Environmental Balance 2007

Summary

Netherlands Environmental Assessment Agency

with

Transport Research Centre (AVV)

Statistics Netherlands (CBS)

Netherlands Bureau for Economic Policy Analysis (CPB)

Netherlands Energy Research Foundation (ECN)

Royal Dutch Meteorological Institute (KMNI)

Agricultural Economics Research Institute (LEI)

National Aviation and Space Exploration Laboratory (NLR)

National Institute for Coastal and Marine Management (RIKZ)

National Institute for Inland Water Management
and Wastewater Treatment (RIZA)

National Institute for Public Health and the Environment (RIVM)

Netherlands Institute for Spatial Research (RPB)

SenterNovem, a government agency for innovation, energy and climate,
and environment & spatial planning

Social and Cultural Planning Office of the Netherlands (SCP)

Wageningen University and Research Centre (WUR)

Netherlands Environmental Assessment Agency

Foreword

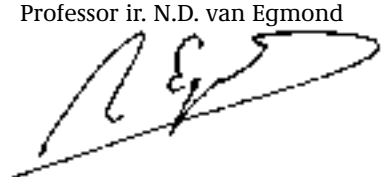
Every year the Netherlands Environmental Assessment Agency (MNP) publishes an Environmental Balance in the framework of the Dutch Environmental Management Act. This Environmental Balance provides an overall picture of the emissions and environmental quality in the Netherlands in relation to current policy and societal trends. Other problem areas and policy dilemmas are also dealt with here. The part dealing with the analysis of the achievement of environmental policy targets has been derived from the MNP publication 'Realisation of Environmental targets – Progress Report 2007' (Realisatie Milieudoelen – Voortgangsrapport 2007), published in May this year. The focus of the Environmental Balance is on broad policy assessment.

The 2007 edition of the Environmental Balance consists of two parts, just as the Nature Balance, which will be published simultaneously with the Environmental Balance. The first part deals with the relationship between the relevant societal trends and environmental quality (Chapter 1), while the second part consists of four chapters in which the trends related to specific environmental themes are integrally discussed. The thematic chapters focus on climate change (Chapter 2), air quality (Chapter 3), environmental quality in rural areas (Chapter 4) and environmental quality in urban areas (Chapter 5). The relationship between environment and nature is dealt with mainly in Chapter 4.

The statistical underpinning of the analysis – including new emission data, provisional data for 2006 and data on environmental costs – is included in the annexes. A detailed statistical survey of the emission data and a large number of other environmental indicators are available in the Environmental and Nature Compendium (in Dutch only) at www.milieuennatuurcompendium.nl – a joint publication of the Environmental Assessment Agency (MNP), Statistics Netherlands (CBS) and the Wageningen University and Research Centre (WUR).

A large number of sister institutes and agencies have contributed their expertise and data to the Environmental Balance publication; they are acknowledged on the title page of the publication itself. Further information was provided by the Pollutant Release & Transfer Register (in Dutch: Emissieregistratie) – a broad joint venture under the Inspectorate of the Ministry of Housing, Spatial Planning and the Environment (VROM).

Professor ir. N.D. van Egmond



Director of the Netherlands Environmental Assessment Agency (MNP)

Summary of the Environmental Balance 2007

Increased awareness about environment not reflected in consumer behaviour

The pressure on the environment has generally declined in the last decades. Very little of this is can be ascribed to environmentally-friendly behaviour by consumers: environmentally-friendly products generally make up less than 5% of total consumption. Nevertheless, the environment has become more important in public opinion. Environmental issues are higher up the list of people's concerns than they were a year ago. Support for additional environmental protection measures has also grown substantially. A clear majority of Dutch citizens take a positive attitude towards measures that would achieve an additional 10% reduction in CO_2 emissions. And people are also prepared to pay for these measures – as long as everyone else does too. In effect, people want the government to regulate the process.

Terrestrial ecosystems face problems of nitrogen deposition, water table drawdown and habitat fragmentation

The increasing scale and intensification of agricultural production, the growing number of buildings in the countryside and the construction of infrastructure have in the past put considerable pressure on the environment and led to fragmentation of nature conservation areas. These problems hamper the sustainable conservation of biodiversity. The most persistent environmental problems affecting terrestrial ecosystems are high nitrogen deposition and water table drawdown. Excessive nutrient concentrations still prevent the achievement of a good ecological quality of surface waters. Under the current policy objectives, the environmental problems and the fragmentation of ecosystems will only partly be resolved by 2010. It is therefore unlikely that the European target of halting the loss of biodiversity before 2010 will be achieved for all species and across all areas.

Since 1994 nitrogen deposition has gradually declined from 3000 to 2100 mol nitrogen per hectare. Despite this fall in deposition, current levels of deposition on many ecosystems are still too high (*Figure 1*). If the Netherlands and other EU countries meet their national emission ceilings for ammonia and nitrogen oxides by 2010, average nitrogen deposition on ecosystems will decline further to about 1900 mol per hectare per year. At this level of deposition, a sustainable level of protection will be achieved for 20% to 30% of the total area of nature conservation interest in the Netherlands. The critical load for Dutch ecosystems – the deposition load below which no significant adverse ecological effects will occur – will then be exceeded by an average of 400 mol per hectare per year. There are large regional differences in the degree to which these critical loads are exceeded. Excess deposition is particularly high in areas containing intensive livestock farms.

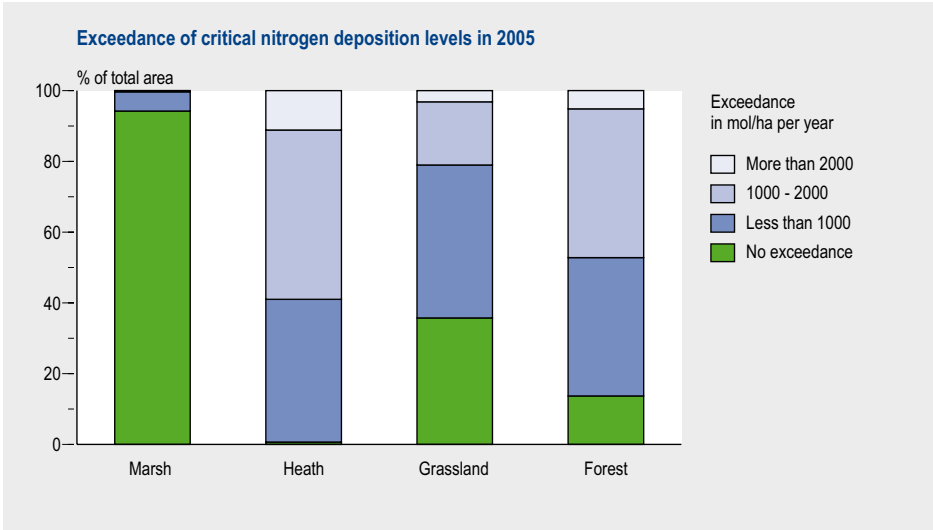


Figure 1 Exceedance of critical nitrogen deposition on ecosystems in 2005. The main categories contain target ecosystem types that are more sensitive to excess nitrogen deposition. Some of these target ecosystem types are subject to statutory obligations under European Union legislation.

The decline in nitrogen deposition is due mainly to generic measures. The introduction of additional generic measures would reduce national ammonia emissions by at most 15 ktonne by 2010. This would reduce the average deposition on Dutch ecosystems by about 170 mol per hectare per year. A more stringent emission policy would create a conflict between the interests of the environment and the landscape. A cost-effective way of reducing ammonia emissions is to fit air scrubbers to livestock sheds. This approach is most effective when the scrubbers are fitted to relatively large livestock sheds, but large sheds are considered to be potentially intrusive – particularly in small-scale landscapes.

Another important environmental problem facing terrestrial ecosystems, besides nitrogen deposition, is water table drawdown. Almost all groundwater-dependent ecosystems are affected by water table drawdown, but over the last few years hardly any progress has been made with the hydrological restoration of these areas. This will change now that the provincial authorities following the advice of the 'water depletion task force' (in Dutch: Taskforce Verdroging), have designated priority areas for hydrological restoration where groundwater levels should be restored by 2015. Although the provincial authorities have in general designated ecologically valuable areas, not all Natura 2000 protected areas affected by water table drawdown will receive priority treatment for hydrological restoration. This is partly because the available budget for hydrological restoration measures (Rural Areas Investment Budget, in Dutch: Investeringsbudget Landelijk Gebied) is insufficient to tackle water table drawdown in all Natura 2000 areas. In addition, the provincial authorities are not aiming at full hy-

drological restoration. Under the current agreements, it is therefore unlikely that the objective of restoring the environmental conditions of Natura 2000 protected areas to an adequate level by 2015 will be achieved.

Further reduction in greenhouse gas emissions after 2012 presents a considerable policy challenge

Global temperatures are rising and the climate is changing. It is highly probable that most of the rise in global temperature since the middle of last century has been caused by the increased greenhouse gas concentrations in the atmosphere resulting from human activities. Given that precipitation rates are rising as the climate changes, one of the consequences of this for the Netherlands is that in time more than 35,000 hectares of land will be needed for water storage. During this century the expected rise in sea level does not appear to present a serious threat to the Dutch coastline. However, rising sea levels may cause problems for river discharges because the gradient in river-water level will become too small for natural river discharge.

To limit the effects of climate change, the EU wants to restrict the average rise in global temperature to 2 degrees Celsius. To achieve this, global emissions of greenhouse gases must have been reduced substantially in 2050, by 25-60% from 1990 base levels. The EU is aiming for a reduction of 20-30% from 1990 levels by 2020, depending on the percentage reduction targets set by other developed countries.

In its coalition agreement, the present government aims at a 30% reduction in greenhouse gas emissions from 1990 levels by 2020, and has set targets for energy saving (2% per year) and renewable energy (20% share of total consumption) to achieve this. Meeting the 2020 targets for both greenhouse gas reductions and for energy saving and renewable energy will involve taking relatively expensive measures. If the most cost-efficient measures are employed for the greenhouse gas reductions – with limited purchases of emission rights from other countries – greater use can be made of cheaper alternatives (such as CO_2 storage and reduction of other greenhouse gases) and the total reduction costs in 2020 can be halved. However, this would mean slightly lower percentages for energy saving (1.8% per year) and renewable energy (16%). Emission reduction costs can be cut back further if more emission rights are purchased from other countries (*Figure 2*).

The production of the biomass required to meet the target for renewable energy will require the use of land in other countries. Energy from biomass is generated from the combustion of organic material, much of it from crops cultivated especially for this purpose. The cultivation of these crops may be at the expense of land that would otherwise be used for food production or for biodiversity conservation.

Despite the use of energy saving measures and renewable energy (wind, solar and biomass), energy consumption and CO_2 emissions are now higher than in 1990. This rise in CO_2 emission levels is expected to continue in the coming years. Although CO_2 emis-

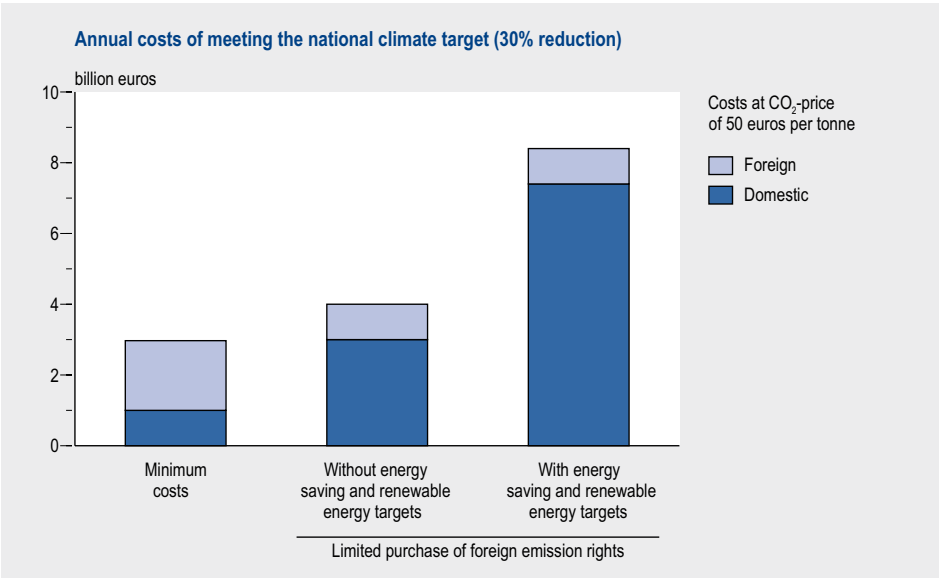


Figure 2 Costs of meeting the national climate target under different investment strategies (CO_2 price of 50 euros per tonne).

sion fell by several million tonnes in 2005, this was partly due to increased electricity imports. Electricity imports are unlikely to remain at this higher level, though, because Dutch energy companies are planning to build a large number of new gas- and coal-fired power stations. The expected fall in emissions of other greenhouse gases (methane, nitrous oxide and F-gases) will probably not be sufficient to entirely compensate for the increase in CO_2 emissions. Because the public and private sectors will buy large volumes of emission rights from other countries, the Netherlands will probably meet its Kyoto commitment (6% reduction in greenhouse gases in 2008-2012 from 1990 base levels) (*Table 1*). However, this presupposes that the government will actually be able to purchase enough emission rights. The increase in the price of emission rights means that the cost will probably be higher than budgeted.

Fewer noise problem areas but less peace and quiet

The growth in road traffic in the Netherlands has caused the extent of tranquil areas to shrink. At the moment about a third of all homes are subject to noise levels within the preferred limit value of 48 dB (*Figure 3*). This limit has been set to keep nuisance and serious noise annoyance to the minimum. Central government aims to have all problem sites subject to noise levels above 65 dB along roads and 70 dB along railways resolved by 2020. In addition, under the Noise Abatement Act local authorities can undertake remedial action to reduce noise levels along municipal and provincial roads.

Despite the growth in road traffic, the number of homes exposed to noise levels above 65 dB from motorways has declined since 2000 due to the use of very open-textured

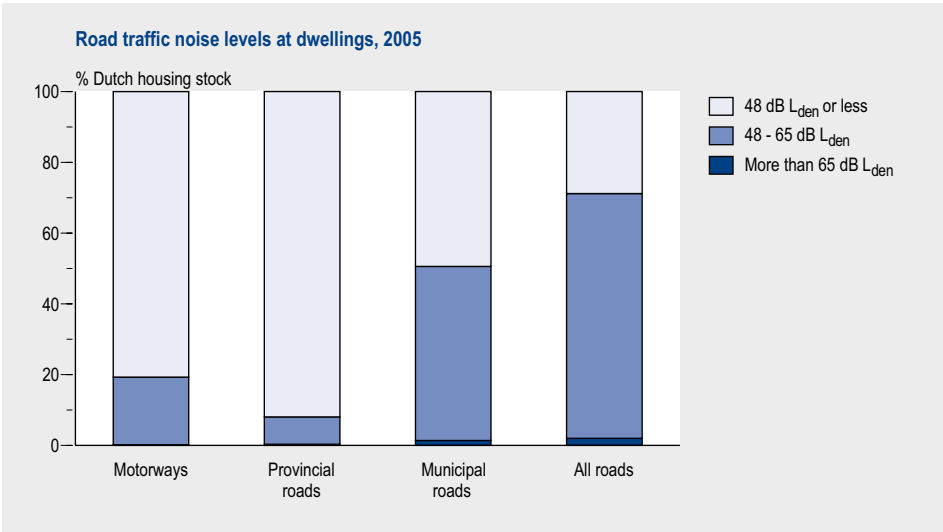


Figure 3 Traffic noise levels at dwellings.

asphaltic concrete (ZOAB) and the construction of noise barriers. However, ZOAB may be less effective at reducing road noise than previously thought. Research has shown that the noise-reducing properties of ZOAB decline as the ZOAB wearing course ages. Sites exposed to excessive noise from rail transport have also been reduced through the use of quieter tracks and rolling stock, and the erection of noise barriers. Currently about 2% of all homes are exposed to noise levels of 65 dB or more. The vast majority of these are located along municipal roads (*Figure 3*).

Air quality has improved – objectives within reach in ten years

Air quality in Europe and the Netherlands has improved greatly during the last decades. Much of this has been achieved through the implementation of source-oriented air pollution abatement policies, including those for industry and traffic (*Figure 4*). Nevertheless, even at present levels air pollution has substantial negative impacts on human health and ecosystems. Under current policies air quality will continue to improve over the next ten years, and the number of areas where air quality problems occur (limit value exceedance) will be considerably reduced. But with the policies now in force, it will not be possible to meet all EU limit values throughout the whole country before 2015, even if advantage is taken of the possibilities for postponing deadlines for compliance as foreseen in the proposed new EU ambient air quality directive. It cannot yet be established whether this will be possible following implementation of the proposed national policies, including the regional and local measures provided for in the national cooperation programme on air quality (NSL), in part because it is not yet clear which of the NSL measures will be implemented and what effects they will have. Moreover, there are uncertainties in the economic and technological developments as well as in the dispersion of air-polluting substances. The orbital roads around the

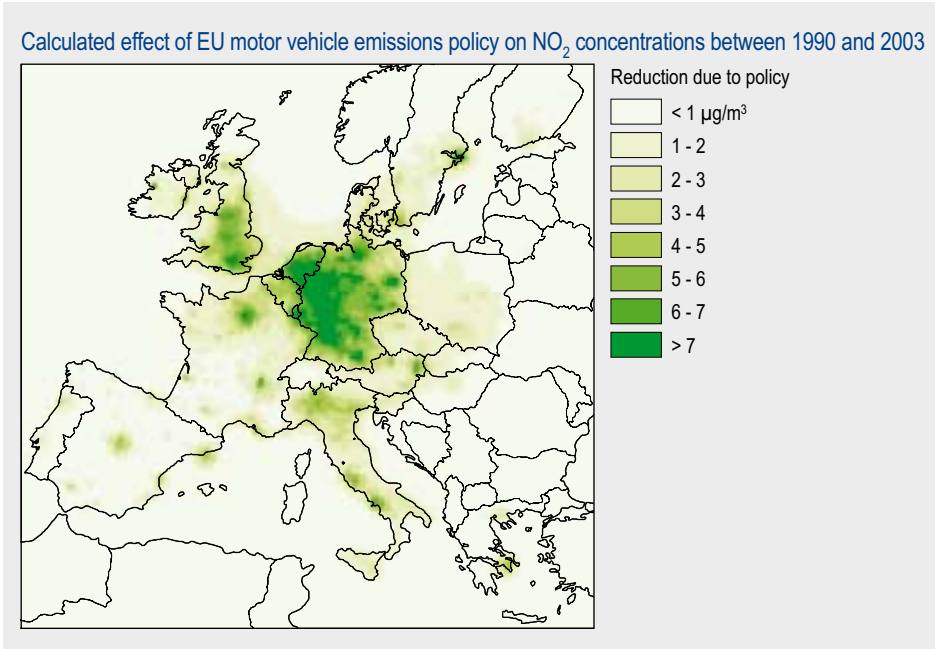


Figure 4 Calculated effect of EU motor vehicle emissions policy on NO_2 concentrations between 1990 and 2003.

major cities and the busiest streets in the city centres in the Randstad are among the most persistent air quality problem areas.

To reduce the impacts of air pollution on health and ecosystems, the EU has set national emission ceilings that must be met by 2010. The probability that the Netherlands will meet the emission ceiling for nitrogen oxides by 2010 under current policies is about 50%. Many other EU states are also finding it difficult to meet their national emissions ceilings for nitrogen oxides. It is unlikely that the sulphur dioxide ceiling will be met under current policies (*Table 1*), but if proposed policy measures are implemented, the probability will rise to about 50%.

The government's plans to reduce emissions of greenhouse gases during the period to 2020 are expected to lead to a net reduction in air polluting emissions. For example, policy measures for energy saving and stimulating the development of wind energy will lead to lower emissions of air pollutants. However, in some cases, the use of biomass and biofuels will lead to higher emissions of air pollutants if no countermeasures are taken.

Decoupling of economy and environment, except for CO_2 emissions and noise

During the last decades technological advances have played a crucial role in decoupling environmental pollution from economic growth. But if the rate of technological

development falls behind the rate of economic growth it may become increasingly difficult to ensure a continued decoupling of environmental pollution from economic growth. No decoupling has as yet been achieved for noise and climate change. The implementation of current environmental policies has succeeded in resolving many serious problem sites for noise pollution, but the growth of road traffic is making peace and quiet a much scarcer commodity in the Netherlands. And despite the energy savings that have been achieved, energy consumption in the Netherlands has increased since 1990, and consequently CO_2 emissions have risen. The traffic sector was responsible for the greatest percentage increase in CO_2 emissions. If the rate of technological development stagnates, the remaining policy option for achieving the desired environmental quality is to aim at changing people's behaviour (volume of consumption). This is currently reflected in proposals directed at the traffic sector, such as a differentiated car and motorcycle tax and road pricing.

Aiming at maximum use of environmental policy 'space' leads to complexity

The policy 'space' between the desired environmental quality and the environmental stress caused by societal trends is limited in 2007. Air quality is a case in point. Making the maximum possible use of the environmental space appears to go hand in hand with an increase in the level of policy complexity. This is at odds with the demand for fewer rules and less bureaucracy. It is almost inevitable that policies focusing on achieving environmental quality (effect-based policies) are more complex than source-oriented policies. After all, in the case of effect-based policies, the unavoidable scientific uncertainties involved in the relation between source and effect may be subject to political and policy debate. Policy complexity may be reduced by separating scientific uncertainties from the political decision-making arena, which requires rules of thumb for translating desired effects into 'source standards'. An example can be found in traffic safety policy, in which maximum speeds are controlled (source standard) with the aim of reducing the number of road casualties (effect).

Maximising the use of the environmental 'space' leads also to more spatial spreading of environmental pressures over the land area, while at the same time reducing peak concentrations of pollutants. This can be seen, for example, in noise abatement policy: lower noise peak levels, but also less peace and quiet. Another example is agricultural pollution: locally, the intensity of environmental stress has been reduced, but the stress is distributed over a larger part of the Netherlands.

Current policies generally insufficient to achieve environmental targets

Table 1 summarises the environmental trends and achievement of targets under current policies that are discussed in the Environmental Balance 2007. The trends in emissions and environmental quality are generally positive, but under current policies many environmental targets will not be met in time.

Table 1 Trends in emissions and environmental quality (1990-2005 and 2000-2005), achievement of policy targets and expenditure on the environment (in millions of euros per year, 2006 prices).

Theme	Trend 1990-2005	Trend 2000-2005	Target achievement[2)]	Environmental costs[1)] 2006
Climate: domestic target			(2008-2012)	
Climate: Kyoto commitment			EU (2008-2012)	
Rate of energy savings		*	(2010)	1250
Renewable energy			(2020)	
Renewable electricity			(2010)	
Emissions NO_x			EU (2010)	
Emissions SO_2			EU (2010)	
Emissions NH_3			EU (2010)**	
Emissions NMVOC			EU (2010)	1750
Emissions: particulate matter				
Air quality: particulate matter, NO_2			EU (2005/2010)	
Nitrate in groundwater			EU (2009)***	
Phosphate accumulation in soils			EU (2015)	
Pesticide-induced environmental pressure			(2010)	2595
Chemical quality of surface water			(2010)	
Ecological quality of surface water			EU (2015-2027)	
Deposition on nature areas			EU (2015)	
Fall in water table			EU (2015)	Unknown
Health effects: particulate matter				
Noise (bottlenecks)			(2020)	365
Noise nuisance				
External safety: societal risk				Unknown
External safety: location-based risk[3)]			(2010)	Unknown
Soil remediation			(2030)	630

[1)] Environmental costs to society, including central government costs; detailed information can be found in Annex 6 (in the Dutch original publication).
[2)] European obligations.
[3)] Based on resolving the problem sites within the 10^{-6} contour.

* Energy saving in the period 2000-2005 relative to 1995-2000.
** No account taken of the 'ammonia gap'.
*** Target will probably be achieved in the period 2010-2015.

Colour	Trend	Target achievement
	falling linear trend	> 66% chance of achieving
	-	55-66% chance of achieving target
	no significant trend	45-55% chance of achieving target; also referred to as 'fifty-fifty'
	-	33-45% chance of achieving target
	rising linear trend	< 33% chance of achieving target
	not applicable	no target set
	indeterminate	indeterminate