PBL Netherlands Environmental
Assessment Agency

ASSESSMENT OF THE HUMAN ENVIRONMENT 2012

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Main conclusion

The paradox of successful policy: the quality of the local human environment has improved in many areas but persistent global issues require systemic changes
The quality of the local human environment has improved in the Netherlands since 1990. There has been a clear improvement in air, water and soil quality, a slowing down in biodiversity loss and, in general, good coordination between the spatial investments made by both government and private parties. This represents successful national policy on environment, nature and spatial development.

The paradox of this success, however, is that the improvement seen in the local human environment is in sharp contrast with the global issues around human environment quality that the Netherlands faces in 2012. Two of these issues, combating climate change and maintaining biodiversity, are well-known and persistent problems. The high level of dependence of prosperity in the Netherlands on rare raw materials is also a growing concern. These issues may seem abstract and far-removed, but in the long term could have a significant effect on society. They therefore require changes to be made to production and consumption systems.

The 'greening' of the economy has become necessary at the same time that the Netherlands is struggling to deal with an economic crisis. It is now, at this time of review, that careful consideration should be given to our dependence on natural resources. After all, greening represents a search for a policy that is also sustainable in the long term. The main challenge for the coming years is to change the production and consumption system to such an extent that the strength of the economy and society is found in the most efficient use of natural resources while keeping hazardous emissions to a minimum. In some cases this can be achieved by intensifying policy; at other times a more fundamental change of approach is required. This therefore requires systemic changes; institutional reforms that help achieve a high-quality human environment without undermining the natural constraints, either in the Netherlands or elsewhere.

The Assessment of the Human Environment 2012 consists of two parts. The first part is the digital assessment, www.pbl.nl/balans2012 (in Dutch). This digital assessment documents all the numerical analyses of developments in the human environment. All developments concerning the environmental, nature and spatial objectives set can be found in this section. The second part is the assessment 'book'. In the book, the PBL Netherlands Environmental Assessment Agency has analysed six social systems: climate and energy, the food system, rural areas and nature, water security and management, accessibility, and urban area development. The book includes an assessment of how best to achieve the sustainable management of the physical human environment. Which intervention options are available? These options vary per system (e.g. in the relationship between regulation, pricing incentives and the provision of information). However, three clear elements can be seen: 1) the value and necessity of formulating a consistent vision and position at the national level, 2) the opportunities available for achieving better coordination at the regional level, and 3) the implementation of pricing strategies as an effective tool for initiating change processes. The implementation of these elements within national policy are summarised below.

Contemporary human environmental policy requires a consistent national government vision and position

The Dutch Government faces major challenges as far as the human environment is concerned. At the same time, it is aware of the limits to its control. The government may try to implement changes in the existing social systems, but should take into account that this opposes a number of vested interests and will result in some opposition. Therefore, it is important to facilitate and stimulate other stakeholders (other government authorities, businesses and the general public) in attempting to achieve public objectives. This requires a clear vision and role conception on the part of national government.

If the government is clear about what is necessary to achieve sustainable development, and if it consistently follows this vision, the result can be a greater willingness among public parties to take action and invest. Such a vision provides a basis for short-term decisions regarding the investments required for longer term sustainable improvements to the human environment. There is room for improvement in the following areas and ways:

- *Energy.* To achieve a low-carbon energy system by 2050, a coherent vision for this system needs to be developed now, including corresponding long-term objectives and predictable, consistent policy. Only then can a suitable investment climate for clean growth develop. One of the reasons why many parties are currently reluctant to invest in the required innovation processes is that there is a lack of this kind of coherent vision. The vision could be based on the observation that there are four robust elements to such a low-carbon energy system in the Netherlands: 1) energy savings, 2) biomass, 3) low-carbon electricity generation, and 4) carbon capture and storage (CCS). The limited availability of sustainable biomass means that large-scale co-firing with biomass at power stations is not part of such a vision. Finally, the

strategies of neighbouring countries should also be taken into account in the development of this vision.

- *Food.* A clear and consistent government position on the direction and ambition for a sustainable food system can encourage parties in the food supply chain to take action. The government position may be strengthened by proposing regulations with which all parties must comply. Parties not faced with uncertainty are likely to be more prepared to invest in sustainability as there would be less risk. It is crucial that any regulations are enforced, to ensure the trust of supply chain parties in government strategy.
- *Accessibility.* In addition to the current focus on the quality of connections (travel speed), more attention is required for effecting change in the 'proximity' of points of departure and arrival and for limiting the demand for mobility. Pricing strategies could be an effective way of addressing the mobility issue.
- *Spatial development.* Strategic spatial visions help weigh up the competing spatial claims of nature, water, agriculture, energy and accessibility. Such visions could be formulated at national or regional level and may considerably increase the effectiveness and viability of sectoral policies on water quality, nature and agriculture.

Regional approach allows complex problems to be tackled more effectively

National government is committed to decentralisation in various policy areas. Such a strategy provides many opportunities, as developing and implementing policy on a regional level enables the regional differences that exist within the Netherlands to be addressed. Regional parties are often in a better position to prioritise problems and solutions. A regional approach, however, does require that more attention is paid to the availability of specialist knowledge on the regional level, and it often takes longer. In theory, however, the result is a more effective and efficient approach than that of national policy, and one that enjoys more support due to the greater involvement of relevant parties.

National government may both facilitate the regional approach and ensure that supra-regional interests are taken into account; for example, by taking a coordinating role (within and between administrative layers, based on national visions), by making it clear which national and international frameworks apply, by implementing process requirements, by supervising implementation, by monitoring the effects of policy and sharing this with regional parties, and by providing regional government authorities with sufficient knowledge and funding. National government must take a coordinating role if efficient solutions require action at a higher level (e.g. for the construction of infrastructure) or if supra-regional dynamics play a role (e.g. regarding urbanisation in the Randstad). By defining the framework, national government can ensure that there is a balance between the benefits of regional-level activities and the benefits of simplicity, transparency and the principle of equality.

National government may create the conditions for a successful regional approach through the reform of environmental law and by following through on the decentralisation of spatial, nature and water policies. The following points, therefore, should be considered within the various areas of human environmental policy:

- Decentralised nature policy provides the provinces with opportunities for taking a leading role in tackling environmental problems and spatial planning issues. As national government remains responsible for ensuring that international nature and water quality obligations are met, guarantees are required that policy will be coordinated between provinces.
- The priority that national government currently gives agriculture seriously hinders the realisation of water and nature policy objectives. In areas in which ambitions for agriculture, water and nature cannot be reconciled, a specific choice must be made at the spatial development level either for agriculture or for nature and water in order to achieve the effective implementation of resources.
- National government has dropped its concentration policy as well as the national buffer zones, and this may endanger the protection of open landscapes; in particular, in areas under high pressure from urbanisation, such as the Randstad. Provinces have been made responsible for spatial policy, without having been given an explicit remit to protect landscapes. National government has also introduced the 'Sustainable Urbanisation Ladder', which stipulates that municipalities must first explore other urbanisation options before expanding the urban areas. In the Randstad, in particular, which lies in three different provinces, it is unclear whether the provinces will pay sufficient attention to the supra-regional importance of open landscapes (for recreation, the preservation of cultural heritage or as an establishment location factor for international businesses). National government should make it possible to intervene whenever urban expansion threatens to take place at the expense of valuable landscapes.
- In the case of urban area development, the current system of environmental standards ensures that environmental interests are upheld and that municipalities are able to work efficiently and can be sure that their plans will stand up to legal examination. Efficiency may be increased by tailoring the level of detail of the environmental impact assessment to the level of detail of the plans. In some specific cases, environmental standards actually prevent a better quality of the human environment from being achieved. As it turns out, the City and Environment Interim Act and the temporary Crisis and Recovery Act provide municipalities with sufficient jurisdiction to solve such problems. However, the Crisis and Recovery Act currently still lacks a legal guarantee for the measures required to meet environmental standards on time.
- The decentralisation of urbanisation policy allows provinces to better match construction activities to local requirements. However, this may be inconsistent with efficient investment in the national transport infrastructure and improvements to accessibility in the Netherlands. After all, accessibility depends just as much on the concentration and compaction of built-up areas as on the construction of extra infrastructure. The supra-regional coordination that is required is currently the

responsibility of the provinces and the MIRT (Multiannual Programme for Infrastructure and Transport) consultation body. There are as yet no guarantees that such coordination is actually taking place.
- Water safety could be brought up to the required standard more efficiently. This could be done by basing it on a risk approach that takes more account of the regional differences in the consequences of flooding (in terms of victims and damage) than the current system. Efficiency would also be improved if investments were differentiated more in time and space, based on these regional differences in cost and required risk reduction.

Pricing stimulates socially desirable technologies and behaviour

Businesses are prepared to develop and introduce technologies that have a smaller environmental footprint, to use raw materials more efficiently and to improve the human environment. However, there must then be the prospect of an attractive return on their investments within the foreseeable future. Citizens would also be prepared to change their behaviour to improve the human environment if they would also benefit on a personal level.

Governments have various options available to make socially desirable technologies and behaviour economically attractive. Intergovernmental coordination is required on international markets, primarily to minimise the effect that government measures may have on the competitive positions of businesses. Examples are:
- The use of clean raw materials could be increased by coordinating or harmonising the sustainability requirements regarding the production and extraction of raw materials for food, energy generation (not just biomass) and industrial products (which could also be achieved by reducing existing indirect subsidies on fossil fuels).
- Changes to the regulations governing the European market of CO_2 emission rights are required to stimulate the development of a low-carbon energy system. Many of the technologies required in such a system will only become profitable at a carbon price that is considerably higher than the current level of 6 to 7 euros per tonne. One effective tool for achieving price increases would be an accelerated lowering of the European emissions ceiling.

In the fields of water, transport and mobility, however, the Dutch Government could adapt some of its regulations without the need for international coordination. Examples are:
- More pricing instruments in the agricultural sector; for example, following the construction of new infrastructure for freshwater irrigation or following increases in nutrient emissions resulting from farm expansions. Pricing could also encourage the agricultural sector to look for production methods that reduce the pressure on the water system.
- Requiring road users to pay for mobility. This is a flexible alternative to the construction of extra infrastructure as a tool to increase flow at the local level. Given the levelling off in the growth in car mobility and the uncertainty regarding the development of car mobility in the medium to long term, the construction of additional infrastructure is often not without risk.

MAIN FINDINGS

Assessment of the Human Environment 2012

In the Assessment of the Human Environment, the PBL Netherlands Environmental Assessment Agency evaluates national government policy for the physical human environment and presents operational options for making improvements to this policy. An indication is given of the extent to which environment, nature and spatial policy objectives have been met, and an assessment is made of what this means as far as public expectations of the quality of the human environment is concerned, now and in the future.

The State of the Human Environment

Introduction

The Assessment of the Human Environment evaluates the extent to which policy objectives, as set by the Dutch Cabinet, are being met in the fields that concern the human environment (the environment, nature and space). The human environment is determined by local surroundings and accessibility of the workplace, as well as by more abstract or globally felt factors, such as climate change and the use of natural resources, such as land, water and fertilisers for food production. Although these factors together form the physical human environment, they do not add up to a single quality standard for the human environment. The issues that provide the concept of the human environment with concrete, relevant meaning are all separate, such as the quality of the local surroundings or global climate change.

These findings present the most prominent developments in relation to the status of the various factors that determine the quality of the human environment, and compare these with government objectives for the policy areas. In areas where objectives are unlikely to be achieved, suggestions for policy improvements have been provided. Developments around all environmental, nature and spatial objectives can be found in the digital assessment – the website that accompanies this Assessment of the Human

Environment (www.pbl.nl/balans2012; in Dutch). It should be noted that only a limited comparison of policy progress is possible between this assessment and the previous one (PBL, 2010). This is because the Rutte Cabinet has formulated some objectives differently (for mobility), lowered some objectives (for nature, landscape and climate and energy) and scrapped a number of concrete, measurable objectives (in particular in the fields of urban development and housing). In general, the quality of the environment in the Netherlands has vastly improved, partly due to decades of consistent policy, with improvements primarily seen on local scales. That being said, there are still two major, persistent problems – climate change and biodiversity loss – for which no change in trend has yet been seen at the policy level. The imminent scarcity of raw materials is also already casting its shadow. On the basis of an analysis of six main systems, the starting points for addressing these policy tasks are indicated.

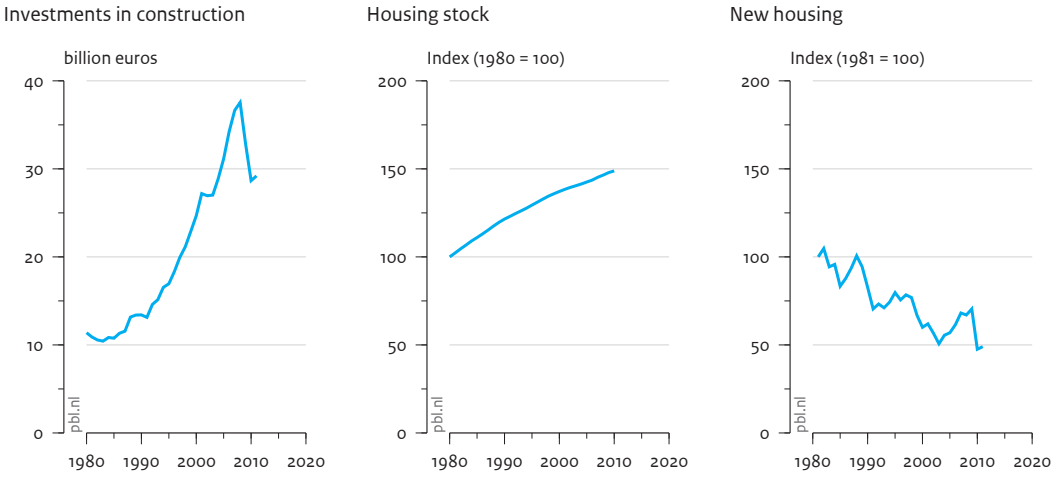
Economic crisis affects quality of the human environment in various ways

The analyses in this Assessment of the Human Environment are greatly affected by the economic crisis. The economic crisis has a major effect on long-term and short-term developments in the human environment – effects that are not always easy to recognise (see www.pbl.nl/balans2012; in Dutch). The global credit crisis and associated uncertainties regarding financing, affordability, risk and other institutional factors, as well as uncertainties regarding government policy, have resulted in high levels of uncertainty and little confidence among home owners and potential buyers. Institutional stakeholders in the housing market, including housing corporations, project developers, municipalities and banks, also have become more cautious (Haffner and Van Dam, 2011). The Netherlands, therefore, has experienced decreasing house prices, stagnating new-housing development, a decrease in the number of people moving house, reduced sales and an increase in risk for home owners. Investments in the construction sector in 2010 were almost 11% lower than in 2009 (see Figure 1), with a particular decrease in the number of completed new-build homes in 2010.

The drop in demand on the housing and real estate markets has also led to fewer investors in area development. This has resulted in less investment in infrastructure and public spaces. Some are attempting to solve this by finding new sources of investment – for certain things in urban area development for which there always remains a need, or for which the need even increases, such as energy infrastructure and care facilities (Peek and Van Remmen, 2012). A more fundamental question, however, is whether the strategy of linking spatial use functions in large-scale urban development plans at both the organisational and financial level is still a robust one. After all, urban development has often been based on tightly coupled systems, in which a complex calculation is made beforehand to be able to fund the land development. Loosely coupled systems, in which a problem in one part of a system does not necessarily result directly in problems in the system as a whole, are less vulnerable and, in times of uncertainty, possibly more robust (Buitelaar et al., 2012). The government should take this into account in its reform of the housing market, spatial policy and environmental law.

Figure 1

Investments and housing



Source: CBS (2012)

The crisis can be clearly seen in investments and in new-housing.

Because of the reduced levels of production and consumption, the economic recession has had an overall positive effect, in the short term, on the quality of the environment and nature and on spatial pressure and congestion. A potential positive effect for environmental policy is also that the reduced number of new-housing contracts are encouraging construction companies to look for other types of work and therefore have a greater focus on home improvements and energy savings in existing buildings. It is important that this focus is utilised now, and that it is maintained once the economy starts to show signs of improvement.

And finally, the crisis has also had less obvious effects on the environment. For example, the temporarily low CO_2 emission levels of 2009 have had a more permanent effect on the price of CO_2 emissions rights, as the unused emission rights from 2009 may be saved for use in laters years. Together with for example the decrease in the expected future demand for emission rights, this has resulted in a reduction in carbon price, down to the current level of less than 10 euros per tonne (see Figure 2). This negatively influences the outlook for the further development of electricity generation technologies – technologies that will be crucial for significantly reducing greenhouse gas emissions. The crisis is also causing a general reduction in investments in efficient and clean technologies, which may therefore partly cancel out the beneficial short-term effects of the crisis on the quality of the human environment.

Figure 2
Price of CO_2 emission rights

Source: Point Carbon (2012)

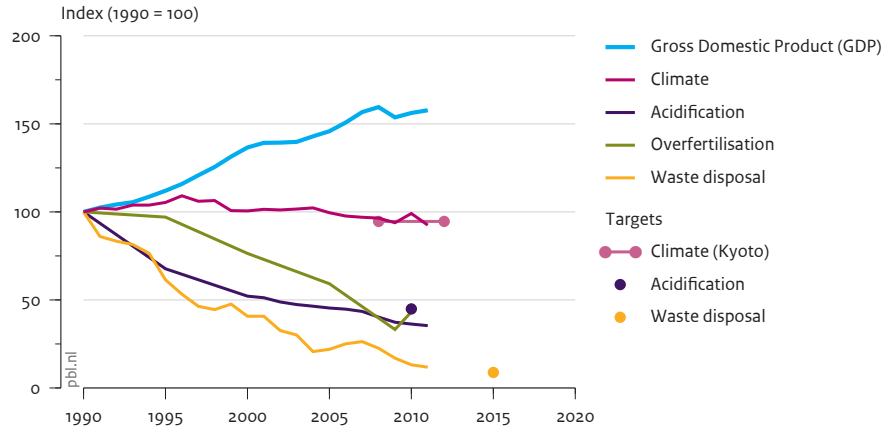
The carbon price fell sharply in 2009, after which it remained at a lower level than in the period prior to 2009.

Human environment in the Netherlands showing significant improvements

Environment

- Environmental pressure has decreased despite continuing economic growth. In general, environmental pressure in the Netherlands decreased significantly between 1990 and 2010, or, in the case of greenhouse gas emissions, remained more or less stable (see Figure 3). The emission of many substances to air, water and land were halved during this period. At the same time, gross domestic product (GDP) increased by over 50% during the same period. Up to now, therefore, the Netherlands has succeeded in uncoupling economic growth from environmental pressure. It should be noted however that part of the polluting production that used to take place in the Netherlands has moved to other countries.
- *The emission of hazardous substances to the air has decreased significantly since 1990*. As of 2010, EU countries must meet the European emission ceilings, implemented to substantially reduce air polluting emissions. The emission ceilings for sulphur dioxide, ammonia and volatile organic compounds are not being exceeded in the Netherlands. The emission of nitrogen oxides roughly equals the emission ceiling.
- *European air quality standards achievable almost everywhere*. Because of European regulations, cars are becoming increasingly clean. Industrial emissions are also decreasing. As a result, European standards for particulates (PM_{10}, $PM_{2.5}$) and nitrogen dioxide will be met, on time, at many locations in the Netherlands. However, even if

Figure 3
Theme indicators



Source: PBL, CBS and Wageningen UR (2012)

Environmental pressure is not coupled to economic growth in the Netherlands and has continued to decrease in recent decades.

standards are being met, there are still considerable health effects due to poor air quality, particularly near busy roads.

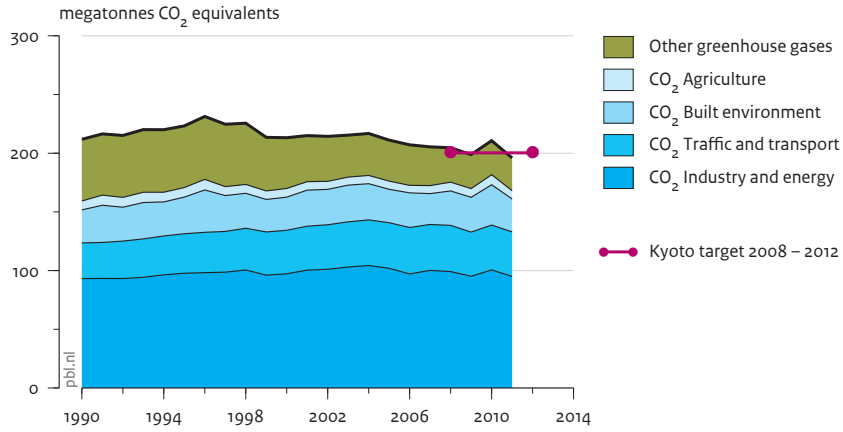
- *The Netherlands adheres to its Kyoto commitment*. Greenhouse gas emissions in 2011 in the Netherlands were about 8% lower than 1990 levels. Compared with 1990, there was an increase in CO_2 emissions and a decrease in emissions of non-CO_2 greenhouse gases. The purchase of emission rights will contribute to the likelihood of the Netherlands achieving its Kyoto target, which is a reduction in greenhouse gas emissions of 6%, averaged over the 2008–2012 period, compared with 1990 levels (see Figure 4). The Netherlands is also on track to achieve its 2020 target for greenhouse gases that do not fall under the European Emissions Trading System (EU ETS).
- *CO_2 emissions from new cars have decreased considerably in recent years*. On the other hand, mobility growth between 1990 and 2011 has resulted in a 25% increase in CO_2 emissions from traffic (see Figures 4 and 5).

Nature and biodiversity

- *Global target to reduce biodiversity loss has been achieved in the Netherlands*. The expansion of nature areas and nature management have made it possible to halt biodiversity decline for many species groups. Recovery is even being seen in marsh areas, although biodiversity decline is still taking place in open dune areas and heathland. Outside the nature areas, however, biodiversity is still continuing to show strong

Figure 4

Greenhouse gas emissions per sector

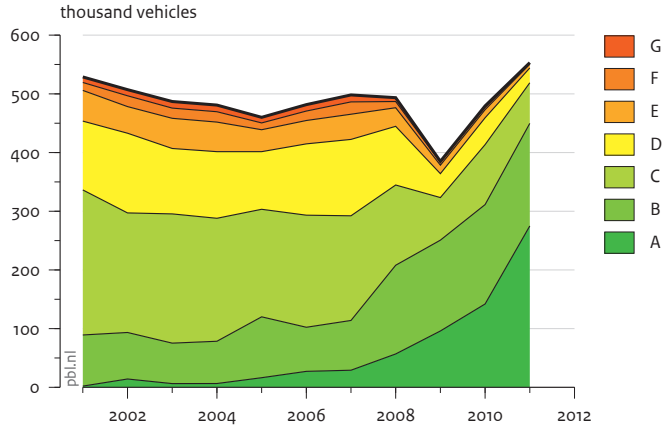


Source: The Netherlands Pollutant Release and Transfer Register

Greenhouse gas emissions in the Netherlands in 2011 were about 8% lower than in 1990. There was an increase in CO_2 emissions and a decrease in emissions of non-CO_2 greenhouse gases. About 60% of other greenhouse gas emissions were produced by the agricultural sector in 2011.

Figure 5

Passenger vehicles sales according to energy label



Source: PBL, CBS and Wageningen UR (2012)

There has been a significant increase in the share of fuel-efficient cars in recent years.

decline. Overall, therefore, biodiversity loss in the Netherlands has slowed, but not stopped. The Netherlands has achieved the global target (to slow down biodiversity loss) but has not met European and national targets (to halt biodiversity loss).

Water safety and water management

- *Taking a generic approach, considerable progress has been made in recent decades in various water policy areas*. The water safety policy of recent decades has meant that the Netherlands is now much better protected against flooding: the human casualty risk is almost 20 times lower than it was in 1950. Surface water quality has also increased considerably since the 1970s, both chemically (nutrients, pesticides) and ecologically. There is sufficient fresh water available in normal and dry years for an adequate water supply to most users. Water drainage floods, swimming water and drinking water are also well-managed. Nevertheless, serious policy tasks remain regarding water security, water quality, aquatic nature and future freshwater supply.

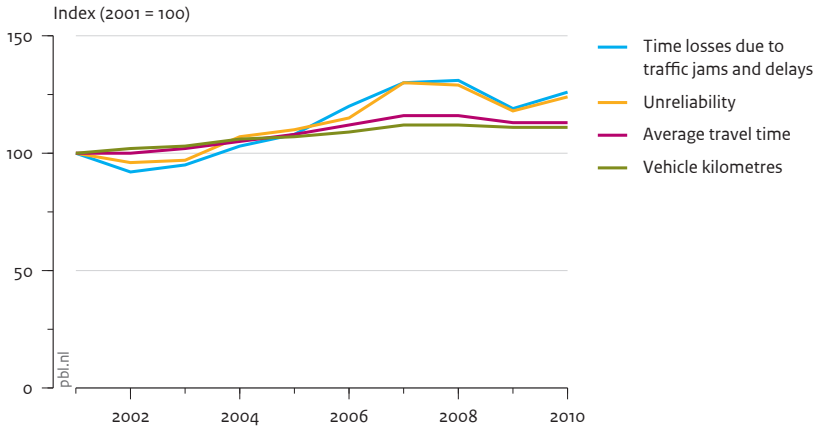
Liveability in cities

- *Urban liveability problems have been reduced*. The number of people living in areas affected by liveability problems decreased from 9% to 6% between 1998 and 2008. This concerns roughly half a million residents in neighbourhoods in which liveability has either improved or considerably improved. Neighbourhoods are considered to have liveability problems if people report being dissatisfied, very dissatisfied or only moderately satisfied with their immediate surroundings. In the subsequent period, from 2008 to 2010, little changed on average in the Netherlands, despite a slight increase in unemployment and other factors known to possibly negatively affect liveability. Some of the neighbourhoods that have shown an improvement in liveability have been renovated, resulting in improvements to the housing stock and public spaces. This is a possible indicator of successful physical policy (BZK, 2011). As well as physical improvements, redevelopment also results in changes in the population distribution within neighbourhoods (Van Dam et al., 2010). The social aspects of the local surroundings play a particularly important role in how neighbourhood liveability is perceived (VROM, 2004).

Traffic and accessibility

- *Investments in roads have limited the increase in travel time losses*. The number of vehicle kilometres on the primary road network increased slowly but surely between 2001 and 2007, after which it levelled off at about 11% to 12% above the 2001 level. Concentration and compaction of residential and employment functions have contributed to the limited growth in mobility. However, the total loss in travel time on the primary road network in 2010 was over 25% higher than in 2001. There was a clear increase in travel time loss between 2002 and 2008, followed by a decrease (probably under the influence of the recession), after which it increased again slightly in 2010. Travel time loss is increasing more rapidly than total use of the primary road network (see Figure 6). This is because use of the road network is concentrated in certain areas

Figure 6
Performance main roads network



Source: KiM (2012)

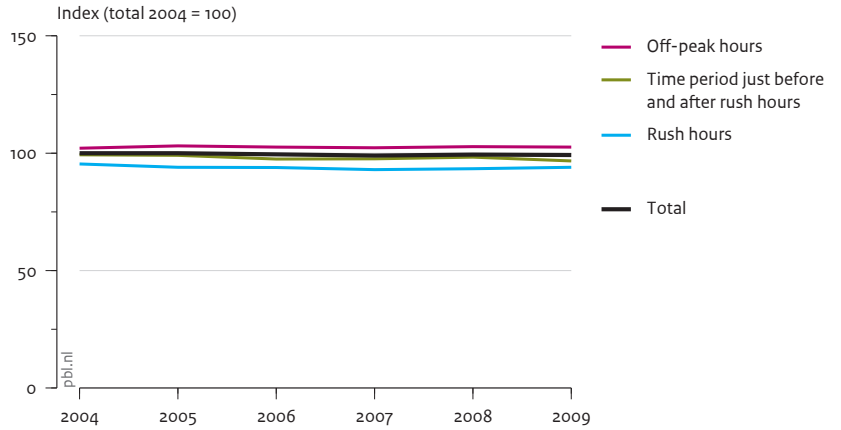
Time lost due to traffic jams and delays has increased more than the amount of traffic.

and at certain times. If no new roads and lanes had been built, the increase in travel time loss would have been about 10% more than it is today (KiM, 2011).

- *Theoretical travel speed (along a straight line between two points) has been more or less stable.* The accessibility indicator introduced in the National Policy for Infrastructure and Spatial Planning (SVIR) focuses on this theoretical travel speed, with the objective of increasing it. In the 2004–2009 period, the theoretical travel speed for cars remained fairly stable, despite the growth in car mobility (Figure 7). Only in the periods just preceding and just following peak travel times was there a slight reduction in the average travel speed. This would indicate a broadening of peak travel times.
- *Home and work located slightly closer together.* There was a slight decrease in average commuting distances over the last ten years. This is because the number of jobs and the population in urban areas have grown more than in rural areas. Increasing proximity (for example of homes and work locations) is an effective way of improving accessibility. Abolishing the mileage allowance and introducing a pricing policy would also contribute.

Figure 7

Theoretical travel speed, by car, along a straight line between two points



Source: PBL (based on MON 2004–2009)

Little change in theoretical travel speed.

Points of consideration for policy: intensification or reform

Although significant improvements have been seen in a number of areas, some elements of the adopted and proposed policies on the human environment are insufficient to achieve certain policy objectives on time. In some cases, intensification would be enough to tailor resources to ambitions; in other cases, the chosen objectives or approach require fundamental changes to be made.

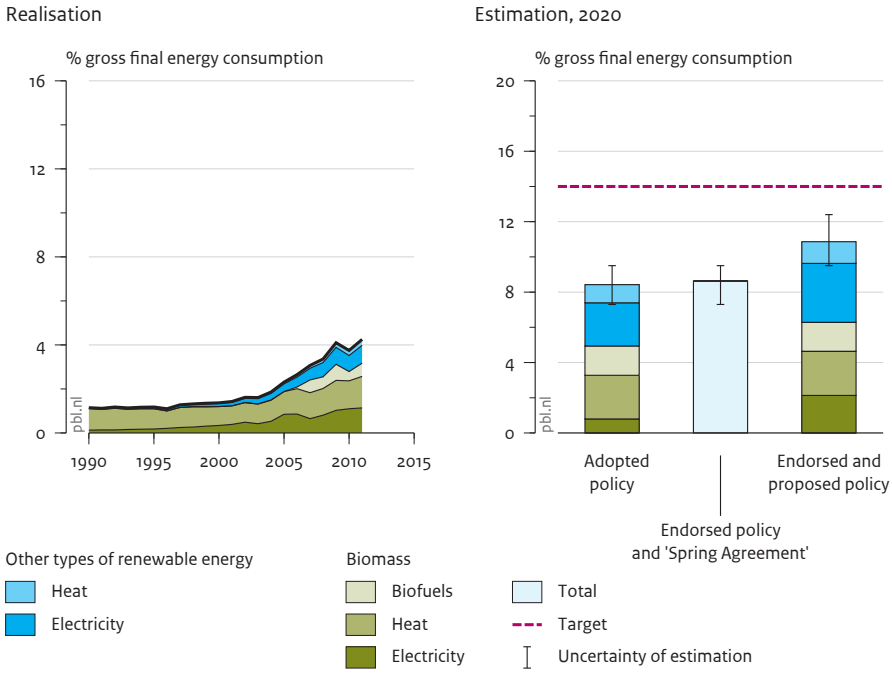
The most important targets that are not expected to be met on time are described below. A distinction is made between policy targets that are expected to be achieved if the current approach is intensified and those that require fundamental changes to be made both to the approach and the target itself. A detailed overview (in Dutch) is provided on this assessment's website, showing the extent to which the operational policy targets are expected to be achieved on time. This is based on the policy targets set by the Rutte Cabinet. Where possible, points of agreement as documented in the most recent parliamentary agreement (*Lenteakkoord*) are also included.

Policy intensification

The policy targets could be achieved in the following areas of the human environment if the current approach were to be intensified:

Figure 8

Share of renewable energy



Source: CBS (2012); Verdonk and Wetzels (2012)

Under current policy and including the government agreement 'Lenteakkoord', the share of renewable energy will increase from 4% in 2011 to about 9% (bandwidth 7% to 10%) by 2020. If proposed policy is also followed the proportion will increase, but will still be insufficient to achieve the target for 2020 (14%).

Environment

- *The share of energy generated from renewable sources (biomass, wind, sun and water) is increasing at an insufficient rate to meet the European target*. Under current policy and including the government agreement 'Lenteakkoord', the share of renewable energy will increase from 4% in 2011 to about 9% (bandwidth 7% to 10%) by 2020 (see Figure 8). If the proposed policy were to be implemented, this would increase to 11% (bandwidth 9% to 12%). The options for achieving the EU target of 14% by 2020 are to increase the financial incentive through the renewed sustainable energy incentive scheme (SDE+), to focus more on energy savings, to import renewable energy, or to put energy producers and suppliers under the obligation to focus on renewable energy. The disadvantage of this last option is that it would temporarily increase uncertainty for investors. There needs to be a greater focus on stimulating innovation in order to achieve targets in the long term.

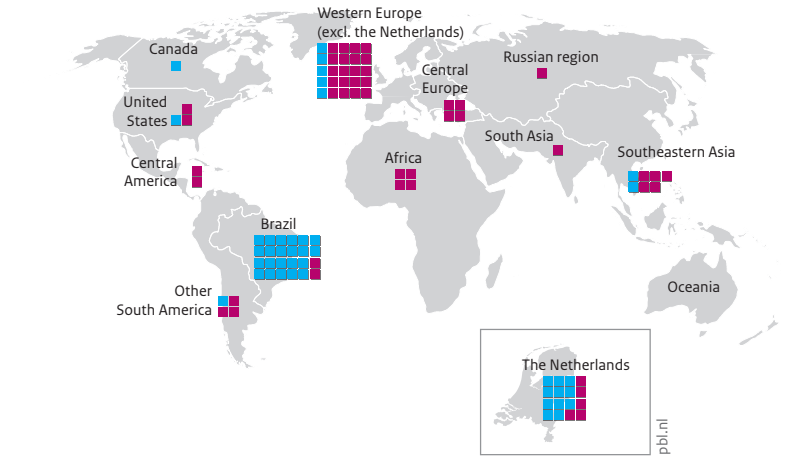
- *Noise levels from traffic and noise nuisance to residents remain too high*. The target to reduce noise produced by road traffic by two decibels and noise from trains by seven decibels was not achieved in 2010. However, the number of problem areas along roads and railways is being reduced considerably through the recent introduction of noise ceilings and changes to the programme for the implementation of anti-noise measures. The target for 2020 is that there are no more problem areas. Although the noise targets could be achieved by accelerating the rate at which low-noise asphalt is laid, this is an expensive option. It would be much more cost-effective to introduce firmer restrictions at the European level regarding the amount of noise that lorries, cars and trains may produce. This is currently only done through a European directive on tyre noise limits. This tyre directive could result in a noise reduction of one decibel from 2020 onwards (TNO, 2011); a reduction that will be partly cancelled out by the recent increase in the speed limit to 130 kilometres an hour.
- *The decrease in nitrate levels in groundwater in sandy areas is stagnating*. The target of the European Nitrates Directive (a maximum of 50 micrograms of nitrate per litre in the upper groundwater layer) has been achieved for clay and peat areas, but not for loess and sandy areas. New prognoses show that current policy is not expected to result in further decreases in nitrate levels in sandy areas. To achieve such decreases, the fertiliser standards for nitrogen need to be tightened and solutions found for the resulting growing manure surplus.

Nature and biodiversity

- *Location of acquired land crucial in new National Ecological Network*. In the agreement on the decentralisation of nature areas (Onderhandelingsakkoord), the Dutch Government and the provinces have agreed on a newly defined, smaller National Ecological Network. National government has also implemented cutbacks in nature and landscape policy. Half of the cutbacks implemented by the Rutte Cabinet were cancelled as part of the latest parliamentary agreement (*Lenteakkoord*), which means that future investments in nature have been reduced by 30% compared with 2010. If the nature targets are to be achieved as much as possible, even though less land can be bought, the focus should be on acquiring land in the right places and on making more use of instruments such as expropriation and full compensation. Purchasing land for new nature areas will allow expansion of ecological areas that are currently too small, making it possible to effectively combat the desiccation of nature areas.
- *Certification of supply chains proceeding slowly*. The government stimulates the use of sustainably produced raw materials and products to reduce the ecological footprint of the Netherlands (see Figure 9). Certificates must indicate that products have been made in compliance with sustainability criteria, and should thus stimulate the purchase of such products. No quantitative targets have been set for the sustainably produced market share of most raw materials and products. A quantitative target has been set for certified wood, at a market share of 50%. This target has been achieved for wood overall, but not for tropical wood. The Dutch market share of sustainable coffee is currently about 25% and for sustainable wood this is 50%. The market share of sustainable fish, however, is about 10% and sustainable soya is barely on the

Figure 9

Global use of space due to Dutch consumption of agricultural products, 2005



Source: PBL

Dutch food consumption requires almost 5 million hectares of land, about 20% of which located in the Netherlands and over 50% outside western Europe.

market at all (data from 2008). The government could introduce more quantitative targets and set a good example through its own purchasing policy.

Traffic and accessibility

- *Too little improvement in road safety.* The number of road deaths decreased by 46% between 2000 and 2010, to 640 deaths; in 2011 there was again a light increase in the number of road deaths. The number of serious road casualties increased by 16% in the 2000–2010 period. After an initial decrease, the number of serious road casualties increased between 2006 and 2010 by almost 25%, to 19,200 casualties. These developments mean that the targets for 2020 of a maximum of 500 road deaths and 10,600 serious road casualties will not be achieved.

Policy reform: a number of targets require a fundamentally different approach

A more fundamental revision of current policy is required in the following areas of the human environment to be able to achieve related policy targets:

Environment

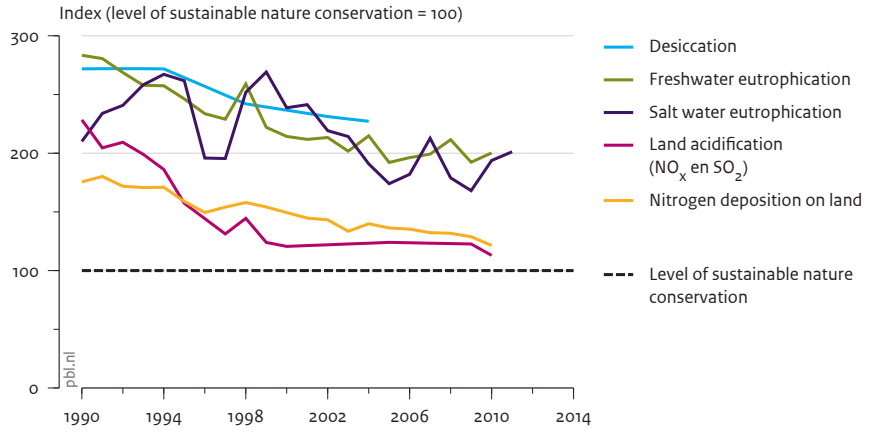
- *Achieving a low-carbon economy in the long term requires additional impulses today*. Current policy provides few stimuli for the development of low-carbon energy systems. The price of CO_2 emission rights is too low to make investments in CO_2 mitigation attractive, and the current stimuli for renewable energy are not focused enough on the technologies required to achieve considerable emission reductions; technologies such as those related to energy savings, wind energy at sea, carbon storage and the gasification of woody biomass. Current policy will not achieve the required fundamental transformations in the energy system on time. The cabinet is aiming for a low-carbon economy in the long term, as this is what is required to cost-effectively mitigate climate change by limiting the global temperature increase to 2˚C. This two-degree target requires that greenhouse gas emissions in rich countries, therefore also in the Netherlands, decrease by between 80% and 95% between 1990 and 2050. However, international negotiations regarding such emission reductions are progressing extremely slowly.

Nature, biodiversity and water quality

- *Global and national biodiversity loss not yet halted*. The Dutch and European policy target to halt biodiversity loss only seems to be achievable if more sustainable methods are introduced in fishery and the agricultural sector. Current policy focuses primarily on stimulating sustainable production methods, so that changes take place slowly. Furthermore, there is a lack of tools to help solve spatial issues around nature areas, and environmental policy is unable to achieve the required environmental conditions for nature.
- *Environmental pressures on nature prevent targets from being achieved*. Problems with water stress and excessive use of fertiliser and plant protection products (in particular with respect to water) undermine the biodiversity of natural ecosystems (see Figure 10). The decrease in environmental pressure has levelled off, but even if emission targets would be achieved, this will still be insufficient to adequately protect nature. In the case of overfertilisation, there is a lack of economically feasible solutions to the manure surplus problem. In the case of water stress, the main problems consist of insufficient land acquisition, a lack of local support, insufficient financial resources and a lack of administrative drive.
- *Almost nowhere does the ecological quality of surface waters meet the objectives of the Water Framework Directive*. It is often impossible to achieve the water objectives and corresponding nature objectives, given the criteria that the measures required must not result in extra costs for agriculture. In large areas of the Netherlands, land use is planned around agricultural use, which involves necessary unnatural drainage, unnatural water level management and unnatural flows, resulting in water stress in nature areas. In addition, as long as fertiliser levels remain too high, investments in land development measures will not be effective. In areas for which the objectives for water quality, nature and a healthy agriculture cannot be reconciled, a specific choice must be made at the spatial level between either agriculture or nature and water, in order to achieve the effective implementation of resources. Another possibility is to

Figure 10

Environmental pressure on water and nature areas



Source: PBL

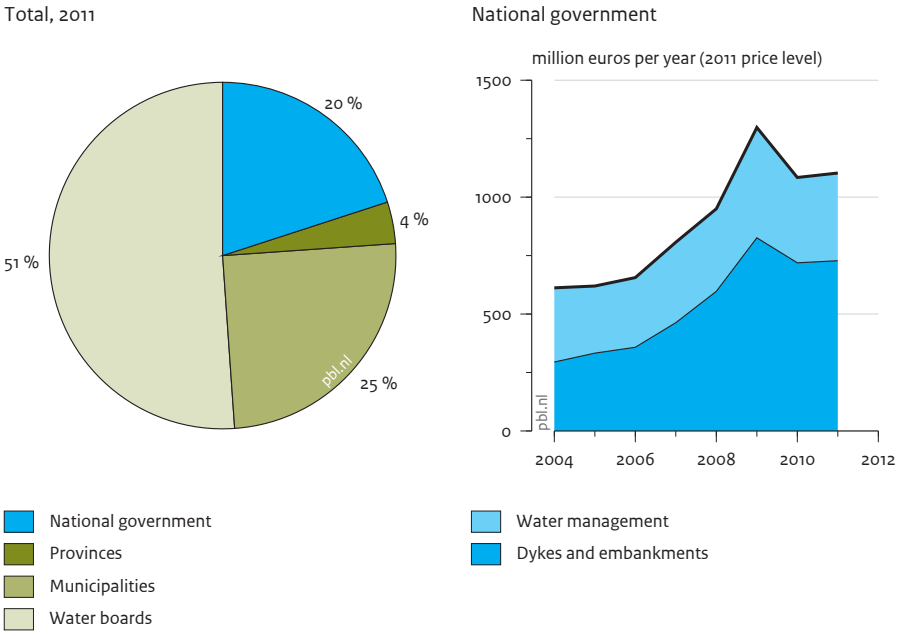
The environmental pressure on nature has decreased considerably since 1990. Nevertheless, it is still not at the level required for sustainable nature conservation.

change the Water Framework Directive (WFD) water quality objectives, although the European Union would require valid arguments before giving permission for such a change.

- *Crop protection has become more sustainable but water quality and safety objectives have not yet been achieved*. Because of the efforts of growers, plant protection product manufacturers, drinking water companies and the government, since 1998, crop protection in the Netherlands has become much safer for people, and the environment. Less crop protection product residues are found in food and the quality of surface waters has also improved. Despite these improvements, however, the policy targets for safety and surface water quality have not been achieved (Van Eerdt et al., 2012). New policy is currently being drawn up and includes targets for 2027. In the short term, better prospects for water quality and safety could be achieved by improving compliance with obligatory emission reduction technologies, better matching the authorisation procedure to the practice setting, replacing the most polluting substances with those that are less polluting or with non-chemical alternatives, and by improving safety instructions for employees. For the longer term, the focus should be on investment in more systems innovation and the development of more environmentally friendly resources and methods, such as organic pesticides.

Figure 11

Government expenditure on tasks related to water, 2011



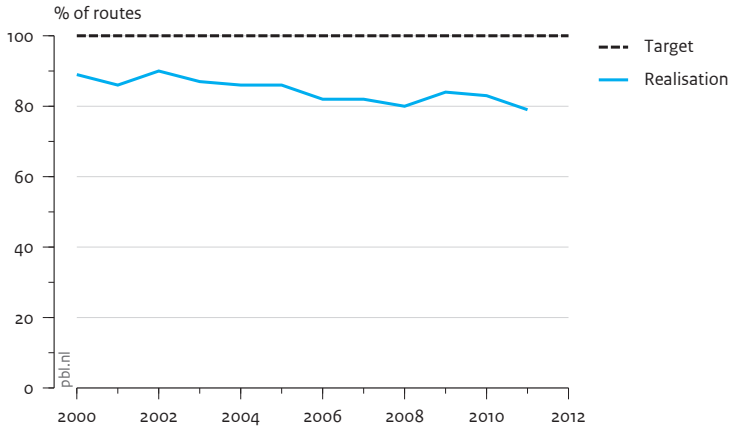
Source: Ministry of IenM (2012)

Total government spending on water was 5.4 billion euros in 2011, of which 1.1 billion came from national government. Spending by national government has doubled since 2004, mainly due to increased spending on water safety.

Water safety

- *Flood risk management not yet at an acceptable level*. Despite ongoing investment (see Figure 11), one third of the primary dykes and one fifth of the coastal defences failed to meet official standards in 2011. Flood risk policy over the past decades, however, has contributed to the fact that the Netherlands is now much better protected against flooding. On the other hand, the water security policy task has increased, due to strong population growth and increased prosperity in high-risk areas, as well as climate change. Current water safety standards mainly relate to design issues concerning the height of dykes. However, not only the height of a dyke determines its strength. Recent knowledge about the ways in which dykes can collapse requires reconsideration of the flood protection requirements for dykes. Current standards are also based on a general assessment of the cost of investment set against the risk. The objective to also include the human casualty risk in the new standards will result in a change in priorities. New safety policy is therefore being developed within the Delta Programme.

Figure 12
Routes with a desired rush-hour travel time



Source: RWS/DVS (2012)

The number of road sections on the primary road network that satisfy the required travel time during peak hours has decreased slightly since 2000.

Traffic and transport

- *Desired travel time ratio between peak and off-peak traffic periods difficult to achieve*. According to current policy, a journey during peak travel hours on motorways between the major cities may take a maximum of one and a half times longer than the same journey at non-peak hours; on other sections of the primary road network it may take a maximum of twice as long. The number of sections of road that met this requirement decreased from 89% to 80% between 2000 and 2008, after which it again increased to 83%, due to stabilising mobility and the construction of new roads and additional lanes (see Figure 12). Travel times during peak hours can be decreased by considerably expanding road capacity and by encouraging drivers to avoid travelling at these times. This first of these options requires a large amount of money for infrastructure – infrastructure that will only be used for a small part of the day. Furthermore, the effect is probably temporary as additional infrastructure also encourages more road use. The second option (avoiding peak travel times) can be stimulated through traffic management, by charging users when they drive at peak times or by abolishing or limiting the tax relief provided through the travel cost allowance.

Main policy tasks for human environment policy

Climate change and biodiversity damage: two persistent but urgent problems
Global biodiversity has decreased by about a quarter, over the last 40 years, with most of the loss taking place in the tropics. Future population and income growth will require space for homes, offices and food production and will therefore continue to put biodiversity under pressure. Through trade and consumption, countries in the temperate zones also have an ecological footprint in tropical areas, and therefore contribute to the considerable biodiversity loss in those areas.

Damage done to biodiversity is a threat to future fisheries and wood production, the regulatory function of the climate and the water cycles and the recovery ability of land and water systems. In developing countries, in particular, biodiversity loss results almost directly in loss of resources such as clean drinking water and fertile land. Although an agreement was made in 2002 to slow global biodiversity loss by 2010 and to halt it all together in Europe, neither of these objectives has been met. In 2010, the decision was taken at the global level to shift the objectives forwards to 2020, with partial biodiversity recovery also being added to the targets.

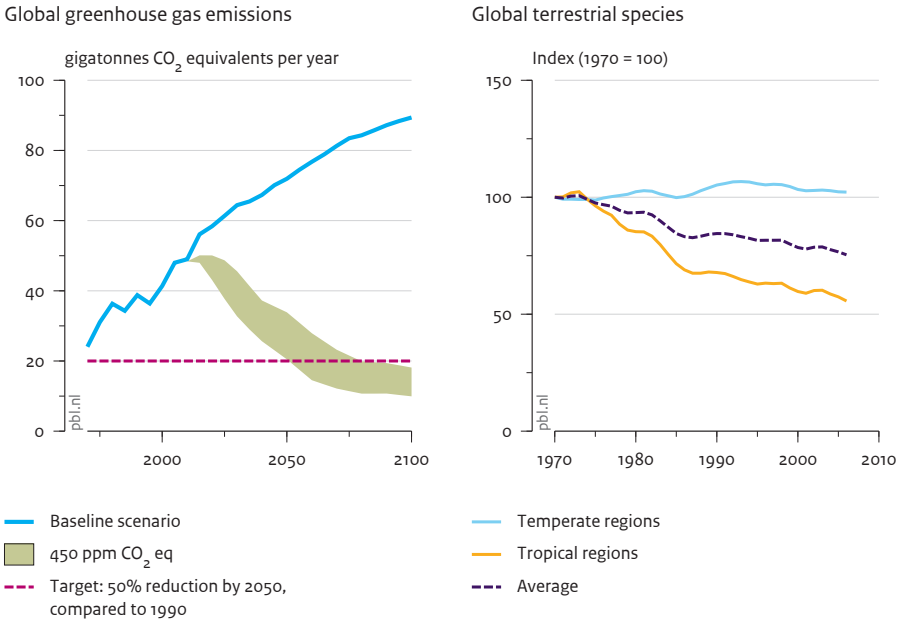
According to the IPCC, the earth could be between 1.1˚C and 6.4˚C warmer in 2100 than in 1990 (IPCC, 2007a), with developing countries being particularly vulnerable to such climate change. There is global political consensus that the global temperature increase must be limited to 2˚C (UNFCCC, 2009), and many studies show that this is technically and economically feasible. Nevertheless, the climate challenge can hardly be exaggerated. The two-degree target can be achieved if a large group of countries agrees on a global reduction in greenhouse gas emissions of 50% between 1990 and 2050. For rich countries such as the Netherlands, which has relatively high greenhouse gas emissions, this means a reduction in emissions of 80% to 95% (IPCC, 2007b). In 2005, industrialised countries came to an agreement under the Kyoto Protocol to achieve a joint emission reduction of 4% between 1990 and the 2008–2012 period. This target will probably be achieved. However, the agreements that have now been made for the period up to 2020 mean that, at best, only half the reduction required to meet the two-degree target will be achieved.

The limited progress being made in addressing these problems reflects the considerable inertia in the social systems. This makes it even more urgent for these problems to be tackled now.

Resource scarcity again on the agenda
The explosive increase in the demand for raw materials has resulted in a strong increase in the price of raw materials in recent years (see Figure 14). This has completely reversed the price drops of the previous century. The high and volatile prices mean that resource scarcity is once more on the political agenda. Concerns about scarcity are further fuelled by our growing dependence on these materials. Although Europe needs to import many

Figure 13

Climate change and biodiversity decline



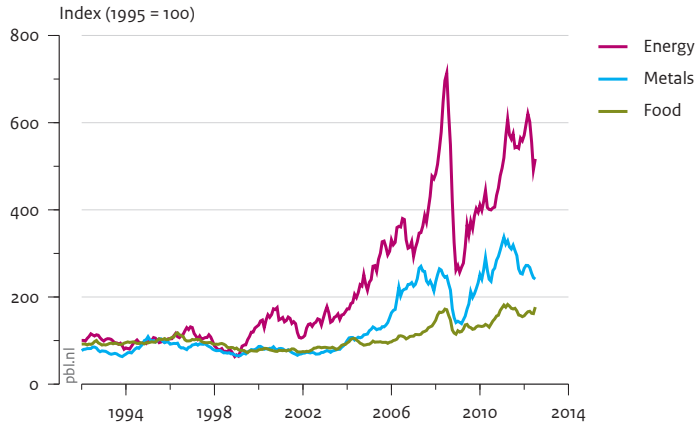
Source: PBL (2011a) (left) and WWF (2012)

The 2 °C target may have been accepted, but emission trends still strongly deviate from this target. To have a 50% chance of achieving the 2 °C target, long-term greenhouse gas concentrations of 400 to 450 ppm CO_2 eq are required. This means a halving of global greenhouse gas emissions compared with 1990, with a peak in about 2020. Global biodiversity has decreased by about a quarter since 1970. In the tropical areas, the decrease was almost twice as much in the same period.

of its raw materials, there are only a few suppliers and these suppliers use their monopoly positions to their economic or political advantage. There has also been a fundamental change in the geopolitical situation, with Europe and other rich countries (OECD countries) no longer determining the rules of the game. Upcoming economies are catching up with Europe and are creating their own frameworks and standards, feeding concerns about future supply security.

Concerns about scarcity will continue to play a role in the coming decades as a growing world population and increasing prosperity will continue to increase the demand for raw materials. It is becoming increasingly expensive to extract the raw materials and the market power of suppliers is increasing. Geopolitical risks will not disappear overnight, and a sufficient supply of certain raw materials in the longer term is uncertain.

Figure 14
Global price of energy, food and metals



Source: IMF

Raw material prices have increased significantly in recent years

Climate change, biodiversity preservation and resource scarcity result in policy dilemma

In addition to the scarcity issue, policymakers are also faced with other issues related to resource use. Climate change, biodiversity loss and air pollution are all a direct result of resource use. It is also the case that many environmental problems are due to the excessive use of raw materials, rather than their scarcity. In this respect, raw materials are actually too cheap, as the environmental costs are not sufficiently taken into account.

The government, therefore, is faced with a dilemma. From an environmental point of view, it would be better to make polluting raw materials more expensive, but from the point of view of scarcity they should be cheaper. Better resource efficiency would seem to be the solution to resource scarcity and the associated environmental pressure. A more efficient use of resources would ensure that limited supplies could be used for longer, and less use would result in less pollution. However, a complete decoupling between economic growth and resource use cannot be taken for granted. Improving efficiency means increasing resource productivity. This may result in additional growth and not necessarily reduce demand for the resource, because of the rebound effect.

System change – a new policy task: what national government can do to effectively improve the quality of the human environment

A description of the status of the human environment gives mixed signals. One the one hand, much has been achieved, while on the other there are still persistent problems that are insufficiently addressed by policy. In order to find policy strategy options, six crucial social 'systems' are analysed in this section. The analysis of these systems also shows who the players are; for example, supranational organisations, the European Union, businesses and interest groups, as well as regional governments and other regional parties. This presents a number of questions: How should national government respond to the various interests? Under which conditions will public actors come into action and be able to contribute to the required changes? The playing field is also made clear: supranational regulations, global markets and an articulate public largely determine and define the sphere of action of the government. What is – in such a situation – a suitable, efficient policy approach?

The six systems partly determine how successful climate and biodiversity policy will be. Resource scarcity will also be evident in these systems (e.g. energy and food). While each of the individual systems has a large impact on the physical human environment, together they represent a cross-section of the sphere of action available to the government. The relationships between stakeholders also vary greatly depending on the system. This clearly makes a future one-size-fits-all approach impossible.

The six systems are:

1. climate and energy: stakeholders depend on one another for the production, transport and use of energy;
2. sustainable food supply: this concerns a global network of production chains (from farmer to consumer) in which the stakeholders are mutually dependent on each other for the conversion of raw materials into high quality and affordable food;
3. rural areas and nature: there are often competing spatial claims for agriculture, nature, water, energy and infrastructure;
4. water security and water management: the different stakeholders are dependent on one another for achieving the required water quality, water management and water security;
5. accessibility: if the various accessibility targets are to be achieved, traffic infrastructure must be tailored to the current and future spatial distribution of businesses, homes and other locations;
6. urban area development: stakeholders must work together to achieve general environmental standards and to meet location-specific spatial requirements.

A number of policy strategy options have been identified for each system.

National policy for climate and energy

Conflict exists In the fields of climate and energy, there is a certain tension between the policy that is required to achieve a clean, low-carbon economy in the longer term and the policy required to meet climate and energy targets for the year 2020.

- A long-term vision for a low-carbon energy system could increase the willingness of the parties involved to take action and invest. Such a vision should preferably take into account the strategies of neighbouring countries and build on four robust elements: energy savings, wind at sea, carbon capture and storage (CCS) and innovative biomass technologies.
- The current focus is primarily on achieving the target of 14% renewable energy by 2020, against the lowest possible cost. This focus possibly threatens innovative, currently expensive clean energy technologies – technologies that are crucial for achieving long-term targets.
- It is possible to improve the investment climate for such innovative clean technologies by placing more emphasis on innovation, combined with a better European emissions trading system. This requires an active role for the European Union.

The road to a low-carbon economy

The energy supply system requires radical reform over the coming decades. This is necessary not only to help limit global climate change, but also, although with slightly less urgency, to ensure sufficient, affordable energy for the future. Such reform presents a challenge for every country in the world – a challenge with specific elements for each country. Global greenhouse gas emissions must be drastically reduced if the global temperature increase is to be limited to 2 ˚C. In rich countries, this means a reduction of between 80% and 95% between 2010 and 2050. It is crucial that energy is used more efficiently if this is to be achieved; for example, by replacing fossil, high-carbon energy sources with renewable sources (biomass, sun, wind, hydropower and geothermal energy) and possibly nuclear energy, by capturing and storing CO_2, and by reducing emissions of non-CO_2 greenhouse gases. Scenario studies show that, in every case, the following will be required in 2050: 1) energy savings, 2) sustainable biomass, 3) low-carbon electricity, and 4) carbon storage (PBL and ECN, 2011).

Low-carbon energy based on innovative, clean technologies is currently much more expensive than fossil energy. This is due to the fact that clean technologies need to be developed further, and partly also because fossil-fuel prices do not fully take into account the environmental damage that they cause. The expected increase in energy demand is also projected to result in an increase in fossil-fuel prices. However, this price increase will not sufficiently stimulate the implementation of clean technologies to solve the climate problem on time. Governments could introduce a price correction for fossil fuels, but by doing so would be faced with the interests of producers and users of fossil energy as well as with the necessity of maintaining economic growth and employment. Some of the economic disadvantages could be overcome by coordinating price corrections at an international level. Such international coordination, however, is

not necessarily in keeping with current thinking regarding the liberalisation of world trade.

New technologies can only be made cheaper through further development and implementation. This begs the question of what wouldbe a suitable timeframe for a transfer to these clean technologies? Those who make the transfer too quickly pay a high price, damage their competitive position and lose turnover, income and employment. It is attractive for individual businesses to wait until innovative, clean technologies have become cheaper, but of course if everyone waits this will never happen. Innovators can only take a limited financial risk and therefore there needs to be a reasonable chance of their clean technologies turning a profit within the foreseeable future. After all, they cannot keep financing their innovations themselves forever. Governments could remove this dilemma by creating markets for clean, although still expensive, technologies.

That which applies to businesses, also applies to countries. Waiting is cheaper in the short term (less loss of competitive position) but does not solve the climate problem. This will only happen if countries work together and create international markets for clean technologies. If countries work together, then loss of competitive power is no longer an issue. It is also possible for countries, as well as businesses, to anticipate such cooperation and begin to invest in the development of clean technologies in the hope of profiting from them once a market has been created.

Dutch climate strategy seeks efficiency in the short term

The cooperation between countries described above, in the European Union, has taken the form of the current EU climate policy. About half of greenhouse gas emissions are regulated through the European emissions trading system (ETS), and Member States are also required by the European Union to reduce emissions that do not fall under the ETS. They are also required to obtain part of their energy from renewable sources.

It currently looks as though the Netherlands will achieve the non-ETS target for 2020, but not the renewable energy target (see Figure 8). The share of renewable energy is now 4% and would need to grow to 14% by 2020. Current policy will achieve a share of no more than 7% to 10%. Taking into account proposed policy, the share could increase to between 9% and 12%. This also takes into account the introduction of the so-called Green Deals, the co-firing of biomass in coal-fired power plants and the implementation of the national planning vision for wind energy on land (*Structuurvisie windenergie op land*). To achieve the 14% target by 2020, the Dutch Government could do more in terms of energy savings, increase its budget through, for example, the SDE+ scheme, import renewable energy, or oblige energy producers or suppliers to make more use of renewable energy sources. The last of these would require systemic change, which would initially result in uncertainty regarding the direction of government policy. In the long term, however, the focus must lie primarily on stimulating innovation.

Insufficient incentive for development of technologies that are needed by 2050
The European Union's emissions trading system indirectly corrects the fossil-fuel price through the price that must be paid for CO_2 emission rights. The more expensive these emission rights become, the more attractive low-carbon energy carriers will be. As a result of the recession, however, there has been a drop in demand for emission rights, and their price has decreased from over 20 euros per tonne of CO_2 to less than 10 euros per tonne. This therefore means the loss of an important incentive to develop low-carbon technologies. The lack of credit available to innovative companies due to the credit crisis has reinforced the problem.

The Dutch Government, meanwhile, has changed its sustainable energy incentive scheme (SDE) into SDE+. Together with the old schemes (MEP and SDE), there will be more funding made available for the implementation of clean technologies over the next few years, but this funding will be distributed differently between the various technologies. Technologies that are ultimately needed but that are currently too expensive, such as wind at sea, carbon storage and the processing of woody biomass, are not included in the SDE+ scheme. The SDE+ funds are now primarily intended for technologies that contribute more per euro to the 2020 renewable energy targets, such as renewable heat and biogas from fermentation. These technologies help achieve a clean economy, but they do not contribute to cost reductions for a number of technologies with large potential that will be needed to achieve the emission target for 2050.

For the production of low-carbon electricity, some of the potential of wind power on land remains unused, mainly because of the difficulties in incorporating wind turbines into the landscape and the opposition from local residents. There is also a large potential for wind power at sea, with corresponding opportunities for Dutch companies. However, the lack of a long-term strategy for wind power at sea in the Netherlands means that companies can only sell their products abroad.

In Europe, there is a lack of clear criteria and control mechanisms that are required to ensure that the production of biomass does not, directly or indirectly, result in the transformation of nature areas into agricultural land and, thus, in additional greenhouse gas emissions. The present use of biomass in electricity generation makes a substantial contribution to renewable energy production. However, the limited sustainable biomass supply could cause a conflict between this application and other uses (such as for vehicle fuel), for which there are far fewer clean alternatives. If coal-fired power plants were to be built today in anticipation of large amounts of biomass co-firing, this could result in an undesirable lock-in situation.

If carbon capture and storage (CCS) is to have a chance, pilot projects are required. These pilots could help reduce CCS costs (currently, between 80 and 100 euros per tonne). If carbon capture and storage is also to be economically feasible, the carbon price in the year 2025 needs to be considerably higher than the present price of less than

10 euros per tonne. As the prospect of this seems unlikely, the initiators of CCS projects are pulling out, not just in the Netherlands but all over Europe.

There is still much potential in the Netherlands for achieving energy savings, both in businesses and homes. The current regulations – requiring businesses to take savings measures that provide a return on investment within five years – are insufficiently monitored, as municipalities lack both capacity and knowledge. There is also a large potential for savings in existing homes, but the diversity of housing types and owners makes this difficult to achieve. The current focus of the government is on providing information and facilitating energy savings (for example using energy labels, the Meer-met-Minder (*more with less*) website and the 'row-by-row' approach (housing renovation per row of houses (*Blok-voor-Blok*)). This is useful policy, but it would be made more effective if it were supplemented with more powerful energy-saving incentives, such as linking taxation to energy labels, making the financing of energy-saving measures easier, increasing the transparency of the supply (certification), and including energy costs in the rental price, also in the case of commercial and industrial buildings and the private rental sector (so that landlords benefit financially from energy-saving improvements). The recent decision taken at European level to oblige energy supply companies to take a role in energy savings may help.

Options for a more effective climate policy

Options are available to the Dutch Government to further stimulate a transition towards a low-carbon energy supply, even in these financially difficult times. For example, the government could provide the European Union with powerful support in creating a market for clean technologies. At the same time, it could support innovation at the national level by concentrating on those technologies that have a large potential in the longer term and that Dutch businesses could use in developing a competitive advantage.

What does this mean in concrete terms?
The Dutch Government has the following options at the European level:

- encourage the European Union to set ambitious targets for greenhouse gas emission reductions;
- recommend changes be made to the ETS to enable businesses to better be able to invest in innovative technologies;
- take the lead in the development of a powerful sustainable biomass system.

Within the national innovation programme, the government could do the following to reinforce the feedback between CO_2 mitigation and economic stimulation in both the short and the long term:

- Develop a robust innovation strategy for wind power at sea, biomass gasification and fermentation and carbon capture and storage. Such a strategy should, at a minimum, contribute to a reduction in the costs of essential low-carbon technologies and provide opportunities for Dutch businesses in the long term.

- Stimulate energy savings in existing homes and commercial and industrial buildings by applying more powerful tools than the current ‚inform and facilitate' policy.

National policy for a sustainable food supply

Improving the sustainability of the food supply chain involves a conflict between efficient and high-quality production. The current focus on price competitiveness falls mainly in the camp of efficient production. High-quality production means taking into account animal welfare, the use of antibiotics and nature and landscape qualities. This production method provides opportunities for parts of the Dutch agri-food sector to compete in terms of quality. The government can do the following to encourage more high-quality production:

- take a clear and consistent position regarding the societal importance of a sustainable food system;
- in addition to developing innovations in the top-sector policy, also focus on creating the right incentives for applying innovations in practice;
- encourage the general public to consume fewer animal proteins and produce less waste, and contribute to raising awareness about the effects of food production and consumption.

Little room for manoeuvre to increase sustainability of the food system

Food production requires large amounts of land, energy, water and fertilisers, and results in a considerable pressure on the environment. At the global scale, food production contributes to biodiversity loss and climate change. These effects are reinforced by population growth and the increasing consumption of meat.

The following aspects of the food system are subjects of public debate: nutritious food, factory farming, animal disease, antibiotic use and animal welfare in the livestock sector. Society looks to the government to provide answers to these issues. However, the government's options are limited when it comes to enforcing increased sustainability of the food system. The nature of international trade agreements (WTO) and competition laws mean that there is little to gain from enforcing unilateral, strict sustainability standards. Such standards usually increase prices, which is disadvantageous to the competitive position of businesses in an open market in which actors mainly compete on price. Investments in sustainability that go beyond what is required by international law must earn a return on the market. The government can make an important contribution by stimulating sustainability initiatives and by increasing the willingness of consumers to pay for sustainable produce.

A one-sided focus on more efficient production not tenable in Dutch agricultural sector

To ensure global food security in the longer term, we need to manage scarce resources, such as land, energy, water and nutrients, as efficiently as possible. Efficient production methods are also beneficial in terms of cost price and therefore suited to the dominant system of competition on price. However, a system based mainly on efficiency and cost price competition does not seem to be tenable in the long term in the Dutch agricultural

sector. To be able to meet environmental standards, agricultural production in the densely populated Netherlands has already achieved a relatively high level of efficiency. It is therefore no simple task to achieve much higher levels of efficiency, certainly given the increasing costs involved in continuing to meet environmental and other standards. As the same time, continuing market liberalisation means increasing international competition. There is also increasing opposition in society to the expansion resulting from increased efficiency and cost price reduction. Expansion, and the related concept of factory farming, has negative connotations in the public discourse.

High-quality production requires new revenue models and a different supply chain organisation

A sustainable food system for the future will need to combine efficiency with quality. Production that takes into consideration animal welfare, the use of antibiotics and nature and landscape is part of the public's idea of a sustainable food production system, but often results in higher cost prices. Despite general public support for high-quality production, it is difficult to recoup the higher cost price. The creation of new revenue models and distribution channels is therefore necessary to be able to pass on the higher costs of high-quality production to the market and to be able to make the transition from 'price' to 'quality'. Such a transition requires new forms of supply chain organisations (see Figure 15), such as farmers and market gardeners who sell their products directly to the consumer, or the Vlees Beter Initiatief (*sustainable meat initiative*) by the Dutch Food Retail Association (CBL), that aims to only have sustainable pork and chicken on sale in supermarkets from 2020 onwards.

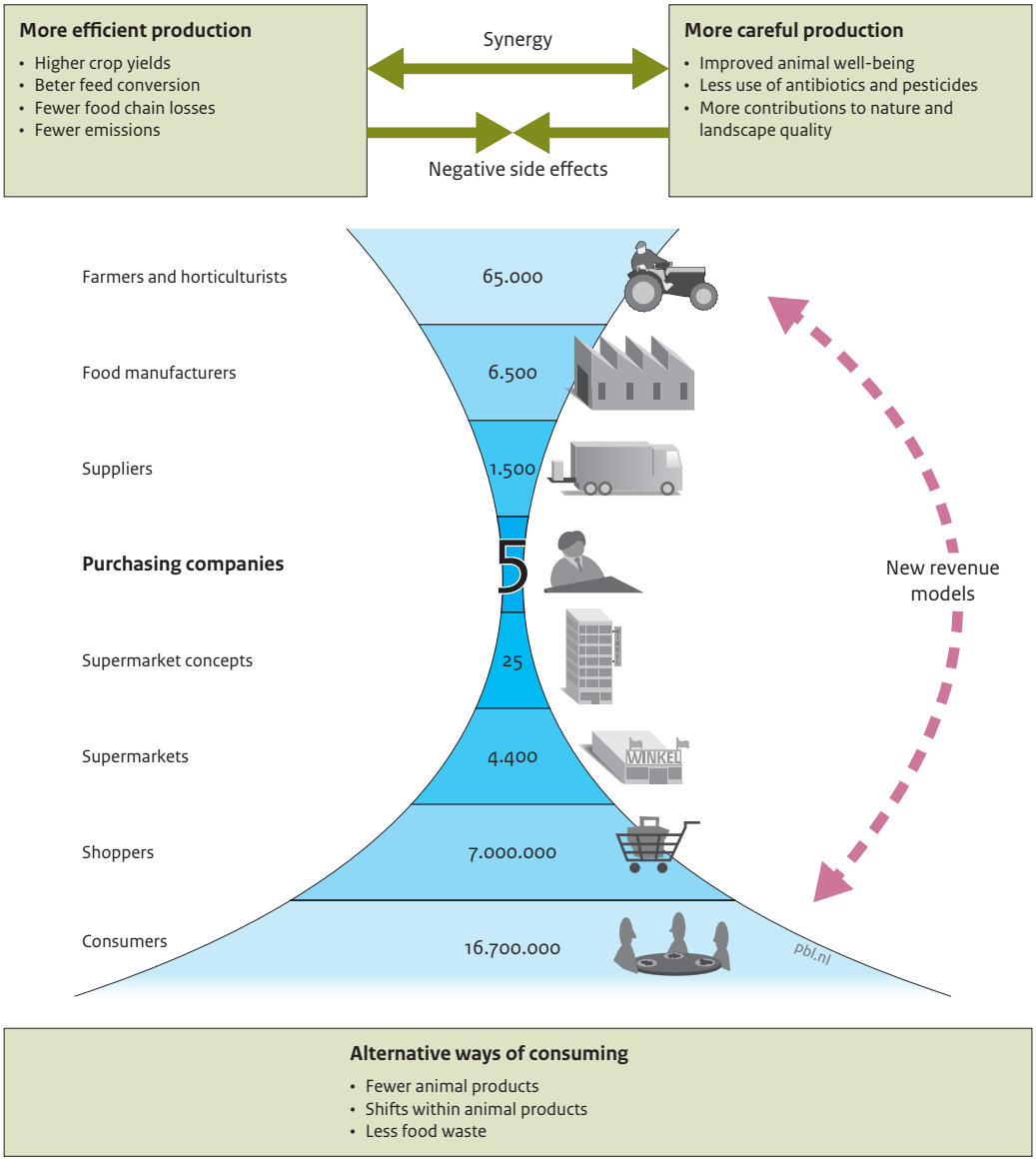
Effect of top-sector policy on improving sustainability of Dutch agricultural sector uncertain

Under the Rutte Cabinet, improving the sustainability of the food system has mainly been shaped by the top-sector policy. Within this innovation-focused policy, private parties determine the research agenda and contribute to its implementation through co-financing. However, with the proposed scrapping of the commodity boards, for example for horticulture, dairy and poultry, a large part of the funding that focuses on research for farmers and market gardeners threatens to be lost. And this while the highest environmental pressure comes from these very sectors, which also represent the highest potential increase in sustainability. Furthermore, removal of this funding would mean that the top-sector policy mainly becomes a policy for large corporations, who usually have enough money to fund their own research and development.

Conditions also need to be created for the implementation of innovation in practice, such as sufficient demand and investment opportunities, organisational capacities within the supply chain and a suitable incentive structure in the form of regulation. However, current policy focuses mainly on the removal of restrictive policy, with little attention paid to the other conditions.

Figure 15

Concentration in food chains and solutions for sustainability of food systems



Source: PBL

Increasing the sustainability of the food system requires a combination of solution strategies, for both food production and food consumption. Achieving these solution strategies demands new revenue models and supply chain organisations.

Not enough focus on increasing sustainability of consumption
Public expectations regarding food production and the global issues of food security, biodiversity and climate require a special type of policy. Such policy must be above and beyond the current regulation of the undesirable external effects of food production on the ambition level of European targets and guidelines. To date, this type of policy – in the footsteps of the policy agenda for sustainable livestock (*Uitvoeringsagenda Duurzame Veehouderij*) and that on sustainable food systems (*Beleidsagenda Duurzame voedselsystemen*) of the Balkenende IV Cabinet – mainly has focused on organising knowledge and mobilising parties in the supply chain to implement sustainability initiatives. Little attention was paid to influencing consumer behaviour, and under the Rutte Cabinet there was no attention for this issue at all. Farmers and other parties in the supply chain are expected to recoup their investments in more high-quality production from the market.

However, it is only profitable for producers to invest in sustainability if consumers are prepared to make different choices and pay more for sustainable products. Consumer behaviour also plays an important role in reducing food wastage and the consumption of animal proteins.

A clear position and regulations are important to get the supply chain moving
Parties within the food supply chain show plenty of willingness to improve the sustainability of the food supply. However, if such sustainability is to be achieved, it is important that they act together. However, rather than working together, the different parties mostly hold each other prisoner. The food market is saturated, with fierce competition for low margins. In this setting, sustainability initiatives carry a high risk, with supply chain parties watching each other to see who will take the first step. This is where the government has a role to play. If it were to take a clear position regarding the direction that sustainability of the food market should take, this would reduce the risk for the parties involved. The government position could be strengthened by providing the prospect of regulation. Parties would then have a clearer idea of their position and be more prepared to invest in sustainability. One important criterion is that such regulations are enforced properly and that no exceptions are made for those who lag behind. The latter seriously damages the trust of supply chain parties in the actions of the government. Without this trust, no one will take action.

The government has relinquished control of the safeguarding of various collective interests
The government's options for exercising direct control within the current market system are limited. This is not cast in stone – it is the result of the decision to place the competitive position of the agri-food sector first. Sustainability of the food system involves many aspects that can be seen as having a collective, or semi-collective, interest. Such interests cannot be served within the market without the introduction of further criteria, and require a government that takes primary responsibility for this. The government is however selective regarding which collective interests it is prepared to

take responsibility for: *yes* to food security, but *no* to landscape quality and health risks due to the use of antibiotics, for example. By leaving the responsibility for the various collective interests to the market, the government relinquishes control and cannot guarantee that the different interests are safeguarded.

National policy for rural areas and nature

Agriculture, nature, leisure and urban development all lay claims on the little space available in rural areas. This results in conflict, in particular between agriculture and nature and between urbanisation and attractive, natural surroundings. The last of these conflicts is seen especially in the Randstad, where there is still a need for new homes and offices as well as an increasing demand for outdoor leisure space. The following points should be taken into consideration when distributing the scarce space available and to enable the economic development of rural areas:

- a greater focus on policy coherence in the various policy areas and in particular the role of agriculture, at a more area-specific level if required;
- the proper implementation of the Programmatic Approach to Nitrogen (*Programmatische Aanpak Stikstof*);
- the support of intermediary organisations in coordinating public initiatives;
- the focused use of Common Agricultural Policy funds.

Nature and water quality need improving

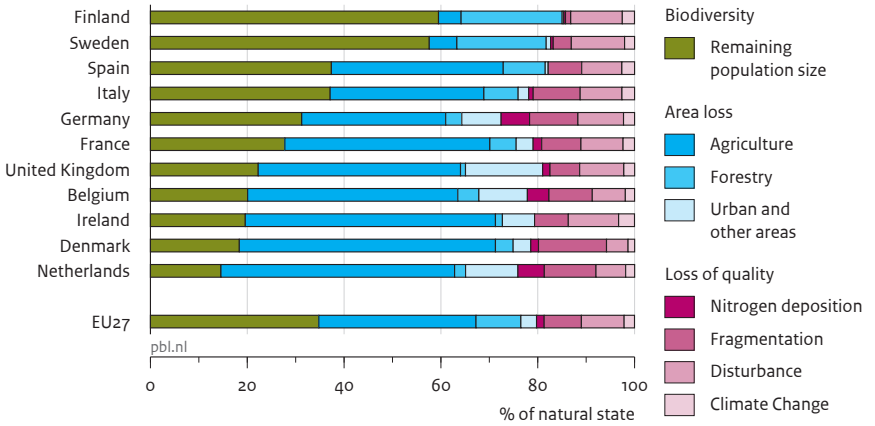
The Netherlands is not on course to meet European objectives and global biodiversity and water quality agreements. The current nature and water policy is not expected to result in these objectives and agreements being met on time. The challenge is also considerable compared with other European countries. Due to the high population density, combined with an intensive agricultural sector, the total effect of pressure factors on biodiversity is significant (see Figure 16). The main reasons for the historical biodiversity loss in the Netherlands are intensive urban and agricultural land use and related pressure factors, such as disturbance, overfertilisation and eutrophication, and the fragmentation of the natural environment. A comparison of the Dutch total area of protected nature areas with that of other Member States shows how intensively space is used in the Netherlands. The Netherlands scores below the European average with a National Ecological Network surface area that covers about 14% of the country.

The Programmatic Approach to Nitrogen may reduce conflict between agriculture and nature

Agricultural development and improvements to nature and water quality lead to conflict. Production conditions are being improved in agricultural areas; for example, through takeovers and expansion and the implementation of labour-saving technologies. In nature areas, the focus is on achieving the status required to be able to meet European nature objectives. The government hopes, through the Programmatic Approach to Nitrogen, to encourage area-specific coordination around the nitrogen-sensitive Natura 2000 areas. Because all the stakeholders are involved in the programme and because recovery measures have been agreed on, this approach makes it possible to both realise nature objectives and enable economic development. The

Figure 16

Causes of biodiversity loss in Europe, 2010



Source: GLOBIO, PBL

Of all the countries in the European Union, spatial pressure is highest in the Netherlands.

success of the approach, however, does depend on implementation of the recovery measures and monitoring of their effects.

Achieving ambitions related to agriculture, nature, environment, water and recreation requires coherence

Reducing conflict between agriculture and nature and between urbanisation and attractive natural surroundings requires a vision that shows how the differing ambitions for rural areas may coherently be achieved. This could enable the Common Agricultural Policy, the Delta Programme, environmental policy and nature policy to have a greater influence on development opportunities for nature, the environment, water, landscape and agriculture at the national level. Such a vision on the development of rural areas could also include its significance for recreation and leisure.

Decentralisation provides opportunities for a regional-specific approach

The decentralisation and deregulation of nature and landscape policy provides opportunities. For each province, they create the possibility of dealing with conflicts in rural areas at the regional level and of focusing more strongly on an area-specific approach. Provinces can take the role of regional manager to reduce conflict between agriculture and nature; for example, within the previously mentioned Programmatic Approach to Nitrogen. Agri-environment management can be implemented where the chance of maintaining an agricultural environment is highest, where ecosystem services are required or where there are environmental issue in nature areas. This should solve

the ambiguousness in the management of agri-environment schemes, within and outside the National Ecological Network. For issues that go beyond the level of the province, it is up to national government – examples are spatial dynamics in the Randstad, European nature and water regulations and meeting international reporting obligations. The previously mentioned coherent vision can provide a framework for this.

Intermediary organisations important in mobilising society
Citizens are increasingly prepared to become involved in managing or protecting nature. However, they are not swayed by the definitions provided by experts or policy, which are regarded as too abstract and incomprehensible. The distinction made between nature, the environment, landscape and agricultural production is insignificant within the much broader definitions as applied by the general public.

A 'catalyst' may help to get private initiatives off the ground – an intermediary organisation that makes sure that initiatives gain a foothold and interested parties find one another, and that helps groups find their way through regulations, subsidies and opportunities. An example are agri-environment organisations, which sometimes extend their sphere of activity, for instance to energy initiatives. Nature and landscape policy also benefits from the support of such organisations.

The greening of the Common Agricultural Policy requires spatial coherence
The Common Agricultural Policy reform to take place in 2013 will ensure a greater focus on biodiversity in agricultural areas; for example, by introducing ecological focus areas. This European policy mainly supports rural development and farm incomes. Ecological focus areas can be effectively implemented by removing them from production for either a period of several years or permanently, through targeted management, by capitalising on an area's regional characteristics and by ensuring good spatial integration of the areas. This last option requires a focus on the connection with existing nature areas, so that species may move freely throughout the agricultural area. Small-scale landscapes can be given an extra boost if landscape elements are created within the ecological focus area. Creating wet buffer zones, for example, benefits water quality.

National policy on water safety and water management

There is a conflict related to water safety between the current, simple, solidary safety policy and the wish to achieve an efficient management of water safety risks. Efficient management can be made possible through:

- an approach that is more focused on risk, in other words on the chance and effects of flooding;
- differentiation, in time and place of investment, based on differences in the costs and the achieved risk reduction;
- paying more attention to group risks.

The main conflict in water quality is between the priority given in policy to agriculture and the efficiency of measures. A review of these priorities could be best carried out by explicitly choosing whether agriculture, water quality or ecology should take priority in a specific area.

- Spatially differentiated choices allow the more targeted interpretation and implementation of water objectives in a region. A strategic spatial vision for water, groundwater, agriculture, nature and housing enables more coherent choices to be made. Such a vision takes into account the priorities of national government (such as an emphasis on the economy) and supra-regional coherency (system mechanisms).

Continuing water policy issues

Dealing with water is a major factor in maintaining the safe, liveable and prosperous delta that is the Netherlands. This includes flood protection, limiting water drainage floods and ensuring enough high-quality water for people and nature. The main water safety objective is the sustainable management of flood risks on a socially acceptable level. Almost 60% of the Netherlands is susceptible to flooding from the sea or rivers; most of this is protected using primary water defences (dunes, dykes and structures such as the Eastern Scheldt storm surge barrier). Climate change, population growth and new knowledge about the ways in which dykes can collapse mean that flood protection requires continuous attention. Climate change also plays a role in the freshwater supply. The water supply may also come under pressure, for example, due to socioeconomic developments. The demand for water will probably increase, while its availability may decrease due to an increase in the number of dry periods. Finally, the ecological status of many water bodies does not yet meet all the objectives set.

Exploration of new water safety and freshwater supply strategies

Current safety policy is simple, effective and solidary in terms of cost and, in general, protection. A new climate-proof security strategy is being explored within the Delta Programme that includes a risk approach and new safety standards. A central concept of national government is 'multi-layered safety'; in addition to a focus on flood prevention, a focus is also required on spatial measures that help limit the consequences of floods and on dealing with emergencies. Possible strategies are also being explored in the Delta Programme to ensure a continued freshwater supply in the future, together with water safety and area-specific strategies.

A more efficient water safety policy

In many places, the water safety challenge is serious or becoming more so. The task of bringing water safety up to the required level can be carried out more efficiently if it is based on a risk approach that takes the effects of flooding (in terms of casualties and damage) more into account than the current system. A risk approach provides the best opportunities for implementing the extra water safety policy task as efficiently as possible, applying smart combinations of the possibilities available in the fields of prevention, spatial development and emergency planning. The concept of casualty risk will also have an important role to play. Efficiency would also be improved if investments were distributed more in time and space, based on differences in cost and

required risk reduction. Although such differentiation makes it more possible to implement cost-effective policy, it may be difficult, politically and administratively, to carry out in actual practice.

Agriculture, water quality and nature objectives often irreconcilable

In many areas, the ambitions for agriculture are irreconcilable with water quality and nature objectives. Because national government currently gives priority to agriculture, water quality improvement measures are inefficient in some areas. The water system in large parts of the country is based on agricultural use and results in water stress in nature areas. This, together with the fertilisers and pesticides from agriculture, prevents realisation of nature and water quality objectives. Should the proposed measures be implemented, all the Water Framework Directive (WFD) objectives for 2027 are expected to be achieved in only 40% of Dutch waters, at the most (see Figure 17). Taking into account the proposed cutbacks presented in the National Administrative Agreements on Water and Nature, this could be even as low as 5%, in the worst-case scenario.

More effective water management possible by differentiating objectives according to areal

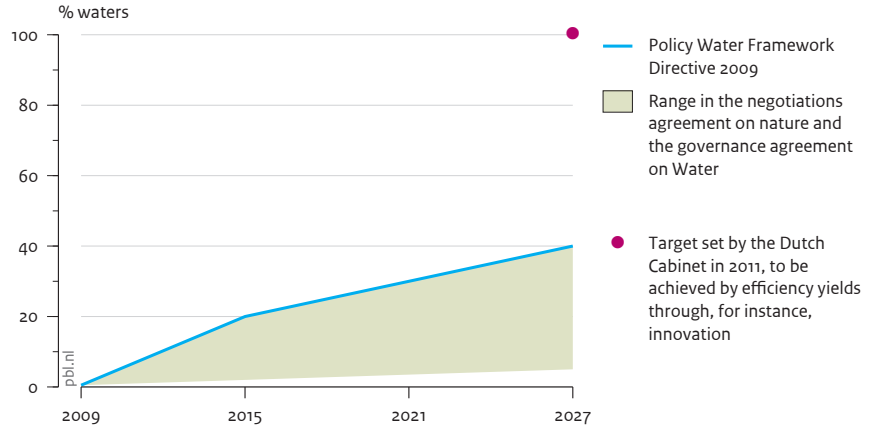
There would be more chance of achieving the agriculture and water management objectives if national government were to review its general criteria regarding the priority given to agriculture (current land use, voluntary land acquisition, no extra agriculture costs). For each area, the government could determine whether the priorities lie with agriculture or water quality and ecology. In areas where agriculture would still have the highest priority, the choice could be made to adjust the water quality objectives and to focus less on water quality measures; in other areas the water quality objectives should define agricultural practice and therefore make the effective implementation of water quality measures possible. Extending these choices to both water quality policy and agricultural policy (including crop protection and fertiliser policy) will increase the currently limited coherence between these policy areas.

Area-specific differentiation requires a strategic spatial vision

A strategic spatial vision for water, agriculture, nature and housing for the Netherlands could broadly clarify the functions that the government would like to facilitate in the Netherlands, as well as where and to what extent. Such a vision could form a basis for the area-specific choice for agriculture or water and ecology. It would take into account the priorities of national government (such as an emphasis on the economy) and supra-regional coherency (system mechanisms). It would also provide guidance regarding the water objectives that are required or possible at the regional level, given the limitations that some functions place on the water system. Finally, a strategic vision could also determine the margins for the regional objectives and measures.

Figure 17

Realisation of water quality target



Source: PBL

The percentage of water bodies that would meet all the Water Framework Directive (WFD) water quality objectives by 2027 will be between 5% in a worst-case scenario based on cutbacks and 40% in the case of the full implementation of the river basin management plans policy (2009). The Rutte Cabinet had hoped to achieve the WFD objectives through efficiency gains and innovation.

National policy on accessibility

For accessibility, the emphasis lies on developing policy that increases travel speeds and facilitates the demand for transport. This means that both government and society will continue to pay a high price for infrastructure, transport and external environmental effects. This results in a conflict, which can be reduced by:

- paying more attention to the importance of proximity;
- questioning the extent of the mobility demand of users;
- improving coordination between regional spatial developments and infrastructure;
- redistributing the existing infrastructure capacity and the cost of accessibility by finding other ways for users to pay for mobility and by reviewing mobility subsidies (such as the tax-free commuter allowance).

Accessibility serves several purposes

Improving accessibility has for many years been a prominent ambition of national government policy in the Netherlands. This ambition serves several public interests and wishes; wishes and interests that the government has used to varying extents over the years to justify its policy. There are, in general, three reasons for improving accessibility: 1) to stimulate the Dutch economy, 2) to provide development opportunities for people by enabling them to take an optimum part in the economic and social process, and 3) to increase the ease with which we travel and the travel experience.

Current accessibility policy mainly is based on travel speed
Economical motives currently dominate accessibility policy. According to the Dutch Planning Vision for Infrastructure and Landscape (*Structuurvisie Infrastructuur en Ruimte (SVIR)*), accessibility should contribute to greater competitive power and a better spatial-economic structure. It should also, as much as possible, meet the mobility wishes of the general public.

Most accessibility measures focus on improving infrastructure and transport volume. Investments are made in all transport modes, as well as for the use and expansion of transport capacity – all with the aim to increase travel speed. Better connections between the different types of infrastructure are also expected to contribute to a multimodal system that functions as smoothly as possible. As far as urban development is concerned, the SVIR states that there must be optimum accessibility for new housing and that new housing developments that cannot be realised within the existing urban area should preferably enjoy multi-modal accessibility. In the interaction between infrastructure and space, too, the focus is mainly on the facilitatory aspect of infrastructure. Necessary constraints to accessibility policy include the protection of nature areas, landscape and cultural-historical qualities and maintaining environmental quality.

Proximity more important than speed and deserves greater policy focus
National government strongly emphasises travel speed. However, the accessibility of a location depends much more on travel distance than travel speed. Even so, proximity – the spatial distribution of points of departure and arrival – is barely addressed in the accessibility policy discussion. Spatial developments that for example contribute to greater 'mass' at a particular point without requiring longer travel distances also contribute to improving accessibility.

The starting position is favourable; spatial policy in recent decades has resulted in the relatively high concentration of functions in, and the compact development of, urban areas. However, this situation may not continue or be intensified in the future. Policy that focuses on the priorities of urban regions can have a favourable effect on the mass of economic core areas. The consequences for the density of a region, however, remain unclear. Decentralised government authorities are the crucial players as they are responsible for good spatial development, although this does not mean that national government can rest on its laurels. National government remains responsible for the possible supra-regional effects of spatial development choices and for ensuring a return on government investments made earlier.

Each approach requires different decisions to be made
If people are able to travel more quickly, this has economic benefits, as well as enabling the traveller to reach a greater number of destinations (see Figure 18). Faster travel, however, is also associated with more pollution, safety risks and higher costs both for journey and infrastructure. The question also arises whether faster travel does in fact

ensure that more people reach their destination in a pleasant manner and against an acceptable cost. The policy emphasis on speed also introduces a risk of possible causes of the higher speeds not being addressed; a decrease in the number of traffic jams, for example, can result from a stagnating economy or a decrease in social participation.

Greater proximity, through concentration and more compact urbanisation, improves accessibility because people quite simply need to travel less far. It also results in a higher economic mass, which is positively related to international competitive power. A higher density of points of departure and arrival, on the other hand, may result in a higher density of traffic and therefore have a negative impact on travel speed. Greater proximity, thus, makes higher demands of the spatial organisation of the human environment. Transport volume improvements may influence proximity, and vice versa.

Increasing travel speed results in a latent demand for mobility, as destinations that are further away can be reached within the same amount of time. In the past, however, increases in speed have resulted in greater travel distances and expansion in many sectors. As previously mentioned, there are economic benefits to this. One of the problems, however, is that the vulnerable groups pay the bill, as using cars or public transport becomes too expensive.

Better management of accessibility through critical examination of the mobility challenge

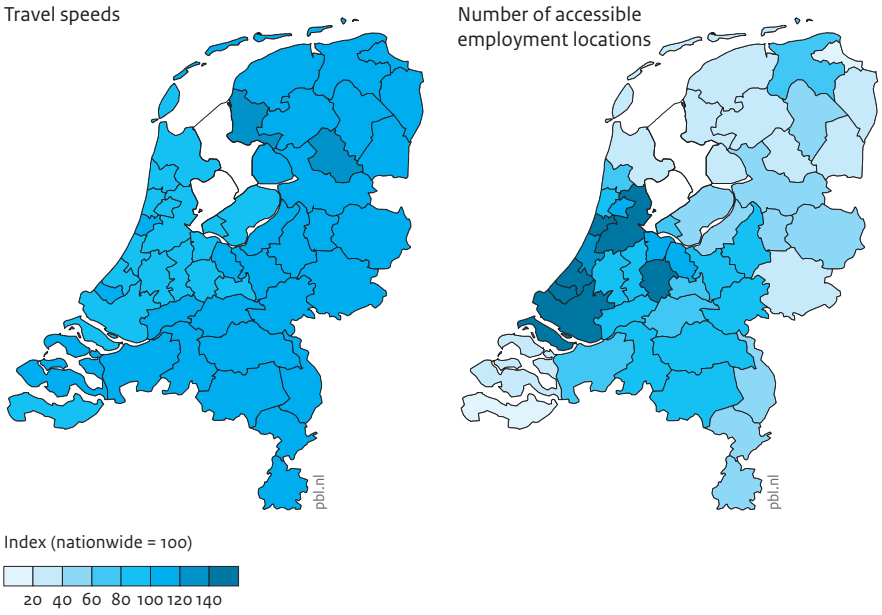
The government is traditionally the main operator of road, rail and waterway networks in the Netherlands. It is also a commissioning body and funder of public transport. In this way, the government fulfils a public task: creating the necessary conditions for economic development and social participation. It is an ambition of national government to facilitate demand for mobility. Such facilitation may have positive effects on the economy and on society, but also results in high costs to society in terms of infrastructure, transport volume and external environmental effects. After all, facilitating mobility focuses mainly on increasing the volume of infrastructure and transport. This results in an increase in travel demand, which in turn requires more investment to facilitate the resulting demand, in any case as long as the extra costs are not, or not fully, passed on to the user. Only if the mobility demand can actually be influenced will it become easier to manage the accessibility issue.

Financial incentives such as pricing policies make businesses and the general public part of the mobility challenge solution

Current accessibility policy does not do much to encourage actors outside government (businesses and the general public) to take responsibility for improving accessibility. Because the government is the main provider of infrastructure and transport, other actors are not required to take this responsibility and their energy and creativity remains untapped. A pricing policy is an example of an instrument which, together with countervailing policies that provide other options, encourages users to take a more critical look at their own mobility. This provides scope for parties other than the

Figure 18

Two approaches to accessibility, 2008



Source: PBL (2011b)

Accessibility, expressed in travel speed, is slightly higher in the north, east and south of the country than in the west. Travelling fast, however, is not the same as arriving at a destination quickly. According to the definition of accessibility, which takes into account the spatial distribution of points of departure and arrival, in the west of the Netherlands there are substantially more destinations within reach than in other areas.

government to be part of the solution. A pricing policy also improves traffic flow. For example, removal of the tax-free commuter travel allowance may improve traffic flow in the longer term and reduce the demand for mobility. However, in the short term, it may be difficult for commuters to adapt their behaviour to the new situation.

Levelling off in growth makes supra-regional coordination of infrastructure investments even more important

The negative external effects of mobility and accessibility, the effect that transport volume has on the daily mobility choices of users (do I use the bicycle or the car, or not go at all) and the large corresponding investments mean that careful choices need to be made. Certainly now that shrinking budgets, a levelling off in population growth and employment, and stabilisation and even decline in large areas of the Netherlands are becoming a realistic future perspective, the spatial development and infrastructure choices that are made now will be crucial, both for the national government and the regions.

The decentralisation of spatial policy makes it more difficult for national government to manage the supra-regional consequences of spatial choices and to obtain an optimum return on national investments in infrastructure. Spatial coordination is now the responsibility of the provinces; in the planning phase, coordination with infrastructure takes place in the meetings held by national government and the decentralised government authorities within the framework of the Multiannual Programme for Infrastructure, Space and Transport (MIRT). There are however insufficient guarantees that supra-regional coordination will take place in actual practice.

National policy on urban area development

In the case of urban area development, the parties involved aim to achieve the best possible result within the framework provided by environmental law. Environmental law, with its generally applicable standards, enables municipalities to work efficiently, provides certainty regarding legal examination and ensures that environmental interests are upheld. The long lead time involved in area development, however, to some extent may be ascribed to environmental law. Environmental law can also, in specific cases, hinder improvements to the quality of the human environment. This does not take away the fact that the proposed changes to this law provide national government with opportunities for increasing the quality of the human environment and the efficiency of planning processes. Examples of such opportunities are:

- To stimulate municipalities to make optimum use of the opportunities provided by the Interim city and environment act (*Interimwet stad-en-milieubenadering*) and the Crisis and Recovery Act. This may enable the parties involved to find creative solutions for area developments that have stalled due to the issue of environmental standards. Most municipalities would then not need to apply their extra jurisdiction – to deviate from the environmental standards (temporarily, and under strict conditions) and to compel companies to take additional environmental measures – to complete the area development.
- To provide decentralised government authorities with more scope, within the confidence intervals of the intended environmental quality, for making a decision taking into account their own interests, as long as environmental interests are given full weight within the assessment. Such an approach may improve the quality of the human environment, but usually requires more effort on the part of municipalities and results in increased uncertainty regarding legal examination of the plans. This uncertainty could be reduced by replacing the legal examination of plans against environmental standards with an examination against clear procedures regarding the method to be used by the municipalities to design and implement the interest assessment process.
- To implement a global environmental assessment in the design process, only including the details in the final version. This would enable the level at which the future environmental quality must be assessed to better match the way in which the details of the plan are drawn up.
- To allow municipalities to promote environmental interests more independently – with no financial interest – by adapting land development regulations.

- To encourage municipalities to make more use of specialist knowledge and to improve intergovernmental cooperation between municipalities.

Urban area development drawn out and sometimes misses opportunities

Traditionally, spatial development in the Netherlands often takes place through large-scale, integrated area development. The economic crisis, however, and the reduced demand for housing and offices have resulted in the creation of smaller-scale and more organic forms of area development. There are usually many different parties involved in area development – both public (municipalities) and private (land owners, property developers and housing corporations) – representing many different interests; for example, social and economic interests and those related to a clean, safe and healthy environment. Environmental law allows these interests to be carefully weighed against each other. The procedures laid down in environmental law, however, can result in drawn-out area development processes and suboptimal results – at least this is often claimed.

Current environmental law also may result in missed opportunities for improving the quality of the human environment (e.g. Kuijpers, 2010). Whether environmental law as applied to area development results in missed opportunities for improving the quality of the human environment – here defined as both environmental and spatial qualities – is difficult to establish empirically, not in the least because an optimum quality is dependent on local opportunities and demands. Because environmental standards are generally formulated, it is also not possible in every situation to make an optimum assessment. A distinction should also preferably be made between the general applicability of the standards (must the same standards always be applied?) and the function of the standards (how do they protect public health?). There are a number of well-known cases, however, in which environmental standards (for air quality in particular) have hindered area development, and therefore the opportunity to improve the quality of the human environment in an area. The Dutch Government has now introduced several tools for getting area development back on track if it has run up against environmental law issues: the Dutch National Air Quality Cooperation Programme (NSL), the Interim city and environment act and the Crisis and Recovery Act area development plan.

Environmental law only partly responsible for long lead time

The many, and sometimes complex, regulations on cultural history, soil, flora and fauna, air quality, noise and external security (environmental law) are only partly responsible for the drawn-out processes. Even the time spent on research that is required by law has only a limited influence on the length of the total process. It in fact appears to be the preparation phase in the area development plan process that takes up so much time. This phase involves finding an optimum balance between design, programme, land use and support, and all within the applicable legal framework. Finding this balance is a complex and time-consuming puzzle. The fact that in the Netherlands people often choose integrated, large-scale plans makes the puzzle even more complex. Delays are

often due to research results that require changes to the design, programme and/or land use. Changes to the design, for example, may also require the research to be repeated.

The informal preparation phase can be as long as ten years or more. The formal procedure, in which a draft development plan is drawn up, is relatively short; this takes an average of 20 weeks. The appeal phase, finally, at court or the Council of State, generally takes around 48 weeks for the average plan.

Municipal financial priority prevents commitment to more than minimum environmental quality

Municipalities represent opposing interests. They have a financial interest in projects that generate a high land price, stimulate employment and attract new residents. They also have an interest in a good environmental quality and in a healthy and safe environment for their residents. In the case of area development, municipalities often attach greater importance to the financial interests than to environmental quality. They earn money through land development, part of which they use to invest in public spaces and to pay for unprofitable developments (offsetting mechanism). This mechanism means that municipalities try to ensure that as many activities as possible remain within the applicable environmental standards, and it discourages a higher environmental quality.

Environmental law does not sufficiently take into account uncertainties in environmental impact assessment

The legally prescribed use of point estimates – estimates without confidence intervals – for the assessment of environmental standards results in differing outcomes, even though the projects result in similar environmental qualities that fall within the confidence interval. One estimate may be just above a standard, and another just below. This arbitrariness could be overcome by allowing greater scope for decision-making at the administrative level, within the confidence intervals. This could improve the quality of the human environment, as long as environmental interests are given full consideration in this decision-making process. However, administrative decision-making generally requires more effort and results in greater uncertainty about legal examination compared with the current procedure involving examination against environmental standards. This uncertainty could be overcome by drawing up clear procedures regarding the method to be used by municipalities to design and implement the interest assessment process.

The required detailed environmental impact assessment not only provides too little scope for dealing with uncertainties in the underlying calculations; the level of detail required early on in the process does not correspond to the level of detail in the development plan. For global development plans, for which there is a greater need due to the current economic crisis, this may result in more research being carried out than may actually be required.

Often, changes are also made to development plans that have already been agreed on; for example, because of a change in market conditions. If these changes cannot be incorporated within the development plan, the detailed research often needs to be carried out all over again. The efficiency and the speed of current environmental impact assessments, therefore, could be improved by ensuring that they better correspond to the level of detail decided on in the development plan: global in the design phase and more detailed in the final version.

Policy renewal for more coherence between environmental policy and area development

Since the beginning of environmental law in the 1970s, the Dutch Government has implemented several policy renewals to increase coherence between various aspects of environmental policy and spatial development, starting towards the end of the 1980s with the creation of the spatial planning and environment (ROM) areas. This has been continued over the last 15 years; for example, with the National Action Plan on Environment and Health (NAMG), the Interim city and environment act, the accountability regarding group risk guideline, the Dutch National Air Quality Cooperation Programme (NSL), the draft policy for temporary nature (Conceptbeleidslijn tijdelijke natuur), the front-runner area experiments regulation (Experimentenbesluit Excellente gebieden) and the Crisis and Recovery Act (Chw) area development plan. An analysis of this last approach produces the following observations:

- By making use of the additional powers given under the Interim city and environment act – to deviate from environmental standards under strict conditions – municipalities can encourage the parties involved to come up with creative solutions for area developments that have reached a deadlock. Experiences with the act show that deviations from the standards are as a result almost never necessary and that the quality of the human environment does improve. However, it seems to be difficult for municipalities to meet the conditions set out in the act, as this requires a high degree of specialist knowledge. Deviation from the usual method also increases uncertainty regarding legal acceptation of the plans. This may help explain why the interim act is applied so little.
- With the NSL, the Dutch Government introduced a programmatic approach that combines area development projects with a packet of measures (often beyond the scope of the projects) to meet air quality standards. The advantage of this is that the standards can be met by applying more efficient measures, and that the projects no longer need to be individually assessed. This allows them to be carried out more quickly and with more certainty. Such a programmatic approach is also in theory suited to application in more local environmental problems such as noise and external security. Potentially effective applications, however, seem to be limited to locations with a high density of sources of noise and/or external security risks, such as ports and industrial areas.
- The Crisis and Recovery Act (Chw) area development plan provides municipalities with the power to temporarily deviate from the applicable environmental standards when carrying out area development, and to oblige businesses to implement certain

environmental measures. Initial experiences show that this motivates parties to actively look for solutions to the problems, which in turn means that municipalities do not always need to make use of their authority. The flip side of such an approach is that the environmental quality of a particular area may temporarily fail to meet the legal standards and that the existing environmental rights of businesses may be affected. Weighing up these rights against local interests results in even more uncertainty regarding the legal examination of the plans. As yet, the Chw offers insufficient guarantees that the intended final result will be achieved. This could be done by making the required environmental measures legally enforceable.

- The current approach to area development often results in a quality that just meets the environmental standards. An environmental quality that goes above and beyond what is legally required is rarely achieved. This is because municipalities allow the financial benefits of profitable land development to weigh more heavily than other factors in their planning. Environmental improvements would have a better chance in the decision-making process if the municipality did not financially benefit from land development. A higher quality could also be encouraged by involving environmental, safety and health experts early on in the planning process and by making more use of their knowledge and competences.

Adapting standards to the most current scientific insights is important for efficient health protection

To ensure the functionality of environmental policy, it is important to regularly carry out a critical review of the effectiveness of environmental standards. An example is following new scientific understanding regarding the link between exposure to environmental factors and their effects on health. For example, there is increasing evidence that exposure to certain ultrafine carbon particles – in particular those emitted from the combustion process – has a significant effect on health through air pollution; more than exposure to a particular mass of particulates or nitrogen dioxide, for which standards are in place. Area development projects take air quality standards into account under the assumption that this effectively ensures a healthy environment, while this is certainly not always the case. It would therefore make sense to research, in consultation with the European Union, whether the current air quality standards system could be replaced with a different approach that would be more beneficial to health.

Environmental law reform offers opportunities for urban area development improvements

Environmental law is only partly responsible for the long lead time involved in area development projects and the corresponding missed opportunities for achieving a better quality human environment. Nevertheless, changes to this law do provide opportunities for a better quality human environment and more efficient planning processes.

Municipalities have a lot of influence on the implementation of development projects and can therefore make a significant contribution to improving the area development

process. In situations in which differing requirements and demands are difficult to unite within the existing environmental standards, municipalities have much to gain though intergovernmental cooperation, by coordinating different policy fields at an early stage, by involving local parties early on in the planning phase and by making use of the required knowledge and skills of third parties or obtaining such knowledge and skills from a higher administrative level if they are not available at the municipal level. National government can help municipalities in this by encouraging intergovernmental cooperation and by improving accessibility to knowledge; for example, through the regional services (*Regionale Uitvoeringsdiensten*).

National government can support urban area development in environmental law reform in several ways, such as by:

- *Changing the current rules regarding the environmental impact assessment*. To be able to improve the quality of the human environment, the environmental impact assessment should focus more on the uncertainties surrounding the determination of the future environmental effects of urban development. This can be done by providing additional scope within the confidence intervals for weighing up environmental interests against other interests, as long as it can be guaranteed that full consideration will be given to environmental interests. To be able to work more quickly and more efficiently, the environmental impact assessment should be global during the design phase and detailed in the final development plan.
- *Giving municipalities additional powers;* for example, as was done in the Interim city and environment act and in the area development plan in the Crisis and Recovery Act. Municipalities could use these extra powers to motivate local and private parties to take part in the early stages of the planning process and to make a constructive contribution to area development projects. National government could also ensure that parties carry out the measures agreed by making this enforceable under the Crisis and Recovery Act.
- Introducing incentives in environmental law that provide compensation for the fact that municipalities have a financial interest in profitable land development. This could promote the realisation of a high-quality environment that surpasses environmental standards.

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Colophon

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