

Summary

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The future depends on the choices made today. The Environment Outlook 2030 investigates how the environment in Flanders might look in a few decades. The aim is to show policy makers and interested citizens how the quality of the environment might develop in Flanders and what impact policy could have on this.

The future developments have been depicted using three policy scenarios with increasing levels of ambition:

- The *reference scenario* investigates how far the current environmental policy reaches.
- The *Europe scenario* investigates what may be required to realise the European ambitions concerning climate change, air quality and water quality in the medium term.
- The *visionary scenario* investigates how the environment may be safeguarded for present and future generations.

The results of the scenarios outline the area for the environmental policy and indicate what may be required to realise certain ambitions. The Environment Outlook 2030 may not in any event be seen as a forecast of the future. The report describes multiple developments that may arise in the future under certain circumstances. The exploration offers new insights that help to anticipate undesirable developments and thereby to make adjustments to the future.

The Environment Outlook 2030 describes developments in the economical sectors, the consequences thereof to the pressure on the environment and the quality of the environment. The Nature Outlook 2030 by the Research Institute for Nature and Forest concentrates on the consequences of the environmental quality and the land use for biodiversity.

Socio-economic outlook

The environmental status is the result of the socio-economic developments and the (environmental) policy implemented. The three policy scenarios are linked to a common set of steering environmental variables drawn up by the Federal Planning Bureau:

- Between 2005 and 2030 the population in Flanders have grown by 12 %, to 6 785 000 inhabitants. The ageing and dejuvenation continues. By 2030 nearly a third of the population is over 60 years of age and less than one fifth below 18 years of age. Family shrinkage trends will continue.
- The price of coal rises by 32 %, of crude oil by 63 % and natural gas by 98 % by 2030 (at constant prices from 2005). The price estimates are the average between the assumptions of the European Commission for the 2020 Energy and Climate package and that of the International Energy Agency. The energy prices affect the choice of energy carrier, the quantity used and the efforts for innovations.
- With an average annual growth of 2.0 % between 2010 and 2030 the growth of the gross domestic product is slightly lower than the growth trend over the last 25 years. The service economy grows further to the expense of industry and agriculture.

Challenges for the environmental policy

In the reference scenario, the current environmental policy (*as of 1 April 2008*) continues unchanged without any additional measures. Testing against the future targets indicates the challenges for the future (environmental) policy:

- The gross domestic energy use is 13 % higher in 2030 than in 2006. The total emissions of greenhouse gases increases by 12 % in 2020 and even by 31 % by 2030 compared to 2006. In 2006 the proportion of renewable energy in the gross end consumption was only 0.8 %. If the policy remains unchanged this will increase to 4 % by 2020 and 6 % by 2030. The use of renewable energy sources is beneficial both for the security of the supply and the emissions of greenhouse gases.
- The energy quality of homes in Flanders is low. Due to the population growth and smaller families, the number of homes grows further. The current energy performance standards for new construction and conversions/renovations are insufficient for decreasing the energy requirements. Industrial activities grow by 43 % between 2006 and 2030. As a result industrial energy consumption increases by 32 %, greenhouse gas emissions by 30 %. Transport flows continue to rise, with a 10 % increase in

greenhouse gas emissions. Transport also fails to reach the European target of 10 % renewable energy by 2020.

- The annual average ozone concentration shows a gradual, but significant, rising trend. This is partly due to the increase in the background concentration due to long distance transport of ozone to Europe but primarily due to a decreased ozone breakdown due to the expected NO_x reduction of emissions. The annual excess falls because the ozone peaks decrease but not enough to achieve the long-term European target.
- The current policy fails to realise the target for particulate matter of the Pact 2020 for Flanders – a drop of the annual average PM₁₀ concentration by 25 % by 2020 compared to 2007. In 2030, 15 % of the population will still be exposed to daily average PM₁₀ concentrations greater than 50 µg/m³ for more than 35 days. Furthermore unfavourable meteorological conditions for air pollution occur more frequently due to climate change.
- The acidifying deposition drops by a quarter by 2030 but the long-term target of 1 400 Aeq/ha will not be reached. Approximately 20 % of the nature area in Flanders will receive an excessive acidifying deposition in 2030.
- The pollutant loads to the surface water decrease further, for instance in 2015 by 12 % for nitrogen and by 23 % for COD compared to 2006. The pollutant loads by households and businesses decrease due to the further expansion and improvement of the public waste water treatment infrastructure. Businesses also decrease their pollutant loads themselves. However pollutant loads from the use of manure by agriculture will not fall. The lower pollutant loads will improve the physico-chemical quality of the water but nitrogen and phosphorus remain problematic. The biological quality of the water also improves but primarily due to shifts from poor to moderate quality.
- The population growth steers the future land use in Flanders to a considerable extent. The increased demand for houses and business premises ensures a further expansion of urbanised areas, by 17 % in the period from 2005 to 2030, or almost 7 ha/day. This is primarily at the expense of agriculture.
- The building primarily increases along the major roads. In this respect the developments for housing and trade within a distance of 450 m from major roads is 21 % higher in 2030 than in 2005. As a result exposure to air pollution and road traffic noise increases. In general, exposure to road traffic noise and the number of people potentially experiencing severe nuisance increase for Flanders.
- New climate scenarios for Flanders to 2100 unanimously indicate an increase in temperatures (winter: +1.5 to 4.4 °C, summer: +2.4 to 7.2 °C), and of precipitation during

the winter. The summers will be drier and the river flows will drop, which increases the probability of severe water shortage. The summer storms will be fiercer with a higher chance of flooding of sewers. The sea level at the Flemish coast may rise by 20 to 200 cm this century.

European ambitions

The Europe scenario researches the effects of additional measures aimed at the European ambitions in the field of climate change, air quality and surface water quality.

The targets of the European 2020 Energy and Climate package take action on energy efficiency, the use of renewable energy sources and greenhouse gas emissions:

- The gross domestic energy use continues to fluctuate around the 2006 level. As a result Flanders cannot fulfil the energy efficiency target of a 20 % increase by 2020 in relation to an unchanged policy.
- Approximately 9 % of the gross final energy consumption is from renewable energy sources by 2020. Belgium had a target of 13 % imposed by Europe but the regions have not yet reached any further agreements regarding burden sharing. The share of green power in electricity production grows to 22 %. There is sufficient potential for renewable energy sources in Flanders to meet the demand. Transport increases the use of biofuels (including from the second generation) and reaches the target of 10 % renewable energy by 2020.
- Through measures regarding space heating the households succeed in almost halving their energy consumption by 2030. Trade & services can reduce their energy consumption by over one fifth. Industry does not succeed in decreasing its energy consumption in the Europe scenario.
- Europe implements a dual approach for the reduction of greenhouse gases by 20 % in 2020 compared to 1990. A national target is applicable for sectors that do not fall under the emission trading system (ETS). For Belgium this is -15 % for the 2005-2020 period. Installations from sectors that do fall under emission trading, must submit emission rights for their CO₂ emissions. The non-ETS sectors (households and the majority of trade & services, agriculture and transport) succeed in decreasing their greenhouse gas emissions by 23 % in 2020. The falling trend continues until 2030. The ETS sectors (industry and energy production) do not succeed in reducing their joint greenhouse gas emissions. Insufficient cost efficiency measures are available with the expected CO₂ prices. These sectors may rely on the acquisition of emission rights.

- With the same electricity production in the period between 2015 and 2020 the greenhouse gas emissions in the Europe scenario are noticeably lower than in the reference scenario. This is due to a larger use of renewable energy. From 2025 the difference is even more considerable due to the use of carbon capture and storage (CCS) with the new coal power stations. This technology will then be ready for the market.
- The scenario results indicate that when phasing-out the nuclear power stations the national power production may further be harmonised with the national power demand without any major negative repercussions on climate change, acidification and photochemical air pollution. A crucial condition is a strong and thorough effort for renewable energy sources (wind and solar energy as well as biomass) and after 2020 for underground CO₂ storage at coal and gas power stations.
- The greenhouse gas emissions from agriculture drop by almost a quarter between 2006 and 2030 due to the decrease of the cattle stock and measures in greenhouse farming. The introduction of road-pricing in the transport sector decreases motorised road traffic. But primarily due to technological measures transport may decrease its emissions by a quarter by 2030 in comparison to 2006. A condition is that consumers and companies increasingly choose energy efficient vehicles.

Europe imposes limit and target values for air pollutants on member states. In the context of the National Emission Ceilings Directive (NEC) stricter targets are expected for 2020. These decreases in emissions must allow the achievement of good air quality in Europe and Flanders:

- In the Europe scenario the annual average ozone concentration increases more greatly than in the reference scenario, up to 54 µg/m³ in 2030. The lower NO concentration (as a result of the expected Flemish and European NO_x emission reductions) ensures that less ozone is broken down. But also the increasing background concentrations, amongst others due to increased emissions in China and India, ensure that the ozone concentration remains high. Due to a lack of threshold values, lower 'every day' ozone concentrations are also harmful to health. However, the annual excess (ozone peak concentrations) shows a significant drop by 37 % between 2007 and 2030. But with drier and warmer weather in the future, for instance as a result of climate change, the positive effect of emission reductions on the ozone peak concentrations largely disappears.
- A decrease in the annual average of PM₁₀ concentration by 25 % by 2020 compared to 2007, as stated in the Pact 2020 for Flanders, is only feasible with extra measures in the Europe scenario. The annual average PM_{2.5} concentration will probably reach the indicative limit value of 20 µg/m³ in 2020. The target for the daily average PM₁₀ con-

centration, i.e. a maximum of 35 days higher than $50 \mu\text{g}/\text{m}^3$, may only be achieved with local measures, such as low emission zones in cities and industrial areas.

- In almost 30 % of Flemish nature (70 000 ha) the nitrogen deposition remains too high to protect biodiversity.
- The industrial growth between 2006 and 2030 ensures an increase in the emissions of air pollutants. The stricter energy and climate policy also has positive effects on air quality, but is inadequate for achieving the air quality targets. Particularly the emission of particulate matter (PM_{2.5}) rises significantly after 2015.
- Agriculture succeeds in decreasing its emissions of acidifying substances and particulate matter (PM_{2.5}) by over 15 % in 2030 compared to 2006. This is a result of the decrease in livestock and extra environmental measures in stock-breeding and greenhouse farming. In 2030 the soil-bound cattle stock will have decreased by 28 % compared to 2006. Landless stock-breeding (pigs and poultry) may maintain its position thanks to manure processing.
- Transport is able to control its emissions of acidifying substances and ozone precursors with additional measures but does not succeed for particulate matter (PM_{2.5}). The non-exhaust emissions must especially be tackled for this. Exposure to road noise may be decreased, for instance by choosing noise-friendly road surfaces and through speed limits. The drafting and execution of noise action plans in the context of the European Environmental Noise Directive provides opportunities for this.

The European Water Framework Directive puts a good status of the water first:

- Additional measures make it possible to decrease the impact on the surface water by households, business and agriculture. In comparison to 2006 the nitrogen and phosphorus load falls by about 35 % in 2027, by 49 % for COD. The execution of zoning plans is a precondition for the decrease in the pollutant loads from households. In addition to the further development of collective waste water treatment, agriculture contributes to this decrease by fertilizing according recommendation, by sowing winter green cover and by decreasing the livestock through government incentives.
- Despite the improvement of the physico-chemical water quality, only 1.5 % of the modelled waterbodies fulfil the quality standards for all modelled variables. Phosphorus remains especially problematic. There are particularly shifts from moderate to good biological quality but less than half of the measurement sites fulfil the quality standard. Under the assumption that the watercourses that flow into Flanders also fulfil the standards, a little below 60 % achieve a good biological quality.

- Water managers will have to take account of the consequences of climate change. Because the changes are uncertain, it must be possible to adapt measures flexibly depending on the changes observed. A lot of attention is paid to flooding but low water problems may become more important this century.
- In the Europe scenario the urbanised surface area also expands, by 13 % between 2005 and 2030. Smaller building plots ensure greater density with greater opportunities to preserve open spaces. The risk of flooding as a result of climate change is at the same level as with current land use. The Europe scenario absorbs the increase in population and additional housing needs better than the reference scenario.

Vision for Flanders

The starting point for the visionary scenario is the need for drastic measures with a view to a sustainable future. This scenario is based on the global challenge of climate change. The visionary scenario assumes additional measures aimed at reducing the greenhouse gas emissions by 60 to 80 % by 2050, with a halving of emissions by 2030. In order not to exceed the global temperature increase of 2 °C an 80 to 95 % reduction in emissions in industrialised countries is required by 2050 according to the IPCC. This implies an evolution to a sustainable low carbon economy:

- The gross domestic energy use falls by 20.6 % by 2020 compared to the reference scenario. As a result, Flanders meets the European energy efficiency target. The share of renewable energy in the gross final energy consumption stagnates at 9.2 % in 2020. The target for Belgium is 13 %. The share increases to 26.4 % by 2030.
- The non-ETS sectors succeed in reducing their greenhouse gas emissions by 32 % by 2020 and halving them by 2030, compared to 1990. After 2020 the ETS sectors also succeed in bringing their emissions under the 2006 level through national measures by 21 %. This decrease must to a great extent be attributed to the energy sector.
- Wind energy (primarily at sea), solar energy and biomass may be used cost-efficiently approximately to a 70 % share of the power production. Adjustments to the electricity grid to a so-called smart grid will require major investments.
- The ambitious targets for the energy and climate policy may be achieved if the housing and work system is drastically changed. The concept of living centres, striving for 'energy neutrality' fits within this.
- If industry wants to limit its greenhouse gas emissions greatly, the production and consumption processes must change fundamentally and structurally. Technological inno-

vations and pricing instruments are important but insufficient. A transitional approach may help to realise the green economy of the 2009-2014 Flemish Coalition Agreement.

- Biofuels do not fit in a visionary scenario for transport because biomass may be used more efficiently as a energy source in other sectors. The breakthrough of electric cars is expected after 2020: by 2030 90 % of new cars will use electricity but this is only 15 % by 2020. Electric cars are more energy efficient and have better environmental performance, even if the emissions of the electricity production are taken into account. Citizens must be prepared to buy more energy-efficient cars, if necessary encouraged through support measures.

The road to transition

Even with far-reaching measures all the sectors will not always succeed in reaching the European targets, let alone the higher ambitions of the visionary scenario. There is a need for transitions: the systems that fulfil social needs, such as the energy system, the housing system and the mobility system must change fundamentally. Transitions generally take place over a period of multiple generations. In order to realise a sustainable low carbon economy by 2050, the transition must be started now. Leadership is expected from the government by stimulating policy integration, by creating spaces for experimentation and by investing in networks.