to the state of the environment of the Brussels-Capital Region:
http://www.bruxellesenvironnement.be/etatdelenvironnement

Documentation scientifique et technique (Scientific and technical documentation)
Info-fiches (Information sheets)
Les publications de Bruxelles Environnement (Brussels Environment publications)

AIR

- BRUSSELS ENVIRONMENT, various dates. Fact sheets «Ozone troposphérique (O3) », « Oxydes d'azote (NOx) », « Composés Organiques Volatils (COV) », « Les particules fines (PM10, PM2,5) ». ■ (air, Fiches documentées)
- BRUSSELS ENVIRONMENT, 2008. « Rapport sur les incidences environnementales du Plan d'urgence en cas de pics de pollution », 88pp. + annexes. ■ (« pics de pollution »)
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- BRUSSELS ENVIRONMENT, various dates. Information sheets « Chenilles processionnaires du chêne », « Coccinelle asiatique », « Perruche à collier et Perruche alexandre », « Renouée du Japon », « Cerisier tardif », « Berce du Caucase ». ■
- BRUSSELS ENVIRONMENT, various dates. Information sheets « Fouine », « Chevreuils, » « Renards roux », « Sanglier », « Guêpe ».■
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BRUSSELS ENVIRONMENT: DEDICATED TO QUALITY OF LIFE FOR THE PEOPLE OF BRUSSELS

The air we breathe, the soil we walk on, the water in our rivers. The energy we use, the waste we generate, the noise we make. The green spaces we relax in, the biodiversity we share. Managing these main areas of our daily life is the job of Brussels Environment.

THE BRUSSELS PUBLIC ADMINISTRATION FOR ENVIRONMENT AND ENERGY

PLANNING ACTION PROGRAMMES

We carry out action plans to combat air pollution and to save energy, waste management and prevention plans, plans to combat urban noise, plans to develop and manage green spaces and water management plans.

ACTION AT GROUND LEVEL

We are not an "indoor" administrative body: planning and developing green and blue spaces, ensuring their cleanliness and security for users, studying the possible consequences of an installation on the neighbourhood, taking action in relation to a complaint by an individual…actions at ground level are the reality of our daily job.

SUPPORTING CITIZENS, COMPANIES AND ASSOCIATIONS

Brussels Environment supports citizens and companies who take action to save energy and preserve the environment. Energy premiums for individuals and companies, zero rate bank loans, aid for cleaning up soil, support for communes (PLAGE and Agenda 21…). Facilitators specialised in different areas are also available for professionals to help them in their approach. Finally, environmental associations are also increasingly supported.

MAKE AWARE, EDUCATE, ADVISE

We provide you with concrete advice to help you better respect the environment. This is achieved through awareness campaigns, exhibitions, events, brochures, actions with schools, the website www.brusselsenvironment.be, and an Environment Info number (02 7757575). Action programmes such as the Energy Challenge allows citizens to be assisted in their effort to reduce their energy consumption.

WORKING WITH COMPANIES

We assume the role of partner to companies to allow them to develop economic activity in the Region while fulfilling their legal obligations as regards the environment. We examine and manage authorisation dossiers and environmental licences, and ensure the control and monitoring of activities. At the same time, we provide companies with information and advice as well as support their voluntary actions, in particular by awarding the “Eco-dynamic Company” label. The Ecobuild Cluster makes it possible to identify, network and support companies active in eco-construction.

DIAGNOSING AND INFORMING

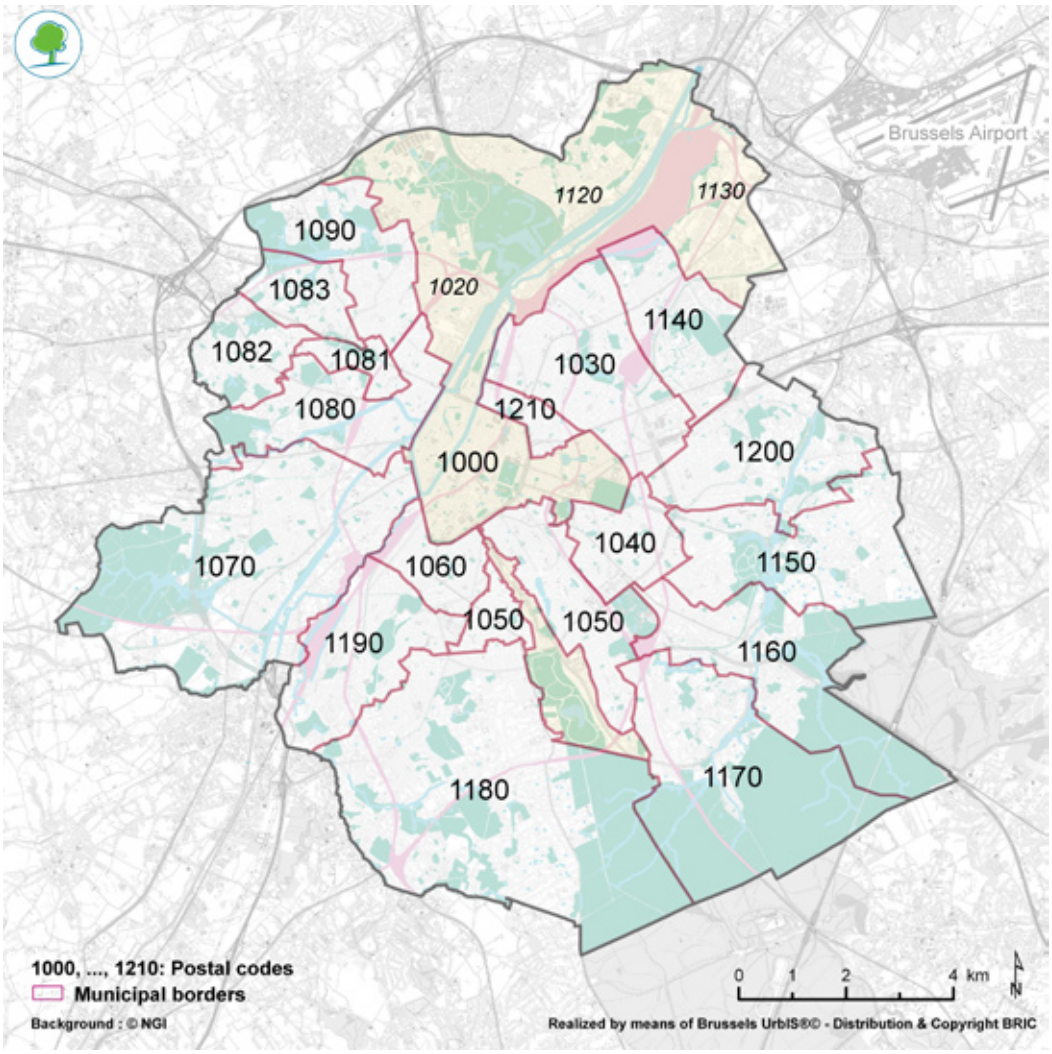
We analyse and constantly monitor air quality, noise sources, the quality of green spaces and water, household waste… Understanding means being better prepared for action. It also means being able to provide citizens with appropriate information on the state of the environment.

AT YOUR SERVICE

- A complaint regarding pollution?
- Need advice to save energy in your home?
- Interested in building or renovating in a sustainable manner?
- Advice on “sustainable” consumption?
- Information on premiums and financial aid as regards energy or other areas?
- Discover green spaces?
- Develop an environmental education or training programme?
- Information on environmental licences?
- Like to know more about the environment in Brussels?

INFOS

02 775 75 75
www.brusselsenvironment.be



Municipalities of the Brussels-Capital Region:

1070	Anderlecht	Anderlecht
1160	Auderghem	Ouderghem
1082	Berchem-Sainte-Agathe	Sint-Agatha-Berchem
1000	Bruxelles	Brussel
1020	*Laeken (Bru.)*	*Laken (Bru.)*
1120	*Neder-over-Heembeek (Bru.)*	*Neder-over-Heembeek (Bru.)*
1130	*Haren (Bru.)*	*Haren (Bru.)*
1040	Etterbeek	Etterbeek
1140	Evere	Evere
1190	Forest	Vorst
1083	Ganshoren	Ganshoren
1050	Ixelles	Elsene
1090	Jette	Jette
1081	Koekelberg	Koekelberg
1080	Molenbeek-Saint-Jean	Sint-Jans-Molenbeek
1060	Saint-Gilles	Sint-Gillis
1210	Saint-Josse-ten-Noode	Sint-Joost-ten-Node
1030	Schaerbeek	Schaarbeek
1180	Uccle	Ukkel
1170	Watermael-Boitsfort	Watermaal-Bosvoorde
1200	Woluwe-Saint-Lambert	Sint-Lambrechts-Woluwe
1150	Woluwe-Saint-Pierre	Sint-Pieters-Woluwe

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FOR DATA AND STUDIES PRESENTING THE BRUSSELS' STATE OF THE ENVIRONMENT:
http://www.bruxellesenvironnement.be/etatdelenvironnement
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