SUMMARY

This study is a first introduction to megatrends and their impacts on the environment in Flanders, today and in the future. Because of the high degree of complexity and uncertainty, the impact of megatrends on our society in general and on the environment in particular cannot be determined unambiguously. What is clear, however, is that the six identified megatrends inevitably impact the environment. They do so through four societal systems: spatial planning, energy, mobility, and production and consumption. The megatrends have a considerable impact on their organisation, hence the need to make those systems more sustainable, more resilient and more future-proof. Policy can play an important role in this process.

WHAT ARE MEGATRENDS?

Megatrends are already apparent, long-term change processes with a very broad scope and decisive, far-reaching and critical implications. Megatrends are powerful factors that shape future society and fundamental developments in that society. Megatrends manifest themselves in a way that is at once incisive and elusive, both worldwide and in Flanders, both today and in the future. They are already well apparent today, change society over a longer period, and are often unpredictable. This is because the various megatrends are surrounded with great uncertainties and mutually influence each other.

PURPOSE OF THE MEGATRENDS PROJECT

The megatrend analysis considers that it is not possible to understand societal developments and their impact on the environment if we do not look at the autonomous developments that are taking place at the global level. The central question is: What global developments need to be taken into account if future (environmental) policy in Flanders is to be adequate, resilient and successful? For this, we look forward into the period 2020 to 2050, or even further in time (for climate change). The study therefore aimed to determine how global megatrends can impact the environment and what the strategic consequences may be for (environmental) policy in Flanders.

The aim of the Megatrends project is twofold:

- map the potential impact of megatrends on society and the environment in Flanders through analysis of the underlying driving forces, constituent trends and structural causes of environmental impacts;
- identify the general strategic consequences of these analyses for (environmental) policy in Flanders.

HOW DID THIS REPORT COME ABOUT?

The VMM-MIRA Megatrends project is a sequel in the series of MIRA Environment Outlook Reports.

Megatrends manifest themselves in various societal domains. In order to build the megatrend analysis on a sound knowledge base, a broad approach was therefore needed. The literature study, the first phase, analysed a broad range of information sources that look at megatrends from various angles. In the second phase, the results were presented to panels of (environmental) experts who were asked to validate and further develop them. This report is the third and concluding phase: it combines the results of the literature study with the findings of the experts in a narrative and accessible manner.

A CLOSE LOOK AT SIX MEGATRENDS

Six megatrends were identified as being relevant to the environment in Flanders: changing demographic balances, accelerated technological developments, growing scarcity of raw materials and other resources, growing multipolarity in society, climate change, and increasing vulnerability of systems.

Changing demographic balances

In the coming decades, worldwide demographic balances will shift profoundly. The world population keeps growing, albeit less rapidly than in the past twenty years and with important regional differences. Slower population growth and increasing welfare lead to increased ageing, so that the need for health care is growing. Migration is increasing for political and economic reasons, but is also increasingly driven by climate change. It takes place both within regions and from developing to more developed regions.

In Flanders, immigration and population growth will probably have a slightly negative impact on the environment. This is first of all due to the fact that demand for space, products, services and energy is rising on average. Migration typically occurs via large cities that serve as gateways for migrants. This causes these cities to sprawl outwards, leading to increased urbanisation. Immigration affects social interactions, and this too may have an impact on the environment.

Open space is an increasingly scarce commodity in Flanders. Demographic shifts and changing living and housing patterns will further amplify this trend. Reduction in family size, new family forms such as one-parent families, immigration and an ageing population further increase the demand for living space. Moreover, the available living space is not always used efficiently. Scattered housing also leads to an increase in transport, with implications for the environment. Traffic congestion in combination with continued intensive use of fossil fuels for transport is a source of air pollution. Urbanisation is also putting agriculture in Flanders under pressure, which as a result may further intensify the latter. While it is difficult for policy to control demographic developments, it can effectively steer the urban developments arising from it.

The increasing ageing of the population is also negative for the environment. The reason for this is the growing consumption of products, energy and space. However, changes in the dominant consumption pattern - for example, the fact that senior citizens increasingly use public transport – can mitigate this effect.

Flanders has a broad middle class, yet poverty is increasing also in our region. This widening welfare gap could have a negative impact on the environment due to the decline in social cohesion and the decrease in public resources for environmental policy. Expectations that encourage greater consumption lead to higher energy use, both locally and globally.

Accelerated technological developments

Technological progress has thoroughly changed society and day-to-day life over the past decades. Today, the focus is more than ever on technological innovation in order to maintain the world economy and welfare, but also to provide answers to major societal challenges such as climate change or the scarcity of natural resources. The steady stream of technological developments, the ever-faster innovation cycles and their growing impact

on society may have far-reaching and sometimes unexpected consequences, including for the environment. The following four domains of enabling technology in particular are expected to have an impact on the environment: ICT, mechatronics, nanotechnology and biotechnology. The fact that these technology domains mutually influence each other in their development makes their impact on the environment and society even more complex.

In Flanders, the use and development of ICT – and interconnectivity, intelligent monitoring systems and artificial intelligence in particular – will continue to increase. Flanders is one of the frontrunners in Europe in terms of internet access, broadband applications, mobile telephony and digital services. The impact on the environment is double. On the one hand, ICT applications can make existing processes or practices more efficient and as such generate environmental gains. On the other hand, ICT is itself a big energy consumer, and today accounts for 20 % of the global energy use.

The factory of the future is considered to be one of the keys for Flanders to remain competitive with low-wage countries. The factory of the future uses new production processes based on electronics, intelligent knowledge systems, automation and robotisation. Smart production techniques could have a positive impact on the environment from 2030 onwards. The question is whether such technologies can make domestic production more competitive again, and also whether that will cause consumption to rise.

Nanotechnology is already being applied in Flanders, in water treatment and the energy sector in particular. Nanotechnology could soon become increasingly common. It is expected to have a positive impact on the environment from 2040 onwards, especially in combination with other technologies. In the medium term, nanotechnology could contribute to more efficient energy production, improved energy conversion and storage, and reduced material requirements and waste.

The use of genetically modified organisms (GMOs) in agriculture could have positive effects on the environment in Flanders (e.g. temporary reduction in the use of pesticides for a disease-resistant crop). In the longer term, however, it may also pose a threat to biodiversity and ecosystems. Any positive effect of GMOs under the influence of further technological progress is estimated to be rather limited and would not become apparent until twenty years from now. Flanders has built up a significant research potential around the technology, but it remains to be seen to what extent it can be realised.

Growing scarcity of raw materials and other resources

Raw materials such as petroleum, iron ore and water, but also biotic natural resources such as wood and fish, are drawn from the environment on a large scale. In addition to material resources, there is also the role of societal resources such as financial resources, labour and social cohesion, which impact the resilience of society and its capacity to take action. The growing world population and the rising living standard further accelerate the pressure on raw materials and other resources worldwide and in Flanders. Climate change and accelerated technological development also play a role.

The global shortage of resources also indirectly leads to five trends in Flanders, which in turn impact the environment. Some of these are already apparent today, whereas others are expected to further increase in the future.

Technological breakthroughs allow the increasing use of waste and residual streams as raw material. The transition to a circular economy is already under way in Flanders, and will only become more pronounced in the future (2030-2050). As a result of rising transport costs, but also because of increased food and environmental awareness, local production and consumption chains are gaining in importance. This trend towards shortening the distance between producer and consumer has already taken hold and will become even more important, which is good for the environment; Collaborative consumption models are also emerging. In Western Europe, for example, car and bicycle sharing, hiring of goods, or swapping homes during the holiday period are already quite popular. Growth in prosperity is increasingly being decoupled from the consumption of raw materials. Such decoupling is already taking place, but will continue to gain momentum as demand for resources grows and reserves decline. To this end, research, innovation and a stimulating policy will be essential in the coming years. The threat of scarce resources can thus be turned into an opportunity, partly through the development of the knowledge economy. All those trends have a positive impact on the environment, even if no radical change to a system where local chains constitute the dominant production-consumption model, is expected to take place.

On the other hand, prices of fossil energy sources and raw materials are becoming increasingly volatile, which in the short term contributes to an uncertain investment climate. This acts as a brake on green investments, which has a predominantly negative environmental impact. Then again, the fact that the prices of resources are increasingly interrelated (e.g. energy, agricultural crops and water) may be an incentive to become more energy- and material-efficient and to sustainably use more renewable energy sources. If Europe and Flanders, just like the US, were to focus on the extraction of (cheap) shale gas, the impact on the environment would be markedly negative.

Growing multipolarity in society

Since the end of the Cold War, global economic, financial, political and military relationships have been determined by an ever increasing number of influential regions and countries. Migration and urbanisation further accentuate multipolarity between and within regions. Due to increasing individualisation and the growing accessibility of information and the ease with which it can be shared via the internet, individuals and social groups become more aware and critical (of society). In such a context of strongly increased diversity and contradictions it is becoming increasingly difficult to formulate policies that adequately tackle major societal and environmental challenges. Worldwide, our society is evolving towards a more multipolar world, and a similar evolution is also taking place in Flanders. It is difficult to predict what the eventual impact on the environment will be. In Flanders, five trends are emerging.

The individual is increasingly coming to the fore, but at the same time new social relationships are emerging. Whereas individuals used to act mainly in adherence to collective values and norms, people in an individualised society increasingly start to act with reference to their own frameworks of values and standards. At the same time, alternative value patterns are gaining in importance. People are consciously starting to live more sustainably or to create alternative forms of living, working and housing, such as cohousing or multigenerational homes. Individualisation leads to increased consumption of goods, energy, transport and space, which is negative for the environment. While more environmentally conscious currents provide some counter-weight, their impact is as yet too limited to drastically change the overall consumption pattern.

The multicultural society reinforces the diversity still further. Multiculturalism may put additional pressure on social cohesion, as population groups tend to interact less with others because of their differences. As a result, it takes more time to channel differences in values or customs in order to achieve common objectives.

In Flanders, as everywhere in the Western world, the middle class has grown steadily throughout history. However, due to globalisation, the pressure from low-wage countries and the financial-economic crisis, the middle class is increasingly coming under pressure and poverty rates are rising in Flanders. The impact on the environment is highly uncertain. A large middle class increases consumption, but can at the same time leverage growing environmental awareness.

Our economy is highly dependent on global developments. Large companies and economic power blocks make economic decisions in an international context. The trend of increased global economic dependence (globalisation) goes hand in hand with the (counter-)trend of falling back on local needs, markets and services (localisation). This phenomenon is called glocalisation. For various reasons, the further development of a knowledge society will be a prerequisite for Flanders if it is to continue to play a role of some significance in the international economic arena. Here, the focus should be on smart specialisation, in both the service and the manufacturing sectors, to consolidate and strengthen its position in the international market.

Growing multipolarity is undermining administrative capacity. In a multipolar society, the dominant position of both classical political and societal actors is weakening. At the same time, alternative structures and networks are being created. A whole array of social groups are trying to influence policy in various (new) ways. Also the collective and consistent steering of societal systems, and in particular of the policy to be pursued with respect to persistent (societal or environmental) problems, is becoming more complex.

Climate change

Apart from the yearly seasonal fluctuations in temperature, precipitation and wind, our climate is structurally changing: the earth is warming up. Changes in the climate system have been observed everywhere in the world since 1950. The atmosphere and the oceans have warmed up, the amount of snow and ice has decreased and the sea level has risen. Many of the changes felt today are more significant than ever before. The last report of the Intergovernmental Panel on Climate Change (IPCC) in 2013 unambiguously confirms that the earth is warming up and that this warming up is caused mainly by human-induced emissions of greenhouse gases, which intensify the natural greenhouse effect. The effects are felt in all areas of society: social, economic, political and ecological. Of the six identified megatrends, climate change has without any doubt the most direct influence on the environment in Flanders.

All climate scenarios for Flanders unambiguously point to a rise in ambient temperature. The rising temperatures may cause a shift in our energy use. The extreme temperatures in summer will have a greater impact in the cities. On hot days, urban areas are genuine 'heat islands'. The temperature rise will also have a strong impact on biodiversity. This change will disturb the existing balance in the ecosystems in the short and medium term.

The annual average precipitation in our country is rising slowly but steadily. Extreme phenomena such as summer storms, whirlwinds, storms and floods, will become more frequent and also more severe. Flooding and other climatic phenomena can cause disruptions in economic life.

Seasonal shifts alter the phenology of plants and animals (foliation and defoliation, flowering, hibernation, etc.). Food chains and reproductive cycles get out of balance and some links are eliminated from the ecological chain. This makes ecosystems more vulnerable and biodiversity comes under pressure.

The sea level rise increases pressure on the available space as well as the risk of flooding, both at the coast and along tidal rivers. The rising sea level also causes the salinisation of groundwater reserves in the coastal areas.

Various events elsewhere in the world, such as the melting of the ice masses and the thawing of the permafrost, intensify the effects of climate change.

Increasing vulnerability of systems

Our social, economic, financial, political and ecological systems are becoming more vulnerable. One reason for this is that the systems can no longer keep up with the speed at which the (global) changes induced by the five other megatrends are taking place. As systems are becoming increasingly intertwined, changes in one system will also more deeply affect other systems. This tends to upset the balance of systems.

The increasing vulnerability of our systems is a result of the other five megatrends and their interactions. This megatrend is therefore actually a 'metatrend'. Generally speaking, unpredictability - in numerous areas and worldwide - is growing and also the risk of disruptions and conflict situations is increasing.

Also in Flanders, the economic system encounters certain limits. The predominantly detrimental impact of the economic system on the environment in Flanders is also indirectly due to the shocks of the financial-economic crisis. Thus, environmental policy relatively loses in importance against, for example, economic (recovery) policy, innovation policy, job creation policy, etc. The still high level of overall consumption is directly harmful to the environment: it is aimed at producing and selling ever more products and services, thereby putting pressure on the resource system and causing energy use and greenhouse gas emissions to increase.

Our resource systems are moreover particularly vulnerable because the infrastructure that was put in place to manage them is not robust enough. The power grid, the sewage system, the road network, etc. were designed a few decades ago, but not to accommodate the global changes we are now witnessing.

Our governance systems are vulnerable, which is due to a large extent to the weakened European governance context. The Flemish governance model is also highly compartmentalised and fragmented due to the large number of policy levels.

What impact this increasing vulnerability of systems will have on the environment in Flanders is difficult to predict. Structural changes appear to be necessary to make systems more robust again.

HOW MEGATRENDS INFLUENCE THE ENVIRONMENT IN FLANDERS THROUGH FOUR SOCIETAL SYSTEMS

Global megatrends influence the environment in Flanders. The mechanisms behind this influence are highly complex, making the impacts of megatrends difficult to predict. Moreover, megatrends also influence each other. However, it is crucial that Flemish policy too comes to grips with the impact of megatrends on the environment in Flanders. For this, the focus should be on four societal systems: spatial planning, the mobility system, the energy system and the production and consumption system.

Spatial planning

Space is scarce in Flanders and impacted by several megatrends. How can we efficiently use the spatial structure, taking into account the expected evolutions resulting from the megatrends? This is possible, for example, by making multifunctional use of the space, using the underground space, and building high-rise clusters. At least equally important is the cooperation between all public authorities and with other societal actors to jointly orient spatial planning in these directions.

Mobility system

Flanders is a logistic transit region with intensive economic traffic flows, but also intensive commuter traffic. Mobility and automobility in particular play a key role in our economy and society. At the same time, the mobility system is closely linked to spatial planning in Flanders. What matters is redefining the societal function of the mobility system, so that the economic function remains intact, while at the same time reducing the negative effects on the environment, health and well-being. This is possible by evolving towards efficient land use , improving and greening the mobility offer, and selectively reducing mobility demand. All this requires that policy invests in a mobility system that meets those requirements.

Energy system

Energy is essential for the functioning of our society. The system that provides for our energy needs has a big impact on the environment. The main causes are the use of fossil energy sources and the driving role of technology. Making the energy system sustainable is possible by reducing energy use and embracing renewable energy on a large scale. We must also invest in technologies for energy storage, and better balance supply and demand. Such an energy transition is possible only if Flanders invests in a long-term vision and resolutely opts for international collaboration.

Production and consumption system

How can the production and consumption system be made less dependent on resources that are becoming increasingly scarce and generally have to be imported anyway?
In Flanders, this transition is already in progress in a number of areas. New technologies, products and business models may help to make our production and consumption system more sustainable. The circular economy is gaining ground and the Flemish government should continue its efforts to stimulate it. A number of societal counter-trends are already causing us to start producing and consuming in a more environmentally friendly way.

Examples are product-service systems, online purchases, and customised production, for example via 3D printing. It is important for these niche developments to become widely adopted and effectively break through, so they can realise their positive effects for the environment.

WHAT DOES THIS STUDY TEACH US?

Complexity and uncertainty are the reasons why the consequences of megatrends cannot be determined unambiguously. What is clear, however, is that the impact of the six studied megatrends is inevitable and manifests itself mainly through four societal systems that are important to the environment. The challenges and uncertainties that the six megatrends entail for Flanders make it necessary - together with the internal tensions and contradictions specific to each of the four societal systems - to structurally reform the organisation of these systems. Such system transitions are important to address persistent environmental problems but also, and not least, to safeguard our welfare and well-being.

Despite the complexity and the high degree of elusiveness of megatrends, policy can play an important role in adequately and successfully dealing with them as a society. If the environmental impact is to be pushed back substantially, it is essential for policy to develop an integrated vision and set up a coherent framework for the different societal systems. All policy levels involved must cooperate with each other: federal, Flemish, provincial and municipal. Public authorities must stimulate the population and companies to make more environmentally conscious choices.

FINAL REMARKS

Policy must pay sufficient attention to making our systems more sustainable and more resilient. Therefore, it is important that Flemish public authorities, together with other public authorities and societal groups, proceed with two essential strategic activities: horizon scanning and transition governance.

A fully fledged system of horizon scanning, where megatrends are followed up with explicit attention for wild cards, weak signals and uncertainties, should enable us to gain better insight in the strategic consequences for Flemish (environmental) policy.

Flanders needs transition governance to bring about the necessary transitions of societal systems. In this, public authorities play various vital roles (facilitator, moderator, participant) and contribute to the creation of social support. A prerequisite for system change is the acquisition of thorough knowledge of the systems. This is possible via system analyses, where specific attention is paid to the impact of megatrends.