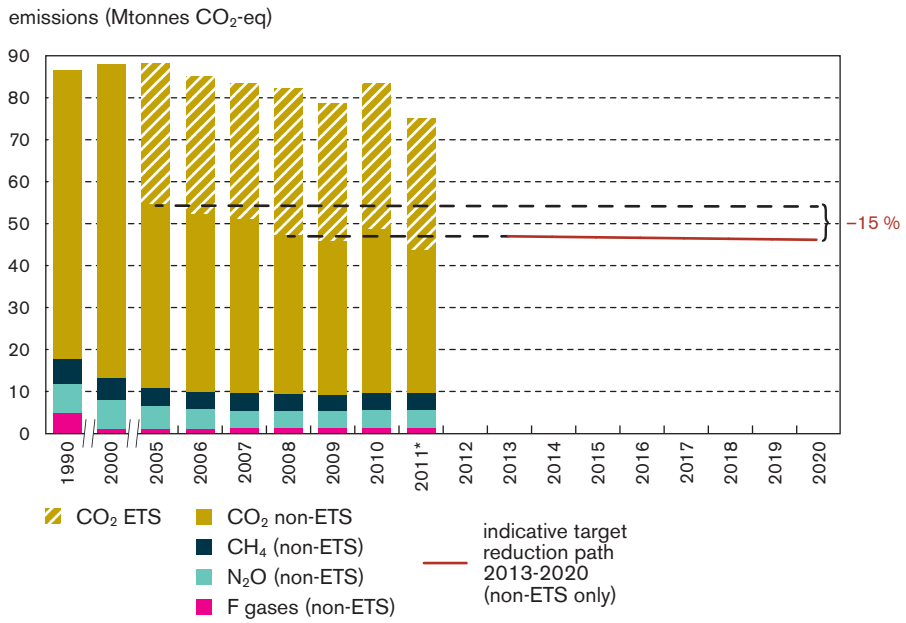
PACT 2020 DPSIR

Total emission of greenhouse gases



* provisional figures

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

Further decrease in greenhouse gas emissions in 2011

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

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

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

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

Emission of greenhouse gases per sector

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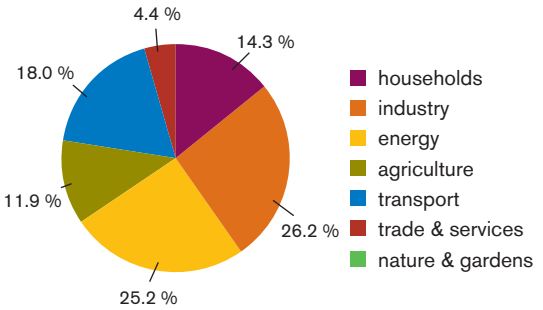
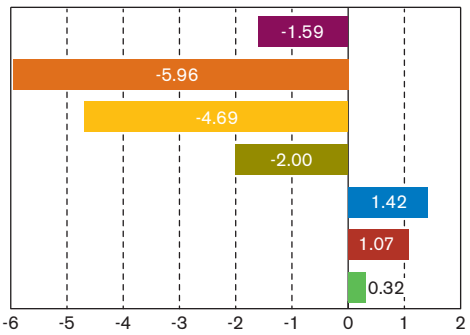


a) share in 2011 (%)



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

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

Source: MIRA based on EIL (VMM)

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

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

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

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

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

Emissions trading

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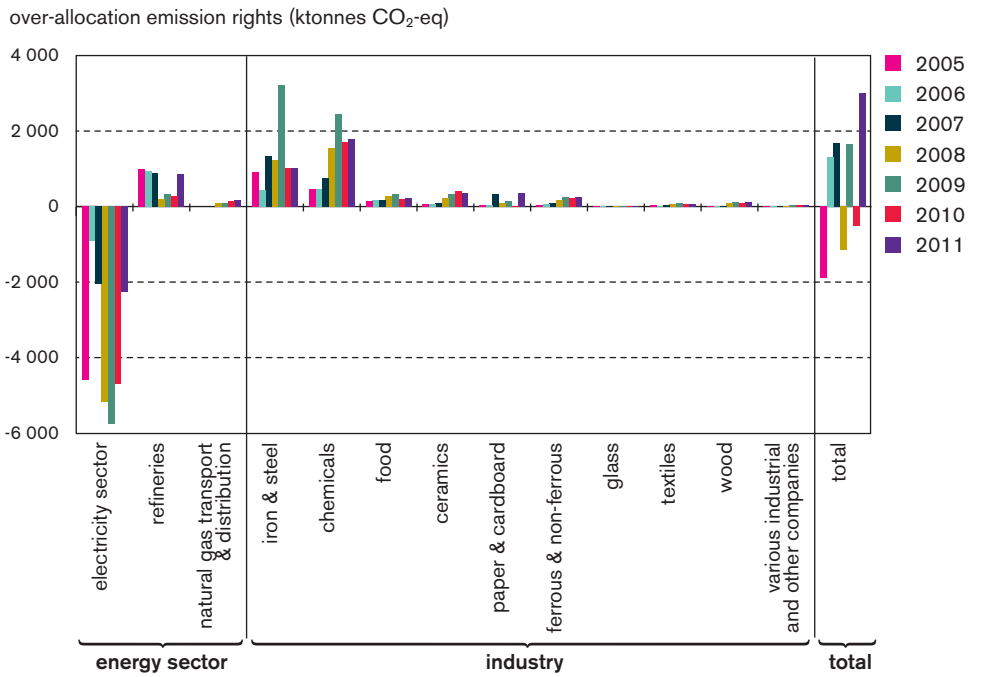


Positive numbers indicate that more free emission rights were allocated than necessary. If the number of freely acquired emission rights was not sufficient to compensate for all verified emissions, the number is negative.

Source: VITO for MIRA based on Department LNE

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

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

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

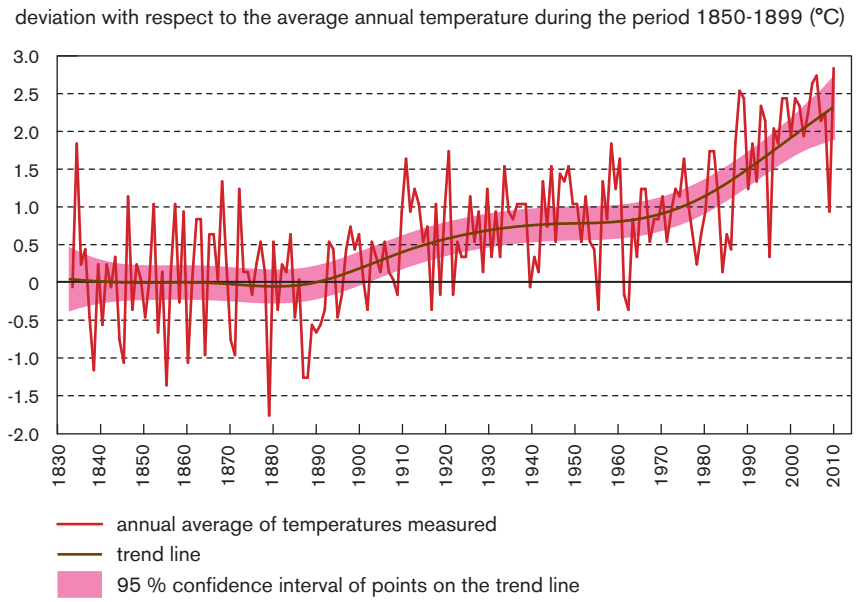
Slight over-allocation of emission rights in Flanders

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

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

☹ Temperature

DPSIR



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

Source: MIRA based on KMI data

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

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

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

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

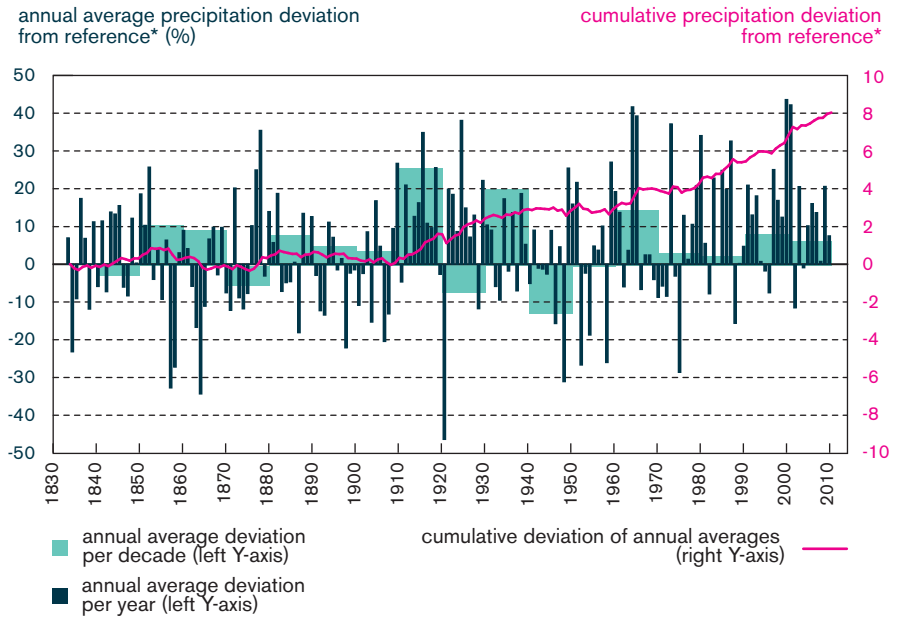
More days with extremely high temperatures

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

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

☹ Precipitation

DPSIR



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

Source: MIRA based on KMI data

Increasing precipitation in Belgium

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

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

Wetter winters

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

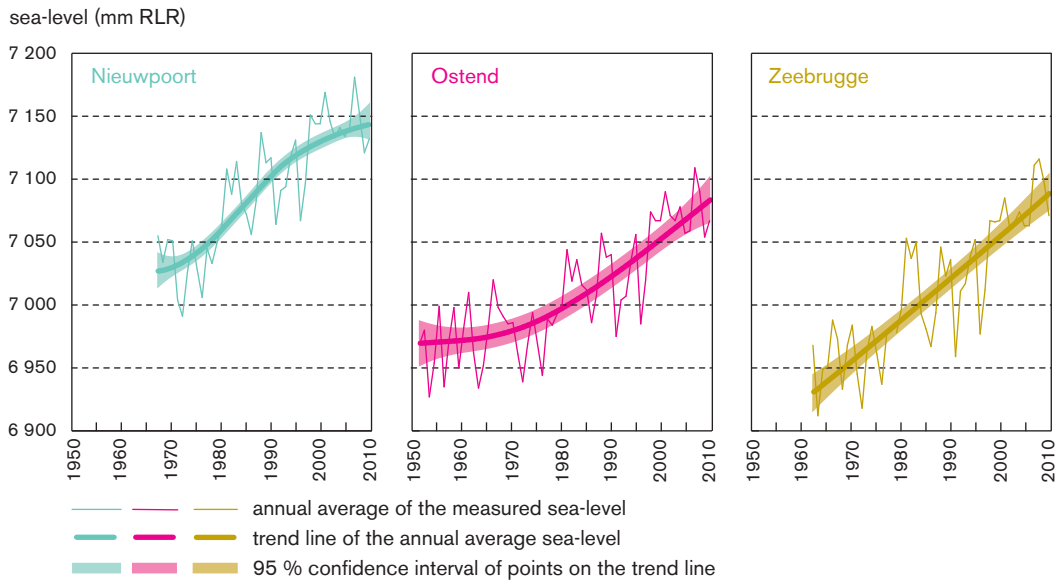
Doubling of the number of days with heavy precipitation

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

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

☹ Sea-level

DPSIR



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

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

Global rise in sea-level is accelerating

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

Belgian coast is following the global trend

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

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

Vulnerable to floods

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