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Sustainable production and consumption

An assessment for the Netherlands

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Abstract

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Poverty, climate change and loss of biodiversity are among the key issues in relation to global sustainable development. The Netherlands is tightly embedded in a global network of economic relations as well as environmental effects: domestic consumption and production patterns affect environmental pressure not only within the country, but also abroad. This report explores the nature and quantity of economic and environmental embedding of the Netherlands in the world. Following from surveys, support for policy measures is identified and explored. It concludes by the notion that sustainability problems have an increasingly global character, but that the inverse is also true: it makes sense to take up responsibilities to improve the environment in other parts of the world.

Key words: production, consumption, sustainability, level of support measures

Rapport in het kort

Duurzame productie en consumptie
Een evaluatie voor Nederland

Armoede, klimaatverandering en verlies van biodiversiteit zijn cruciale factoren voor mondiale duurzame ontwikkeling. Nederland is stevig ingebed in een mondiaal netwerk van economische relaties en van milieueffecten: binnenlandse consumptie- en productiepatronen beïnvloeden de milieudruk in Nederland, maar ook daar buiten. Dit rapport verkent de aard en omvang van de mondiale inbedding van Nederland in termen van zowel economie als milieu. In combinatie met resultaten van enquêtes worden vervolgens enkele beleidsmogelijkheden ten aanzien van duurzaamheid verkend. De conclusie is dat duurzaamheidsproblemen in toenemende mate een mondiaal karakter hebben, maar dat complementair daaraan ook lokale oplossingsgerichte activiteiten een gunstige effect kunnen hebben op milieu en duurzaamheid in andere delen van de wereld.

Trefwoorden: productie, consumptie, globalisering, maatschappelijk verantwoord ondernemen, enquêtes

Contents

Summary

Sustainable development is said to be achieved when the quality of life can be maintained with a certain minimum standard for that quality of life in existence throughout the world. On the one hand, this calls for an ongoing balance in the quality between the planet, people and profit, while on the other hand, the quality of life will have to be improved, particularly for the world's poorest people. This report focuses on the consequences of Dutch economic developments (consumption and production) on sustainability. Referred to in particular here are the problems of climate change and the loss of biodiversity, which undermine the continuity of the quality of the planet in such a manner that continuation of the other developments is at risk.

The Netherlands is economically embedded in a global context: domestic consumption is fed by imported products and production within the country, while national production not only nourishes domestic consumption, but also contributes to exports for consumption abroad. As a result, environmental pressure related to Dutch consumption and production is spread throughout the world.

The Netherlands is one of the countries in the world with the highest level of income per capita. As a result, the current level of per capita greenhouse gas emissions related to Dutch consumption is almost 2.5 times the global average level. Greenhouse gas emissions occur directly during the use of products by the consumer; however, to a large extent (currently 55%) they also occur during the production of consumer goods and services. These so-called indirect greenhouse gas emissions partly occur within the geographical borders of the Netherlands, but also partly abroad. This comes, for example, because the Dutch consumption also consists of imported products, the production of which causes emissions abroad. As a result of an expected substantial increase in the private consumption expenditures in the Netherlands in the coming decades, greenhouse gas emissions related to Dutch consumption will also increase. However, mainly because of the improved energy efficiency of production processes and products, the increase in emissions is less than the increase in consumption expenditures.

Because the Netherlands is a densely populated country where land is scarce, land used for Dutch consumption takes place abroad. As a result, Dutch consumption contributes to the problems that are coupled with the use of land elsewhere in the world, for example loss of biodiversity. The per capita land use for Dutch consumption is about the same as the average per capita land use in the world (0.8 hectares per capita), which is relatively low in comparison with other rich countries. The level of per capita land use is also expected to increase in the coming decades, which will lead to more land use abroad, in particular to satisfy the higher demand to wood. Land use increases less than consumption expenditures as a result of efficiency improvements in food production.

Environmental pressure related to Dutch industrial production, with reference to many environmental themes, is becoming increasingly disconnected from economic growth, indicating a trend towards greening of the industry. Whereas GDP in the Netherlands increased by almost 45% between 1990 and 2005, the associated CO_2 emissions increased only by approximately 18%. The main driver for this process of disconnection between economic growth and environmental pressure has been the increasing efficiency of Dutch production due to technological developments and learning-by-doing. Other trends relevant for the environmental pressure of production, but to a smaller extent than the technological change, are:

(i) a shift in the economy from manufacturing to services, which are less polluting than the traditional manufacturing sectors, and

(ii) globalisation: as with increasing imports and the relocation of business activities to other countries, the environmental pressure related to production also shifts abroad. Currently, greenhouse gas emissions related to imports and exports are more or less in balance, but forecasts indicate that in the future greenhouse gas emissions abroad related to imports will be larger than domestic emissions for exports.

Although many Dutch citizens indicate that they are prepared to contribute to environmental solutions, for example, for climate change, and to make some (modest) financial sacrifices, only very few people are voluntarily willing to make behavioural changes for the public environmental benefit. The costs associated with changing behaviour (not only the financial cost, but also the cost involved with loss of comfort, convenience and breaking routines), are too high for the change to take place voluntarily. Citizens expect the government to take measures in order to actualise behavioural changes, for example, by enforcing standards or taxes. With respect to climate change, there is a level of support from a majority of the population in the Netherlands and other European countries for policy measures with which an approximate 10% reduction in CO_2 emissions can be achieved. People are also prepared to pay the additional costs required to achieve this reduction, preferably via a limited general increase in (electricity) prices compensating for energy-saving measures by manufacturers. The level of support for changing eating patterns in order to reduce loss of biodiversity, e.g. a reduction in consumption of meat or dairy products induced by a tax, does not represent a majority.

Multinational firms are subject to relatively high public pressure and scrutiny from NGOs, which possibly explains high levels of involvement with various global sustainability issues, such as child labour, low wages and poor working conditions. Dutch multinationals generally score high on international sustainability benchmarks. In order to further improve these scores, companies will require government to realise a level playing field on sustainability issues, which ensures their competitiveness in relation to other firms in the Netherlands and preferably in other parts of the world as well. Furthermore, taking up entrepreneurial responsibility in the production chain can assist in making this chain more sustainable, because it will help companies to make specific choices leading to more sustainable products. In small- and medium-sized enterprises, corporate social responsibility (CSR) chiefly involves activities internal to the firm, often related to personnel matters. Voluntary environmental measures are not applied very often, presumably because of relatively high efforts (in terms of time and money) in relation to the main activities of the firm.

As indicated above, many Dutch citizens and companies indicate that they are willing to (financially) contribute to solutions to tackle climate change, but only very few are willing to make their own behavioural changes for public environmental benefit. Both citizens and companies expect the government to take the initiative to solve important environmental issues in order to deal with this discrepancy. In the assessment described in this report, four main policy lines are set out in the context of climate change and biodiversity loss:

- Use is made of the willingness-to-pay by consumers to have tax measures ensure endowments required for specific or general environmental policy measures.

- Routine behaviour can be addressed in specific cases (see in parentheses) by imposing strict obligatory regulations (unwillingness), showing alternative perspectives (lack of knowledge) or lowering barriers (high transaction cost).

- If individual firms are reluctant to make their production processes more sustainable and more transparent, covenants (agreements) can be useful in calling for collective action where individual action would not be acceptable to firms. For laggards, stricter regulation will often be needed. An international level playing field for firms will require international institutions that are responsible for harmonising regulation and setting up criteria for sustainability of production chains.

- In order to transfer small-scale initiatives to large-scale effects, credible international governance structures will also be necessary.

1 Introduction

Sustainable development is said to be achieved when the quality of life can be maintained with a certain minimum standard for that quality of life in existence throughout the world. On the one hand, this calls for an ongoing balance in the quality between the planet, people and profit, while on the other hand, the quality of life will have to be improved, particularly for the world's poorest people. In its Second Sustainability Outlook (MNP, 2008 forthcoming), the Netherlands Environmental Assessment Agency (MNP) focused on three problems related with each other: poverty, climate change and loss of biodiversity. Tackling poverty manifests itself in the challenges involved in bringing the quality of life to an acceptable level for many (MNP, 2008 forthcoming). Climate change and the loss of biodiversity undermine the continuity of the quality of the planet in such a manner that continuation of the other developments is at risk.

A worldwide social swing will be necessary in order to achieve – or get as close as possible to – the internationally established goals for poverty (Millennium Development Goals), climate change (the 2-degrees goal) and biodiversity (reducing the rate of loss of species). The challenge of achieving the proposed goals involves tackling poverty, which would result in attaining an acceptable quality of life for everyone, and subsequently applying technology and changes in consumption patterns to absorb the additional demand for energy and land, among other things. Up until now, the use of technology has considerably increased efficiency, but not sufficiently enough to compensate for the increase in the global use of energy and land. Policy options for addressing the three correlated problems are formulated in the sustainability outlook by the MNP. The policy options can result in policy measures that should lead to a change of behaviour by civilians and companies, and consequently to lowering environmental pressure.

This report serves as a background document for the Second Sustainability Outlook (MNP, 2008 forthcoming) and the Environmental Balance 2007 (MNP, 2007)[1] and it has been focused on the impact of the Dutch economic developments (consumption and production) on climate change en biodiversity in the rest of the world. This report examines developments that took place in recent decades as well as looking at the developments forecasted for the coming decades up to 2040. The level of support for behaviour change by companies and consumers needed to reach the goals established as much as possible is also covered. A trend scenario that is founded on the baseline of the second *Environment Outlook* by the OECD (see Appendix 1) was used for the prospectus on future developments. The level of support for a number of policy options is also addressed in the report. The report starts with a comparison of the Netherlands with other countries in the world on several aspects that are relevant for a sustainable development. The focus in environmental assessments is often on the environmental pressure that occurs within the geographical borders of a country. Production in the Netherlands is, however, not only meant for domestic consumption, but for an important part also for the export. Furthermore, Dutch consumption includes imported products, the production of which

[1] Available in Dutch only, but a summary in English can be found on the MNP website (see reference list).

causes environmental pressure abroad. Therefore, the analysis in this report is not limited to the environmental pressure within the Netherlands, but also includes the environmental pressure abroad that is related to Dutch consumption. As a result, the report deals with the sustainability of Dutch consumption and production from two different points of view: consumption and production. Consumption directly causes environmental pressure, i.e. during consumption itself, but also indirectly, i.e. during the production of the consumer goods.

2 Extent and distribution of economic prosperity and environmental pressure

2.1 Economic development and differences in the world

2.1.1 Global disparity in economic growth

The world GDP has increased 3% a year since 1975. However this increase is not equally distributed across all world regions. With a GDP growth of more than 9% a year, China has the most spectacular economic growth of all the large countries. India and a few countries in Southeast Asia also vigorously grew in recent decades. European economic growth chiefly remained behind in the growth of the world economy. This is not only due to the stagnant economic development since 1990 in Eastern Europe and the states of the former Soviet Union, but also of the lower growth in Western Europe, where the average annual growth fell more than 0.5% behind the annual growth rate of the world GDP. The annual growth rate in Sub-Saharan Africa and South America was somewhat lower than the world growth rate, but higher than the annual growth rate in Western Europe.

The share of Western Europe in the world economy decreased from more than 36% in 1975 to less than 30% in 2006. Other regions that lost some share in world GDP were South America, Sub-Saharan Africa and Eastern Europe, where the share of the latter region fell considerably. China has more than doubled its share in the world economy from 2.5% in 1975 to 5.5% in 2006. Other countries in Asia also increased their share in world GDP: between 1975 and 2006, the share of Asia increased from 19% to 28%. In the same period, the contribution of the United States increased from 25% to 27%. The share of the United States in the world GDP is more than ten times the share of Africa (2.5% both in 1975 and in 2006).

Besides differences between regions with respect to growth and size of the economies, there are also differences with respect to growth and size of the population in the various regions. The annual growth rate of the world population was 1.5% in the past three decades. In most rich countries the population growth was less than growth rate of the world population, in particular in Western Europe and Japan, where the population increased with less than 0.5% a year. The population size in Eastern Europe and the European former Soviet states even decreased between 1975 and 2006. In contrast, in some poorer regions the population growth was higher than the growth rate of the world population. The population in Sub-Saharan Africa increased with more than 2.7% a year since 1975. The highest population growth occurred in Western Asia (the Middle East), where the population increased with almost 3% a year. As a consequence, whereas the annual economic growth rate in Sub-Saharan Africa and South America is higher than the annual growth rate in Western Europe, the growth rate of GDP per capita was higher in Western Europe, because the population growth was relatively low in this region. The growth rate of GDP per capita was just slightly above zero in Sub-Saharan Africa, which was even lower than the per capita growth rate in Eastern Europe and the former Soviet Union.

2.1.2 The influence of culture on economic development

While a large number of Asian countries have had lofty economic growth in recent years, the growth in other developing regions remains stagnant, particularly in Sub-Saharan Africa. Such differences in economic growth frequently correlate with differences in the share of private investments, in the knowledge and education levels (human capital) as well as differences in the degree to which they conduct trade with other countries (Levine and Renelt, 1992). Roughly speaking, it can be said that Sub-Saharan African countries invest too little in the scope and quality of their human and physical capital; and along with that, they have too few potential markets for their production because they do not conduct enough trade with other countries (see Porter, 1990). The low trade volume is perhaps related to the fact that a large number of African countries do not lie on the coast and therefore have no harbours at their disposal (The World Bank, 2004; Sachs, 2005). Then again, investments in knowledge through education are partially negated by death from diseases such as malaria, AIDS and tuberculosis (Sen, 2004). Investing in health and education care is consequently a condition for economic development.

There is less insight concerning the influence of political and cultural aspects upon economic growth. Even though there is nothing explicit about the influence of political stability, corruption and democratic rights on economic growth (Levine and Renelt, 1992), a (strongly) negative influence that these aspects have on economic growth is not ruled out, particularly in Sub-Saharan Africa. The influence of culture on economic development was already described by Weber at the beginning of the twentieth century (Weber, 1905). There are indications that values such as honesty, austerity, work ethic, trust and a sense of enterprise have influence upon economic growth. However, a direct relationship between culture and economic growth has not been found (The World Bank, 2004). There are indications that a relationship exists between prosperity and cultural changes, but the causality is conversely true: growing prosperity leads to cultural changes. Furthermore, these changes are dependent on the original culture (Inglehart and Baker, 2000).

2.1.3 Quality of life, personal satisfaction and the Human Development Index (HDI)

GDP gives an indication for people's consumption possibilities. Consumption is one of the factors that influence the quality of life. Quality of life is determined by possibilities available to people to provide a satisfactory form to their lives (Robeyns and Van der Veen, 2007). Higher prosperity and subsequently a higher consumption level increases the quality of life. However, consumption is not the only factor that influences the quality. According to the British economist, Layard, the main factors that influence the quality of life are health, relationships and employment (even unpaid work) (Layard, 2003). Even though a higher income increases the possibilities available to people to give their life form and subsequently contribute to the quality of life, this does not by definition lead to an increased average happiness (Veenhoven and Hagerty, 2006). International research found that people with an income higher than approximately $15,000 do not become easily more satisfied from extra income (Inglehart, 1997). In rich countries where the basic necessities of life are met, relative income is more important than absolute income. Most people want to be at least as well off as the neighbours (*Keeping up with the Joneses*). When *peer group* income as well as one's own income increase to an equal degree, there is hardly any effect on the sense of satisfaction (Layard, 2003).

Quality of life is unevenly distributed in the world. Many people in Africa, as well as in large parts of China and India, are unable to meet the basic necessities of life. In contrast, with the growing middle class in China and India there is a greater need for cars, and many Europeans have more need for leisure time. The United Nations Development Programme (UNDP) developed the Human Development Index (HDI) in the 1990s, which gives an indication of the developmental status for all countries. This index is an aggregation of the indices of life expectancy, educational level and GDP per capita of a country, known as 'purchasing power'. HDI can be seen as a *proxy* for the quality of life, even though this highly aggregated index does not comprise many aspects of the quality of life, such as environment, nature, leisure time, human rights and political participation. HDI also gives no indication for the differences found within countries. HDI score is the highest in a number of western countries, among which the Netherlands. HDI provides a broader impression of a country's welfare than does the GDP, which only reflects a country's economic production. The components of HDI are discussed further in the following sections.

2.1.4 Global differences in real disposable income

Real disposable income – purchasing power – is one of the three gauges in the Human Development Index, along with educational level and life expectancy. It is the measure of citizens' material standard of living. Purchasing power is often expressed in *purchasing power parity* (PPP), a measure that takes the price differences for a number of basic goods into account, which allows for a comparison of the standard of living in different countries. A comparison of countries based on PPP shows great differences in purchasing power (Figure 2.1).

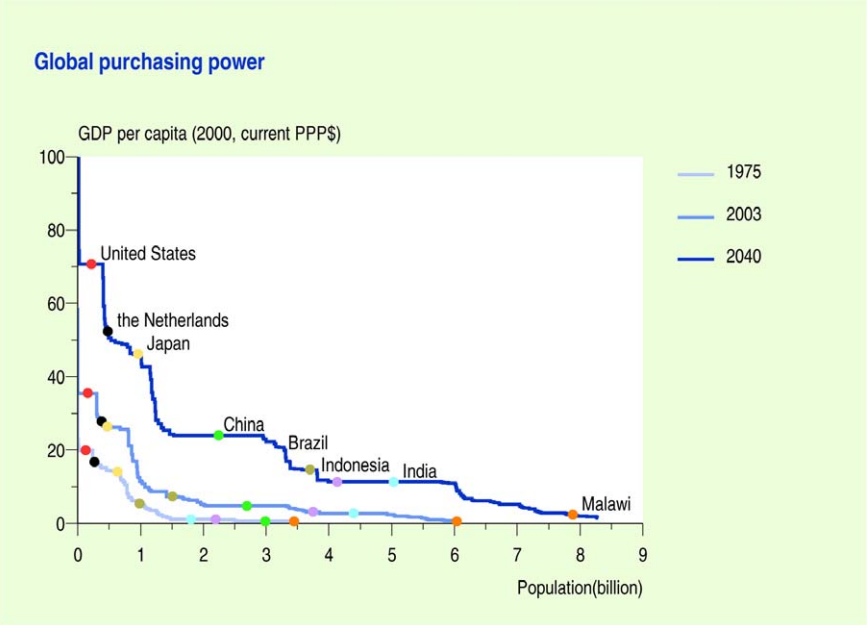

Figure 2.1 *Comparison of the purchasing power over the world in 1975, 2003 and 2040. The Netherlands and some typical countries are pinpointed*

Economic prosperity is not evenly distributed between countries. As indicated above, since 1975 there have large disparities in the rate of economic growth in various regions. According to the trend scenario (see Appendix 1), differences will continue to exist in the coming decades. As a consequence, there will be disparities in the development of real disposable income. In particular in China, there will be a substantial growth in real disposable income up to 2040. The United States is the richest of the larger countries in the world and shall also hold that position in 2040 (see Figure 2.1). Currently, 20% of the world population lives in the most prosperous countries that together have a share of over 85% in the world GDP.

A more precise measure for determining the disparity in real disposable income is the Gini Index. The Gini Index is a measure of disparity, with a value between 0 (income is equally distributed) and 1 (all incomes go to one person or group). A higher Gini Index therefore means that the differences in incomes are larger. The Gini Index on a global scale (based on differences between average per capita income in individual countries) fell from 0.62 to 0.53 between 1975 and 2003.[2] According to the basis scenario, it shall fall further to 0.45 in 2040. The differences among countries have therefore decreased during the past three decades and the forecast is that they shall decrease further in the coming four decades. The disparity in income decreases particularly because poor countries in Southern Asia, such as China, India, Vietnam and Indonesia, have a vigorous increase in incomes in the past three decades of more than 3.5% a year. Whereas the per capita income in the poor Southern Asian region strongly increased in the past three decades, it did hardly increase in the other poor region, Sub-Saharan Africa. The growth in per capita income also lagged behind in Latin America and Eastern Europe, where most countries held a middle position in 1975. Although the Gini Index decreases, it is only the very populous region of Southern Asia that can reduce the gap with the rich regions Northern America, Western Europe, Australia and Japan.

The aforementioned data are based on a comparison of a country's average incomes. The distribution of income within countries is also important for the distribution of prosperity, which, according to UNDP (2004), varies greatly among countries. The differences in incomes are the greatest in African and Latin American countries. China, Russia and the United States occupy the middle position. In South Asian countries such as India, Pakistan and Bangladesh, the differences in incomes are approximately the same as in the Netherlands. The smallest differences in incomes can be found in the Scandinavian countries, Japan, Belgium and a few Central European countries (Hungary, Czech Republic and Slovakia).[3] There is no direct relationship between the level of the average incomes and the degree of the distribution of incomes. Income inequality has risen in most countries and regions in the past two decades (IMF, 2007). According to the IMF-report, technological progress and financial globalization cause income inequality to increase, whereas trade globalization mitigate income inequality.

During the UN Conference on Environment and Development in 1992 in Rio de Janeiro, it was established that there can be no sustainable development as long as the quality of life severely improves for the people who live under extremely impoverished conditions. The solution of poverty

[2] This result is in line with Milanovic (2005) when he uses a similar concept to calculate the Gini-coefficient (Concept 2).

[3] There are no data available on the distribution of incomes in the oil-rich Arabic countries in the Middle East

and hunger is one of the most significant sustainability problems. Poverty is a relative concept. An income at the poverty level in the Netherlands is approximately $18,000 - PPP (also see Appendix 3), with which a Dutch consumer can just barely keep pace with the Dutch society. This amount is an ample income for the average Zambian, generally speaking. The World Bank uses an income of $1 a day as a reference in formulating the Millennium Development Goals, for which this is the level for extreme poverty: less than $1 a day means hunger. In 2001, 1.1 billion people lived under the poverty level. In most countries the average per capita income is well above this level, but in many countries there are large groups within the population that live in extreme poverty. E.g., more than 70% of the population in Zambia, Nigeria and Mali still lives under the poverty level.

Evidently, the distribution of real disposable income of families worldwide, across the different consumption categories is not heavily dependent on the level of income. With a high average real disposable income in a country, the relative expenditures for food are low, while on the average, the expenditures for education, health care and financial business services are higher (Figure 2.2).

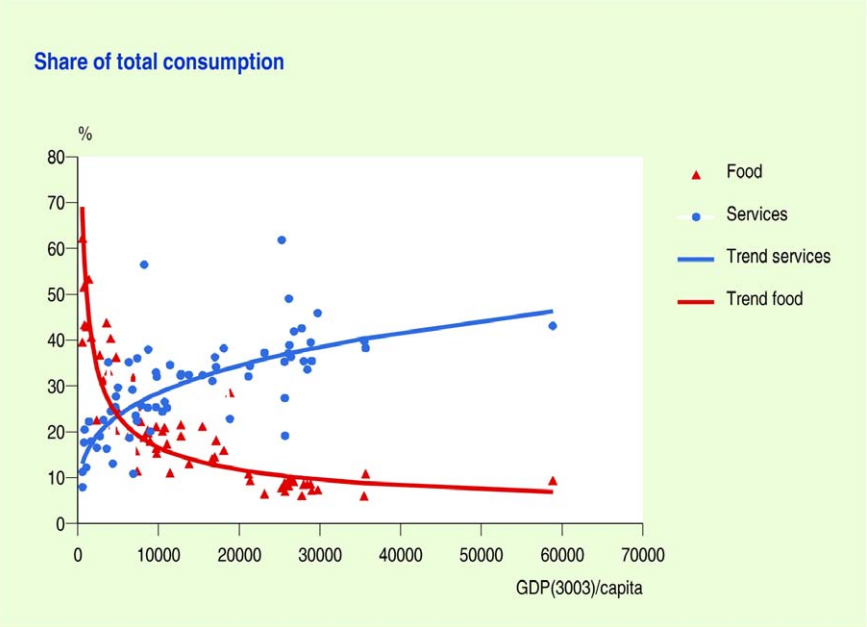

Figure 2.2 *The share of the private consumption that is spent on services and food for 66 countries (collectively, 75% of the world population)*

2.1.5 Life expectancy and education level

Along with purchasing power, education level and life expectancy are also significant gauges for HDI. Figure 2.3 shows the distribution of life expectancy in 2004 across different countries. This shows that in a number of African countries, such as Zambia and Zimbabwe, the average life expectancy is currently lower than 40 years, whereas life expectancy in Japan is more than twice as high at 82 years. The differences in child mortality rate are also great. In most of the developed countries this is far below 10 children for every 1,000 births, while child mortality in some Sub-Saharan African countries comes out to be above 150. In Sierra Leone, one in six children born there dies in the first year. On the average, the second child dies before its fifth year, and the third shall not become older than 45. Significant causes of this are the lack of basic health care, malnutrition, lack of clean drinking water and HIV/AIDS (MNP, 2008 forthcoming, chapter 2).

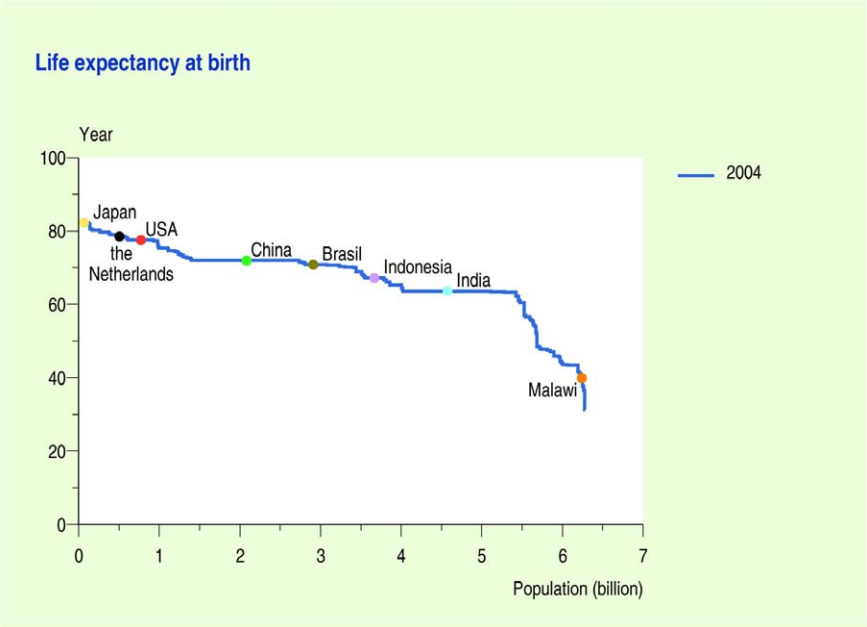

Figure 2.3 Life expectancy of the world population

There have been great advances in the area of education worldwide. The percentage of illiterate adults has been reduced from 44% in 1970 to 21% in 2000 (UNESCO, 2002). Great advancements have taken place particularly in Sub-Saharan Africa, North Africa, South and West Asia and the Middle East. These regions had a high percentage of illiteracy in the 1970s, which has since been lowered by almost 50%. Figure 2.4 shows the distribution of education level in 2004 among different countries. Burkina Faso, Niger and Mali have the lowest education levels.

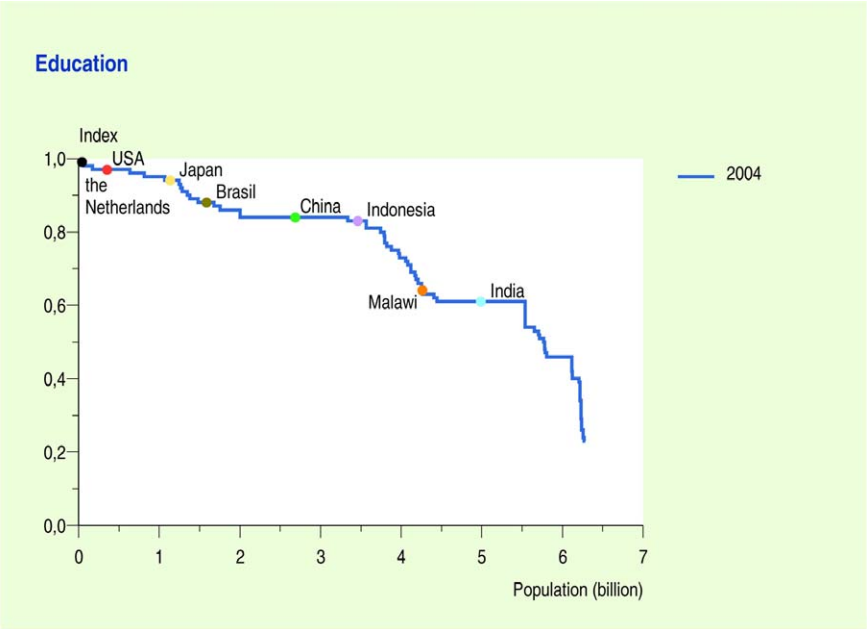

Figure 2.4 Education level of the world population

2.2 Distribution of the global environmental pressure: greenhouse gases and land use

2.2.1 Global greenhouse gas emission resulting from consumption

As a result of the increase in energy use, global emissions of greenhouse gases have increased substantially. The global average per capita greenhouse gas emissions, however, have decreased from 6.9 ton CO_2-equivalents in 1970 to 6.7 ton CO_2-eq. in 2001. Consumption contributes to greenhouse gas emissions directly (emissions from energy use) as well as indirectly (emissions during the production of consumer goods). In the trend scenario, the average greenhouse gas emission per capita increases between 2001 and 2040 by approximately 16% (0.4% per year). Due to the growth in world population, the total greenhouse gas emission in the world increases about 65% (1.3% a year). The European goal is to limit global temperature increase to 2 degrees. The Netherlands have subscribed to this goal. In order to accomplish this goal in 2050, in 2040 no more than 3.5 tons of CO_2-eq. per capita of the world population can be emitted, in comparison with the approximate 6.7 tons of CO_2 in 2001 (see Figure 2.5). The consumption-related emissions per capita are the highest in the richest countries in the world, including the Netherlands. In the OECD countries, but also in countries such as China and Brazil, the consumption-related emissions are currently more than the 3.4 ton CO_2-eq. per person. This shall be the case for almost all countries in 2040. Consequently, a substantial effort towards a policy is necessary to prevent a severe climate change.

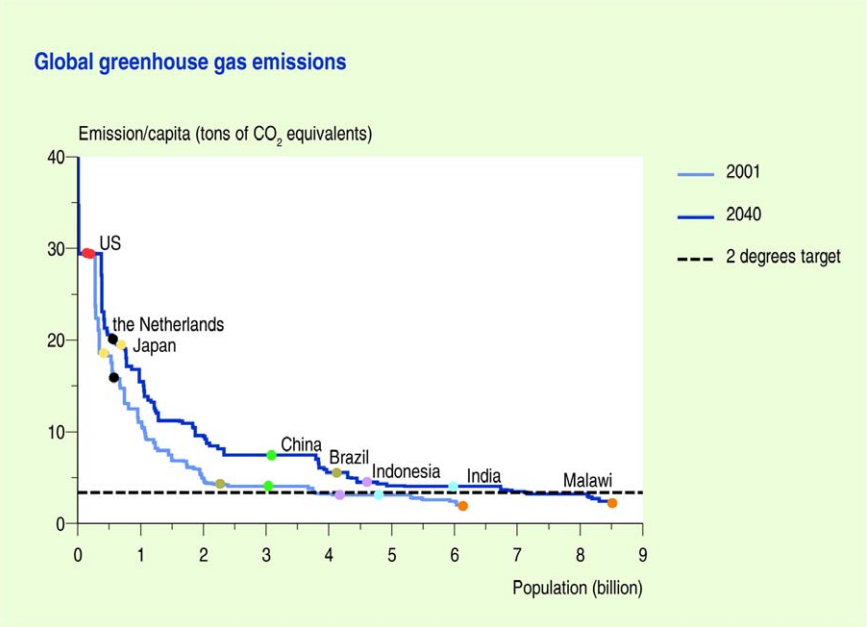

Figure 2.5 *Greenhouse gas emissions for the world from private and government consumption, for 2001 and 2040* [4]

The total greenhouse gas emissions from the United States amounted to almost 20% of the global emissions in 2005, in contrast to approximately 11% for the European Union. In particular, the emissions from China, however, are rapidly increasing. In 2006, China surpassed the United States as the country with the greatest CO_2 emissions in the world, which is, according to the trend scenario, also forecasted to remain so in the coming decades.

The Gini Index can also be applied to measure the distribution of global greenhouse gas emissions in the same manner that it is applied for the distribution of global prosperity. The Gini Index for consumption-related greenhouse gas emissions decreases from 0.42 in 2001 to 0.38 in 2040, reducing the disparity among countries in greenhouse gas emissions per capita. This trend corresponds with the trend toward more equality in income. The richer countries particularly have high consumption-related emissions per capita. Even though the differences in greenhouse gas emissions per capita shall be reduced, inhabitants of richer countries shall still release ten times more greenhouse gas emissions on average than inhabitants of poor countries.

In 2001, the level of per capita greenhouse gas emissions for consumption in the Netherlands was almost 2.5 times the global average level, and also higher than the average level in Western Europe, although the difference with the level in Western Europe is rather small (6%). In Northern America, Japan and Australia, the per capita emissions were larger than in the Netherlands. Per dollar spent on consumption, however, the greenhouse gas emissions were relatively low in the Netherlands. It was

[4] See Wilting and Vringer (2007) for a description of the methodology for calculating greenhouse gas emissions and land use per capita.

smaller only in Norway, Denmark and Japan, mainly as a result of differences in the consumption pattern. In the United States, the level of greenhouse gas emissions per dollar spent on consumption were approximately 7% higher than in Western Europe and in Canada, Australia and New Zealand it was even higher. The highest level was found for the states of the former Soviet Union, where the emissions per dollar spent on consumption were in 2001 approximately 10 times higher than in the Netherlands.

As indicated before, the consumption of imported goods in a country causes emissions abroad during the production of these goods. On the other hand, the production of commodities for the export causes emissions in a country that are related to consumption abroad. For the Netherlands it is so that greenhouse gas emissions from the production in the country that is intended for the exports are at the same level as the consumption-related emissions abroad. For many industrialized countries, however, domestic emissions for exports are lower than the emissions for consumption-related imports. It is expected that the Netherlands will become a net-exporter of greenhouse gas emissions in the future too. To the contrary, countries like China, Brazil, Russia as well as Australia and Canada have higher emissions caused by export production than what occurs abroad for their own consumption (Figure 2.6). Among the things that cause this are the extensive emissions from agriculture in Australia and CO_2 emissions from coal-fired power stations in China.

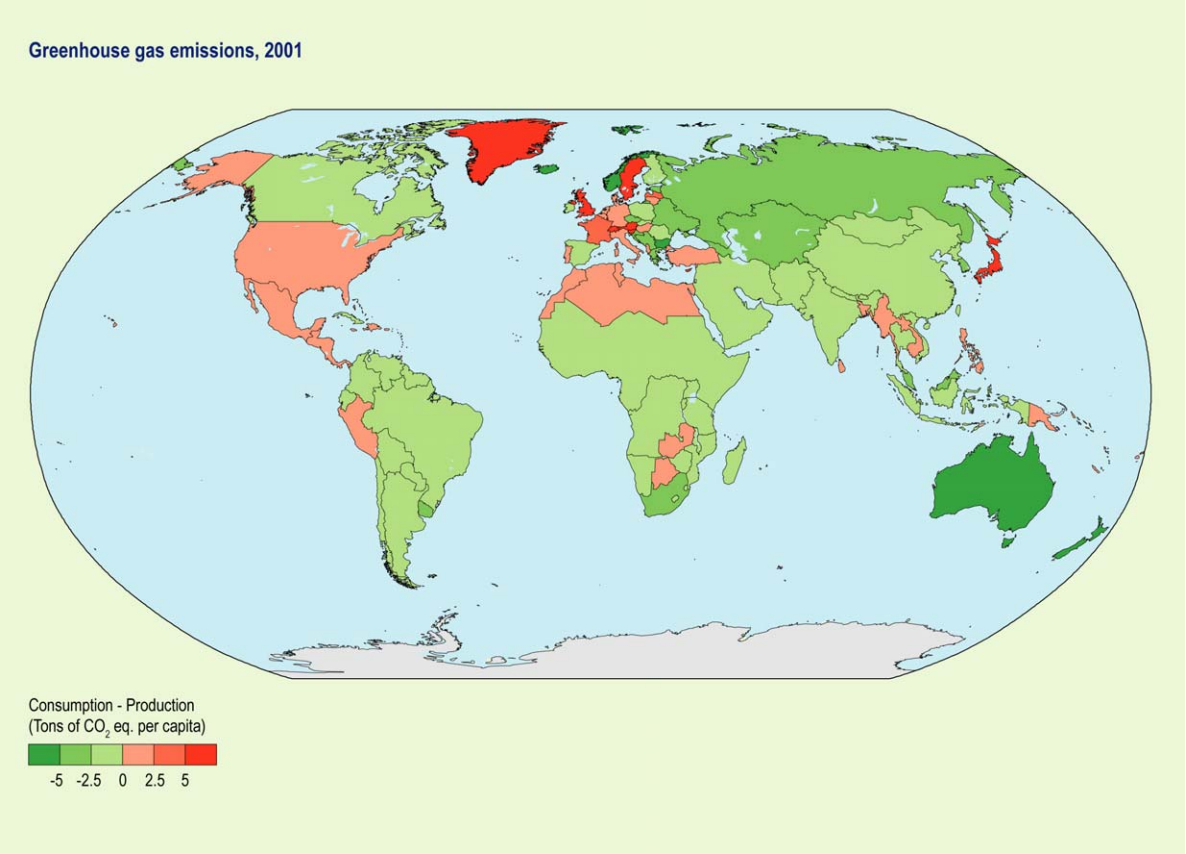

Figure 2.6 Difference between greenhouse gas emissions for consumption (incl. import) and production (incl. export) in 87 countries/regions (2001; ton CO_2.eq. per capita)

2.2.2 Global land use resulting from consumption

For the consumption of food and wood products land is required. As a result of an increasing demand for land for agricultural purposes, the pressure on biodiversity will increase. Land use is strongly related to the level of consumption: richer countries generally take up more land in the world than poorer countries. These differences are, however, smaller than the differences in greenhouse gas emissions. The majority of land use is related to food production (particularly diary and meat), clothing and wood (MNP, 2006). Land use in richer countries is generally more efficient and more intense than land use in poorer countries. Between 2001 and 2040, the total global use of land for agriculture increases by 10% as a result of a growing world population and in particular an increasing level of per capita food consumption in developing countries. As a result of a substantial improvement of the agricultural productivity in developing countries the global increase in land use is much lower than the population growth in this period of 45%. The use of land for wood production will increase by almost 70 percent, which causes total land use for consumption to increase by approximately 20%, from 5.9 billion hectares to almost 7.2 billion hectares.

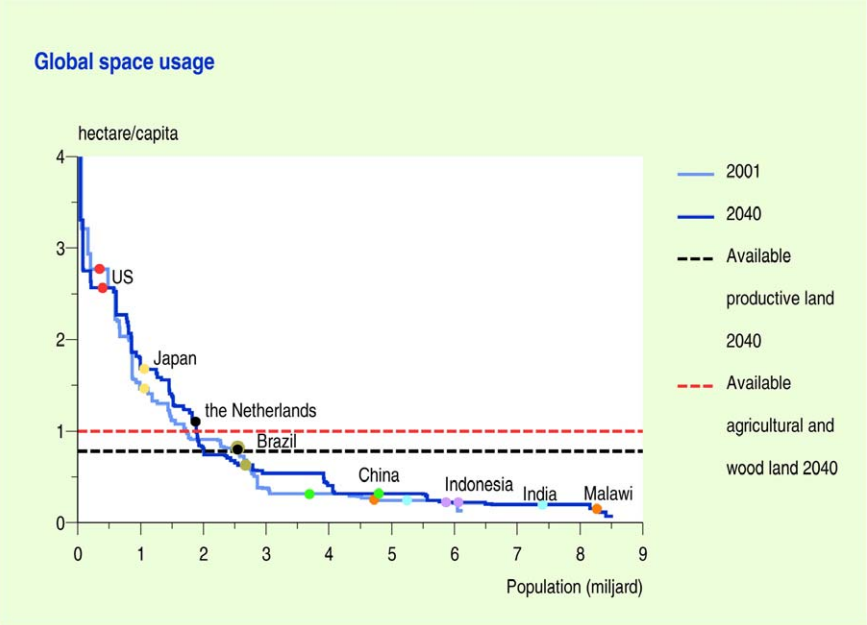

Figure 2.7 *Land use resulting from consumption for the Netherlands and the world, for 2001 and 2040*

Currently, worldwide 5 billion hectares are used for agricultural activities. With a world population of 6 billion people this is an average of 0.8 hectares per person. The entire amount of productive agricultural land that is globally available is 7 billion hectares. With world population increasing to 9 billion in 2040, the potential for productive agricultural land is almost 0.8 hectares per person in 2040 (including grasslands; see dotted reference line in Figure 2.7). This includes the current agricultural land supplemented with potentially productive agricultural land, including large sections of the tropical rain forests and tropical grasslands. Terrains, such as deserts, glacial areas, coniferous forests and tundra in northern cold zones, such as Siberia, have a very low level of production for agriculture and are not taken into account. Parts of these non-productive terrains are currently dedicated to wood production. The increase in the demand for wood products can theoretically be met by making use of

these less productive regions (which means an additional 2 billion hectares of land available). Taking into account this additional area, the potential for land use is almost 1.0 hectares per capita in 2040. However, managing these less productive regions is very uncertain. In view of the forecasted increase in food consumption, in particular the pressure on tropical biodiversity will increase. A severe increase in productivity is needed in order to limit the pressure on the remaining natural areas.

The Gini Index as measurement for the distribution of global land use amounts to 0.49 in 2001. This value is higher than that of the distribution of global greenhouse gas emissions in this year. The global distribution of land use remains more or less the same in the trend scenario; in the trend scenario the Gini Index increases to 0.51 in 2040. Land use is less strongly correlated with income than greenhouse gas emissions are. The per capita land use for the Dutch consumption is about the same level as the average per capita land use in the world (0.8 hectares in 2001). In Northern America the per capita land use for consumption is more than three times higher and in Australia and New Zealand it is almost ten times higher due to the use of low-productive pasture land. The Dutch consumption is relatively efficient with respect to land use: per dollar spent on consumption land use is lower than in all other regions, except for Japan. Apart from Australia and New Zealand, in OECD countries land use per dollar spent on consumption is lower than other countries.

2.3 Globalization and sustainability

'Globalization' is a process that refers to the increasingly greater scale, pace and impact of global social interactions (Held and McGrew, 2002). Communities across the whole world come into contact with each other to a greater degree and influence each other through ideas, institutions and power relations. On a global scale, this leads to increasing dependence among cultures and economies. This can lead to greater economic advantages, but also perhaps to large-scale changes in the organization of societies. To a strong degree, globalization is fed by technological possibilities, such as in the past decade particularly via the internet (Castells, 1996). The globalization process has impact on the worldwide and national socio-economic relationships, on the distribution of political power, on the role of the nation state, and on issues concerning sustainability.

The increasing social interaction is not universal: large segments of the world population stand on the sidelines of the globalization process. This is often related to a shortage of technological or economic opportunities, but also at times globalization is explicitly rejected because of an association with the increasing influence of foreign cultures. The anti-globalization movement is the most prominent example of this, but also more extreme 'closed communities' movements keep themselves on the sidelines or position themselves as being flatly opposed to other cultures (zie ook Huntington, 1993). Globalization is therefore also not a balanced global development: it often leads to greater economic growth, but also to an increasing dependence on interaction with other cultures.

Globalization is not a clear concept and there are different perspectives to differentiate regarding the nature and the extent of globalization. In a broad sense, the sceptical approach, the hyper-globalizing approach and the transforming approach are frequently distinguished (Held et al., 1999; Huynen et al., 2005). The sceptics pose that the nature and extent of globalization are strongly exaggerated and that international interrelationship have always existed. The hyper-globalizationists pose that globalization is indeed a new phase in history that is characterized by a process of erosion of the role of nation states. The transformationalist's proposition is that globalization is a new process, but continues to

build upon historical developments that have been in progress for a long time. Furthermore, it is acknowledged that the level of interrelationship in the global network has reached a historically high level.

In order to understand the relationship between globalization and sustainability, a distinction can be made in the nature of the problem on the one side and the nature of the solution on the other. At first, globalization changes the nature of environmental problems. Global problems are becoming increasingly more important and have increasingly more impact on our daily lives; consider, for instance, climate change, the exchange of plant and animal species across the world and the increasing amount of over-fishing in the oceans. More so than many other problems, large-scale environmental problems reflect the limits of globalization processes and are therefore not only a result of, but have also become a factual and significant trademark of globalization. Second, an increasingly greater pressure on the social cohesion develops in societies though migration flows and through cultural exchange, media and travel. On the one hand, this leads to mutual understanding among cultures, but on the other hand, it frequently leads to further demarcation of what is ‘mine’ as well, resulting in cultural fragmentation. Third, globalization is influenced by the economic order in the world. It is not easy to assess the nature of these influences: some highlight the growth in capital flow and increase in density of the global economic network, others question whether an increasing integration of the world economy can be demonstrated. Economic globalization remains limited to the OECD countries to a great extent, and within this order, nation states remain the dominant economic players. Furthermore, international institutions, such as the World Bank and the WTO do have regulating power, but always within the contexts of the authority given to them by the nation-states.

Along with the problem, the globalization process also alters the possibilities to reach solutions for sustainability. Since developments abroad can have an impact at home, the inverse is also true: it makes sense for a citizen to take action on behalf of the environment, because embedding in the global network translates this action into impact elsewhere in the world. In order to facilitate this process, international governance structures and institutions will have to be better geared to deal with the main sustainability issues. The primary challenge for this task is to strengthen the credibility of the current international structures, which is now often said to favour the richest and most powerful countries and corporations (see, among many others, Klein, 2000; Hertz, 2001). A change in the international governance structures is not only necessary for a credible approach to global sustainability problems, but also to take into account the ideas of both sceptics and proponents of globalization.

Additionally, various international frameworks give attention to various subsectors of sustainability by means of institutions and multilateral or bilateral agreements. The challenge of this task is to integrate these subsectors. As of now, environmental agreements can still conflict with WTO trade agreements, for example, an import embargo of protected species that conflicts with the WTO’s free trade principle. Moreover, the adoption of the precautionary principle from the environmental perspective is often not shared from the perspective of trade promotion. Furthermore, a credible sanction regime is also needed for countries that ignore agreements. However, in actual practice this is difficult, because it can cause infringement of the states’ independence and can entail an erosion of democratic national interests. In addition, the formation of the agreements, institutions and the sanction regimen would have to take the sceptics as well as the proponents of liberal globalization into account.

3 Dutch consumption and sustainability

3.1 Introduction

The Netherlands is among one of the richest countries in the world. The high level of consumption per capita in the Netherlands consequently causes high environmental pressures. In order to achieve the EU 2-degrees goal, emissions of greenhouse gases (GHG) from Dutch consumption should be reduced by a factor five in 2040, assuming an even distribution of greenhouse gas emissions per world population capita in 2040. The emissions per capita for countries like India and China should stabilize to reach the 2-degrees goal. The efforts to achieve such a reduction for the Netherlands would have to be severe.

3.2 Private consumption by Dutch citizens

Dutch consumption consists of all goods and services that are consumed by private households and the government. This section looks at the national and international issue of private consumption by Dutch citizens. Government consumption is not included here. The size of private consumption by Dutch citizens is closely related to the size of the population and the real disposable income per capita. Between 1950 and 2000, the Dutch population has increased from 10 million to 16.3 million inhabitants; further growth to 17 million inhabitants is predicted for 2040. This is an increase of 70% in 90 years. Along with the population growth, other demographic developments also have their influences on the extent of the consumption-related environmental pressure. One of the most significant demographic changes that affect the environmental pressure is the declining number of people per household (3.9 in 1950, 2.3 in 2005 and a forecast of 2.0 in 2040). The decline in household size has, however, a limited effect on environmental pressure compared with the effect of population growth and the growth of real disposable income.

The growth of real disposable income per capita has resulted in almost a quadrupling of actual private consumer expenditures per capita in the past 50 years, an average annual increase of 2.7%. According to the OECD trend scenario, the private consumption per capita shall more than double between now and 2040 (Figure 3.1).

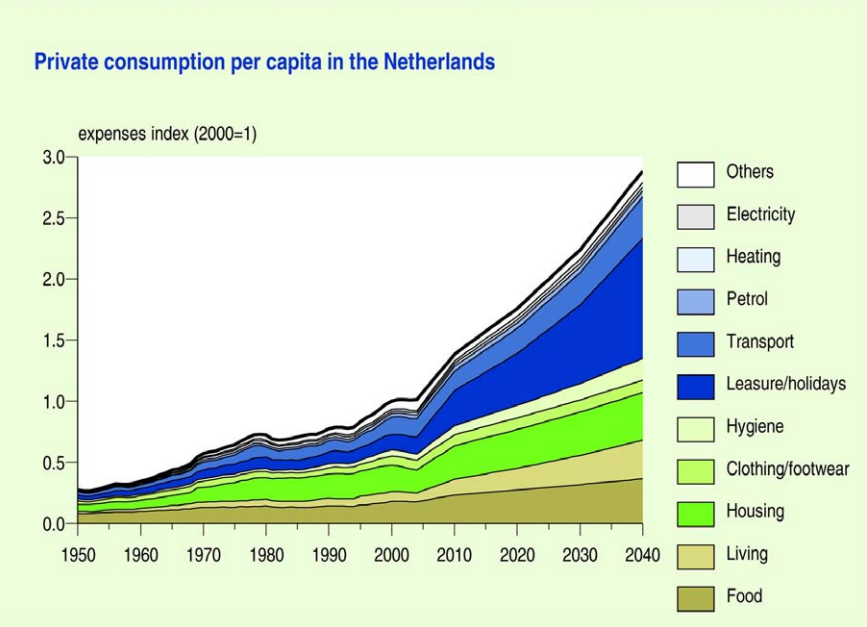

Figure 3.1 *Private per capita consumption by the Dutch for the period of 1950-2040 (price indexed expenditures) according to the reference scenario.*

3.3 Physical developments in consumption by Dutch citizens

The Dutch consumption pattern has drastically changed in recent decades. Compared with 1950, the share of consumption of private and public transport, leisure time and holidays as well as household goods has increased considerably. Relatively less is spent on food, housing and clothing, even though absolute expenditures have also increased. These trends are forecasted to continue in the future.

From an analysis of household consumption it appears that use of gas, use of electricity, transport and food together cause more than 70% of total greenhouse gas emissions and 60% of total land use (Nijdam et al., 2005). Changes in the consumption pattern (1990-2005) are reflected in a number of physical consumption indicators (Table 3.1). The increase for a large number of these indicators is related to the steady reduction in prices, particularly of electrical devices and appliances.

Less than half of the Dutch population went on holiday in the 1960s, of which less than half went abroad. Currently more than 80% of the Dutch population goes on holiday, on the average twice a year. In 1969 the average distance to and from the holiday destination was approximately 700 kilometres. In 1990 approximately 1900 kilometres were travelled for holidays and this rose to approximately 3700 kilometres in 2005. Extrapolation of this trend further increases the average distance travelled to more than 6000 kilometres in 2020 and 9500 kilometres in 2040 (Mulder et al., 2007a). The share of holiday kilometres travelled in an airplane increased to 50% in 2005, and is expected to climb further to 90 percent in 2020 (Mulder et al., 2007a).

Table 3.1 Development of population, income and some physical indicators of consumption.

	1990	2005	2020[a]
Population (in millions)	14.9	16.3	17.9
People per household	2.5	2.3	
Household expenditures (billion in euros, 2000)	156	219	343
Car ownership (per 100 inhabitants)	37	45	
Driving distance (km/person per day)	14	16	
Households with 2 or more cars	13%	25%	
Average annual kilometre distance per car	16400	15500	
Holiday kilometre distance by airplane (km/person)	950	2800	5500[b]
Meat consumption (kg/person per year)	84	86	
Consumption of electricity (kWh/person per year)	1150	1472	2355
Gas usage (m^3/person per year)	915	610	518
Households with dishwasher	25%	59%	
Households with clothes dryer	41%	59%	

[a] Estimates according to the Trend scenario (see Appendix 1)
[b] Estimates based on (Mulder et al., 2007a)

The increase in expenditures on *private and public transport* and holidays is expressed in the increase of car ownership and the annual amount of kilometres travelled per person. Merely 1 in 18 households had a car in 1950; in 1990, there were 0.9 cars per household and this had increased to an average of more than one car per household in 2005. The prediction for 2040 is an increase in car ownership to 1.2 cars per household, along with a further reduction in household size. The total number of kilometres travelled by car had increased just about 20% between 1990 and 2005. Cars have become somewhat more efficient, but the cars themselves have become heavier and more luxurious (air-conditioned), which has counteracted the gain in efficiency (MNP, 2006). The CO_2 emissions from personal transport have increased by 10% per capita between 1990 and 2005.

The transition from coal to natural *gas* for household heating took place between 1960 and 1975. There was a doubling of energy usage for household heating and hot water in the same period. With the implementation of central heating, people started to heat more rooms rather than just the living room. Gas usage fell since 1980, mainly because of improved insulation of dwellings and use of more efficient boilers. Carbon dioxide emissions from gas use fell by 15% per capita between 1990 and 2005 as a result.

In contrast to gas usage, *consumption of electricity* continues to increase. Consumption of electricity per capita increased about 30% between 1990 and 2005. This is mainly caused by the increase in the number of electrical appliances; in recent years particularly dishwashers, clothes dryers and computers. The availability of more efficient appliances has not decreased household consumption of electricity. The increase in the number of devices has become too great for this to occur. The need for convenience has led to more and more electronic appliances and devices.

Although relatively less is spent on *food* in recent decades, the expenditures have increased in an absolute sense. This increase is due to products with higher added value, such as pre-sliced vegetables, salads and ready-to-eat meals. Expenditures on ready-to-eat meals have more than quadrupled in the past decade. Seasonal fruit and vegetables have largely been replaced by out of

season products, cultivated in greenhouses or transported from southern countries. Meat consumption increased by 40% between 1975 and 1995 and has virtually stabilized since then. The expenditures on 'eating out' have also continually increased. Currently, approximately one-third of expenditures on food are spent in cafes, restaurants, cafeterias and other establishments. The forecast is that this share shall increase to 40% in 2020 (CPB/MNP/RPB, 2006).

3.4 Environmental pressure from Dutch private consumption

3.4.1 Greenhouse gas emissions

More than 70% of the total greenhouse gas emissions from consumption in 2000 were caused by consumption of gas and electricity, transport and food (Nijdam et al., 2005). This environmental pressure takes place partially in the Netherlands, partially abroad. The development of environmental pressure resulting from household consumption expenditures is related to the increase in the volume of consumption, production efficiency and the composition of the consumption pattern.

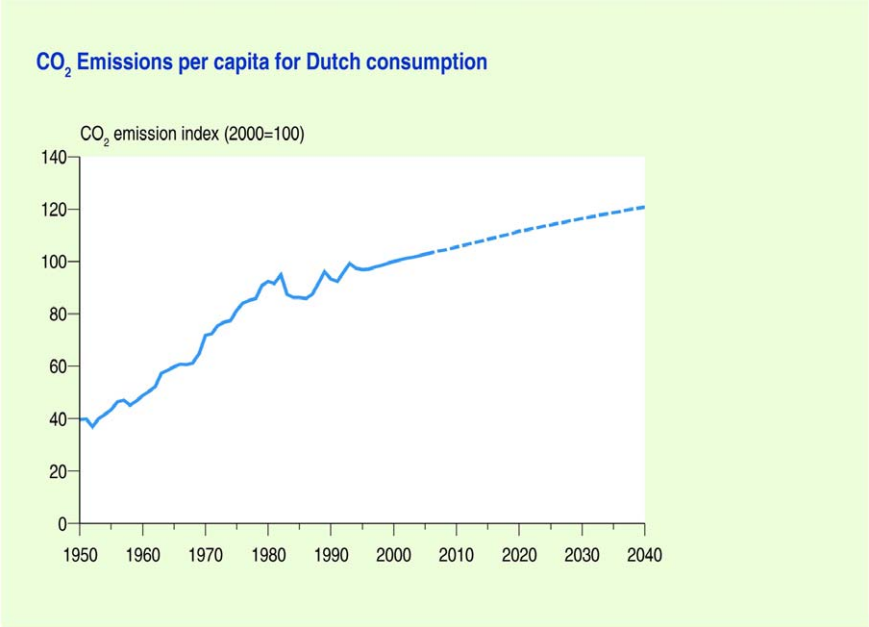

Figure 3.2 *CO_2 emissions per capita resulting from private consumption in the Netherlands from 1950-2040 (2000 = 100)*

The emission of CO_2 per capita has increased by 160% since 1950 (Figure 3.2). The forecast in the trend scenario is that this increase levels off. It is expected that in 2040 an emission will be reached 20% higher than in 2005. A significant portion of these emissions takes place during the manufacture of consumer goods (more than 55% in 2000). Changes in the consumption pattern hardly influence these so-called indirect emissions. The CO_2 emissions increase less rapidly than the consumer expenditures because of efficiency improvements during production. Additionally, direct energy usage in households (electricity, gas and car fuels) increases less than total household expenditures. The portion of the CO_2 emissions related to direct energy usage is expected to decrease from 40% in

2005 to 30% in 2040 as a result of improvements in electrical devices and transport, and from further insulation of dwellings. In the period of 1980 to 2000, there was an annual decrease of 1.4% per year in CO_2 emission per euro spent, due to efficiency improvements. The assumption in the trend scenario is a further annual reduction of 1.5% up to 2040.

3.4.2 Land use

Land use is strongly correlated with the level of consumption: richer countries generally appropriate a greater amount of land per person in the world than poorer countries. These differences, however, are less great than with the emission of greenhouse gas emissions (Figure 2.7), because land use in richer countries is generally more efficient and more intensive than land use in poorer countries.

The total land use dedicated to consumption for all of the Netherlands has increased approximately 7% between 1990 and 2004, which was far below the increase of household expenditures. Without the efficiency improvements in agriculture and food production, the land use for consumption would have been 20% higher in 2004. Per capita land use was in 1990 and 2004 approximately at the same level. Currently, the use of land, necessary for Dutch private consumption, is approximately four times the size of the Netherlands itself. Approximately 45% of this area is used for the production of food, 55% relates to the production of wood, which is to an increasing extent intended for paper products, e.g. for packaging. The Netherlands is a densely populated country where land is scarce. As a consequence, the land use for Dutch consumption to a large extent takes place abroad (Figure 3.3). Dutch consumption therefore contributes to the problems that are coupled with the increasing use of land elsewhere in the world, for example loss of biodiversity.

Land use for Dutch consumption is approximately 0.8 hectares per person. This is lower than in other rich countries in the world (Figure 2.7), which can be attributed to the use of land with high agricultural productivity, in the Netherlands as well as abroad. The trend scenario predicts an increase in land use for Dutch consumption by 2040, leading to more land use abroad. In particular, the land use for wood and paper products is expected to increase. Although consumer expenditures in the Netherlands for food also are expected to increase, the agricultural acreage for food consumption is expected not to increase by 2040. Higher expenditures are mainly related to the higher added values of food and to a lesser extent to the volume of food consumed (Mulder et al., 2007b). Moreover, agricultural productivity is expected to increase (Eickhout et al., 2006).

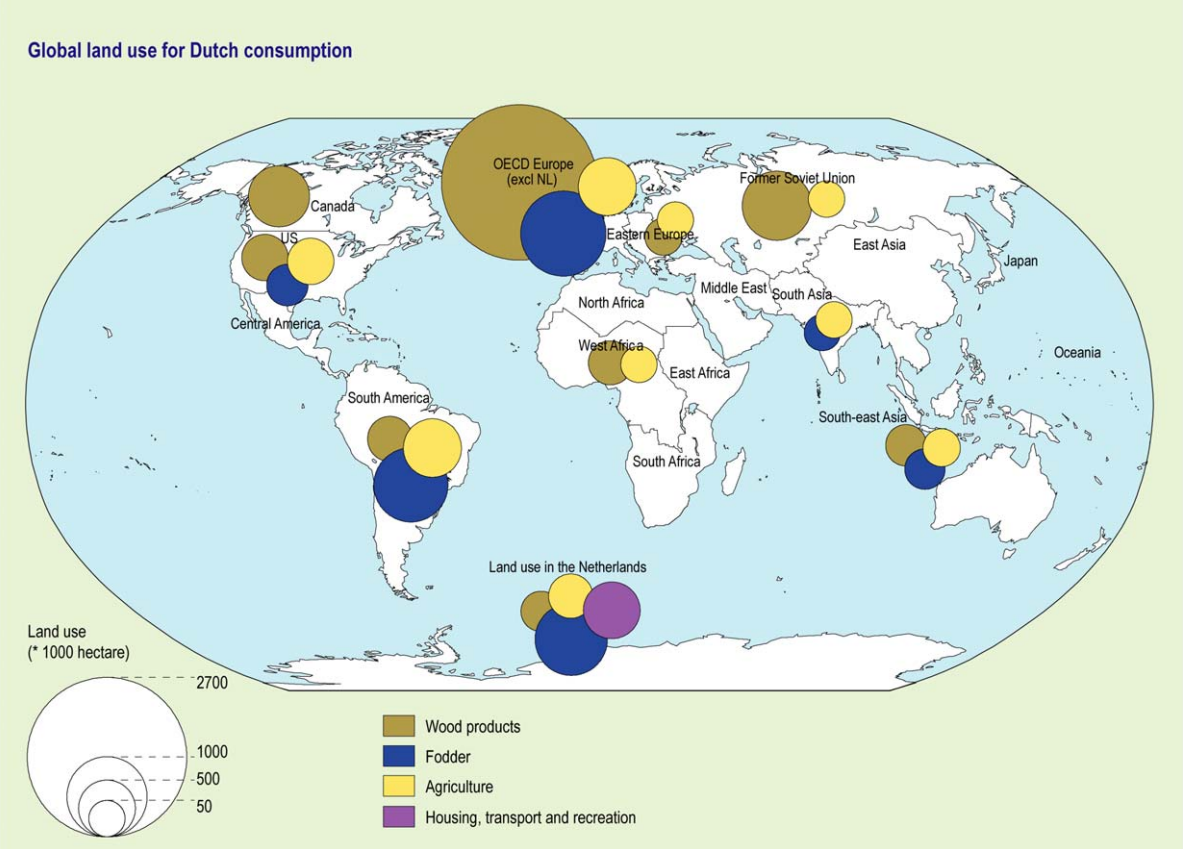

Figure 3.3 *Land use by Dutch citizens in 2000. Land use of less than 50,000 hectares is not represented (Rood et al., 2004)*

In the trend scenario, land use for Dutch consumption is expected to increase to approximately 1.0 hectares per person by 2040. In addition to the trend scenario, the Dutch government aims at an increasing use of biomass for energy purposes in 2040. This will lead to an additional land use of 0.1 hectare per capita. Currently, wood production for Dutch consumption mainly originates from regions with low-productive land. If the future increase in demand for wood is met by wood from these areas, this will result in biodiversity loss in these areas, but this will not compete with global food production. If, however, the increasing demand for wood and biomass will be imported from tropical areas, this will result to a loss in tropical biodiversity and will compete with the production of food.

4 Dutch production and sustainability

4.1 Trends in Dutch production

The Netherlands' gross domestic product (GPD) doubled between 1970 and 2005 with an average volume growth of 2.6% per year. This growth is expected to continue for the coming decades. The estimate is that GDP will increase by approximately 2% per year by 2040. GDP growth is significant related to the strong increase of the added value from commercial services (averaging 3.6% per year between 1970 and 2005). Along with this, the share of the commercial services in total gross added value increased from 38% to 51% in this period.

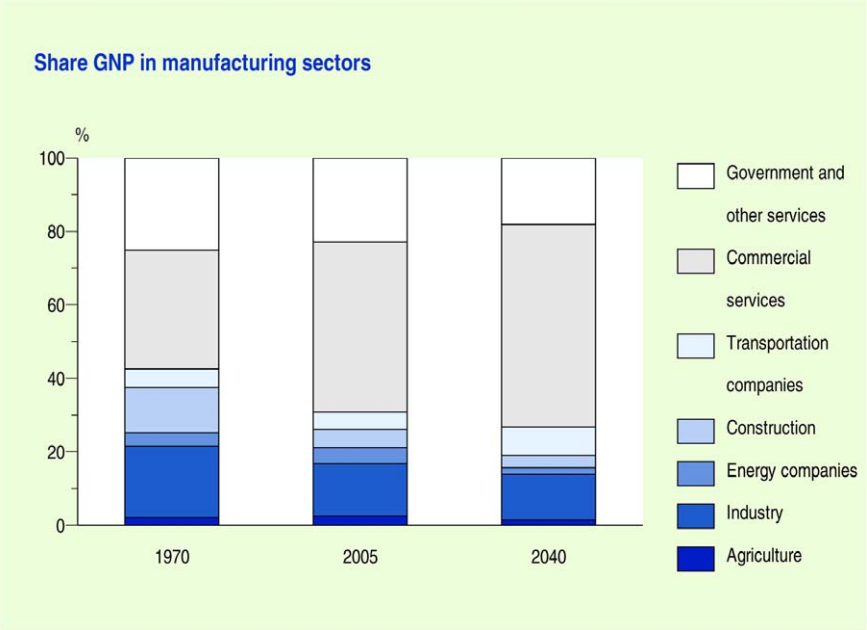

Figure 4.1 *1970-2005-2040 GDP shares based on production sectors (volume, basic prices). Sources: CBS and (CPB/MNP/RPB, 2006)*

The increase in the share of services (including government and transport) to the GDP is also expected to continue in the coming decades, and shall account for approximately 80% of the Dutch GDP in 2040 (Figure 4.1). Moreover, the service sector shall also provide approximately 80% of the employment in the Netherlands in 2040.

Greenhouse gas emissions have increased less intensively than production has, because of technological developments. Whereas the GDP in the Netherlands grew almost 45% between 1990 and 2005, CO_2 emissions from production in the Netherlands increased approximately 18% (Figure 4.2). The trend scenario forecasts a near doubling of the GDP until 2040, while the CO_2 emissions

from production shall increase approximately 29%. The shift to services, technological development and globalization all have an effect on the development of the Dutch production sectors and the development of the production-related environmental pressure in the Netherlands as well as abroad. The following sections shall further address these developments.

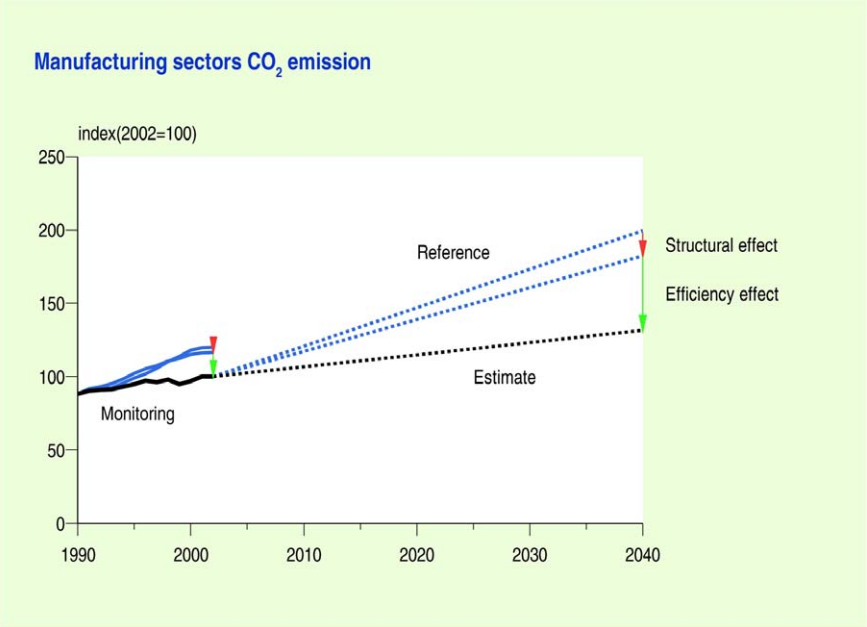

Figure 4.2 *The changes in CO_2 emissions from production, represented by the economic growth (reference line), changing economic sectoral composition (structure effect) and changing environmental intensity of the economy (efficiency effect), 1990-2040.*

4.2 Shift to services

In terms of job opportunities as well as of added value (contribution to the GDP), the share of services in the Dutch economy has vigorously increased at the expense of the share of industry and agriculture. This shift to services, which is occurring worldwide, is based on various factors (Schettkat and Yocarini, 2003). First, labour productivity in the service sector increases less rapidly than in industry and agriculture. Many services are labour-intensive and client-specific, which limits the possibilities for automation or further specialization (Suijker et al., 2002). Second, with increasing incomes, the demand for services increases more rapidly than the demand for goods. Finally, industries increasingly outsource their service activities to specialized companies in the service sector, or they divest divisions of the original company, which subsequently continue as an independent company in the service sector. Activities that used to be performed by the companies in the industry themselves, and which were therefore included in the statistics for industry, are included in the statistics for business service sector after outsourcing (Suijker et al., 2002). Consequently, there is no question of an actual shift in the economy, but of a statistical artefact (Schenk and Theeuwes, 2002).

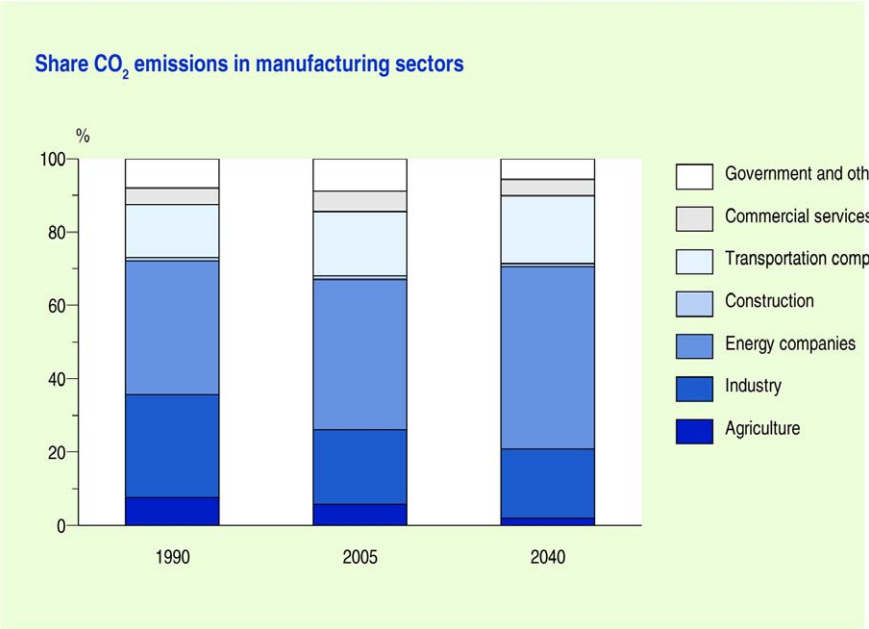

Figure 4.3 *1990-2005-2040 shares of CO_2 emissions based on production sectors. Sources: CBS and (CPB/MNP/RPB, 2006).*

While the share of the services in the GDP increases (Figure 4.1) the share in the CO_2 emissions are forecasted to decrease in the coming decades (Figure 4.3). The share remains limited because the services, with the exception of the transport sector, are relatively energy-efficient. The consumption of electricity by the service sectors contributes indirectly to the CO_2 emissions; in 2003 the service sector accounted for approximately 25% of the entire consumption of electricity in the Netherlands. The share of CO_2 emissions by the energy companies increased intensely between 1990 and 2005, and shall increase to 50% for 2040 according to the scenario.

The CO_2 emissions increase less severely than economic production. The shift to services contributes merely a small part to this because it doesn't replace industrial production, but rather it augments it. Moreover, a greater efficiency improvement can be realized with the manufacture of goods than with services. Lastly, the service sector itself also generates environmental pressure, chiefly due to the use of transport and energy.

4.3 Technological development and eco-efficiency

Technological developments in production sectors often lead to a reduction in detrimental emissions. Environmental policy provides a significant motive for such environmental technological developments, through stimulating the diffusion of technological applications or by giving incentive for innovation. Setting standards can also play a role by establishing emission standards through which the development of less environmentally friendly technology is either curbed or forbidden. In some cases a win-win situation can occur from this: as a result of strict regulation, environmental gain

can be achieved on the one hand, while on the other hand, companies can increase their competitiveness through innovation (Porter and Van der Linde, 1995).

Along with regulation, innovation and diffusion procedures are also encouraged through the implementation of economic stimulation such as subsidies, quota and fiscal advantages that provide advantages to environmentally friendly, as opposed to environmentally polluting, technologies. Market-based policy instruments are frequently preferred because of their efficiency, but the effectiveness is strongly related to the design of the instrument (Jaffe et al., 2002). An important instrument for stimulating innovations is investing in research and development (R and D). Among the levels of R&D investments by the OECD countries, the Netherlands is somewhere in the middle range; and the level of the EU in its entirety is substantially lower than that of the US or Japan. With the comparison of investments in environmental research, in contrast, the Netherlands scores relatively well (Figure 4.4).

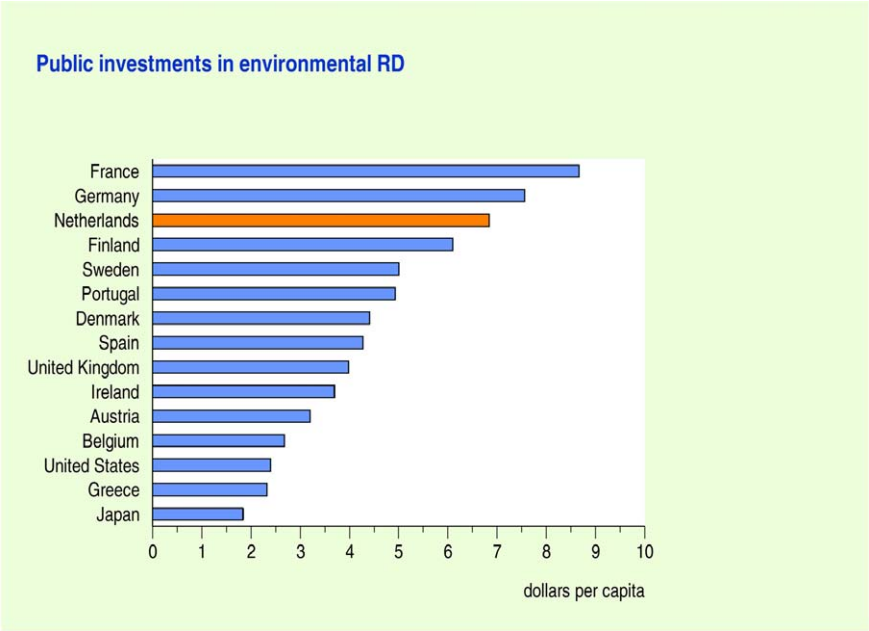

Figure 4.4 *Public investments in environmental R&D (2004) for the EU 15, in dollars per capita, based on figures from Eurostat and OECD. No figures are available for Italy and Luxemburg.*

To a great extent, the fact that the environmental pressure related to production has increased less severely than the production itself can be attributed to technological reduction measures. Technological measures have led to a decrease in acidification emissions (absolute decoupling of economic growth and environmental pressure). CO_2 emissions still increase, however, this is much less severe than it would have been without the advancements in technology. Technological measures do not always turn out to be sufficient to achieve actual reductions in CO_2 emissions. Though, robust reductions have been achieved for other greenhouse gases by applying technological measures.

The reduction costs per unit of emission are decreasing through technological developments over time, such that emission reductions continue to become cheaper (MNP, 2006). The learning effects from more stringent standards, and by insisting on the diffusion of environmentally friendly technology, can lead to not only substantial reductions, but also to decreased costs per reduction unit. These learning effects often result in greater results than the approach of using the first cheap reduction measures conceived, selecting an ad hoc 'easy solution', leaving the more inconvenient and therefore more expensive measures postponed to some future date.

4.4 Globalizing Dutch production and consumption

4.4.1 Interrelationship of the Netherlands in the global economy

Free and liberalized international trade is important for the development of a small open economy such as the Dutch economy. The Dutch economy is becoming increasingly more closely interrelated with other economies in the world. One manner this is manifesting itself is in the vigorous increase of trade flows in recent years: between 1970 and 2005 the import as well as the export of goods has grown more robustly than the entire Dutch economy. Additionally, export has more rapidly increased than import, respectively averaging 5.2% and 4.5% per year, causing the balance of trade surplus to increase to more than 7.5% of the GDP in 2005 (CPB, 2007). Internationally seen, the Netherlands is a large exporter: the Netherlands was placed sixth on the World Trade Organization's ranking list of largest exporters in the world in 2005, with a share of almost 4% of the entire export (WTO, 2006).

Dutch manufacturers can sell their products abroad for a good price. The Netherlands gained more than 30% of its GDP in 2003 through export; this share has hardly changed since 1990. The share in export for industry is approximately 50% of its entire market, which is greater than the approximate 15% of the service sector, which focuses more on the domestic market. Service markets are, however, becoming continually more international-oriented. On the other hand, import provides a greater supply and lower prices of products for the Dutch consumer. Directly imported goods make up 16% of household consumption.

The Netherlands trades chiefly with European countries (Figure 4.5). More than 80% of the exported goods go to other European countries. The share of Asia has increased vigorously in recent decades, mainly because of the growth in China's share in the entire import from 0.2% in 1970 to almost 8% in 2005. The shares of Africa, Central America and South America in the entirety of trade flows remain limited to a few per cents. Additionally, the Netherlands has a significant role as transit country to the European hinterland. A share of the import is then again directly exported without the Netherlands needing to do much to it. This re-export has created an increasingly greater portion of the total export in the Netherlands since the 1980s (approximately 40% in 2005). This involves products from China to an increasing degree. Two thirds of the Dutch import from China is directly exported again.

Figure 4.5 The Netherlands' export destination and import origin

The foreign direct investments have also grown substantially. The amount of direct investments in other countries by Dutch companies has quadrupled in the past 15 years (Gorter et al., 2005) The majority of them are in the EU (approximately 50%) and the US (approximately 25%). Merely a limited part of the investments go to Southeast Asia, Africa and South America. In comparison with the outgoing investments, there is also a smaller flow of investments in the Netherlands by foreign companies; approximately one half from the EU and about a quarter of them from the United States.

Companies have increasingly more choices for locations in the world where they can place their production process in order to profit from the differences in costs between countries. As such, Dutch companies can shift their activities to, for example, Eastern Europe or Asia in order to profit from low costs of labour. Although there is somewhat of an increase in the relocation of economic activities out of the Netherlands, this does not occur on a large scale (Haverhals et al., 2004). Along with this, the number of foreign companies established in the Netherlands is also increasing (EZ, 2006). Furthermore, the investment and trade statistics show that the majority of the Dutch outflow and inflow from direct investments takes place between Europe and the United States. The interest in low-salary countries is limited in size and is not increasing very much (Gorter et al., 2005). The effects on income and unemployment are likely to be limited. The loss of jobs caused by moving to other countries fades into insignificance compared to the number of jobs that are created and disappear from the Dutch job market annually (Gorter et al., 2005). From economic literature it also follows that it is not probable that increasing international specialisation will further weaken the position of semi- and unskilled labourers structurally (Gorter et al., 2005). The trade and investment figures suggest that the Dutch labourers compete more strongly with labourers in comparably developed countries than with labourers in low-salary countries. Additionally, in contrast with the shifts to other countries, new domestic activities also arise, often with a relatively higher added value from which the economy in its entirety can grow (Schenk and Theeuwes, 2002; EZ, 2005). On balance, the Netherlands has economic advantage of international trade and investments (Gorter et al., 2005).

With the relocation of economic activities to other countries, the environmental pressure that is coupled with the production also shifts abroad. An increase of imported products from abroad also means an increase in environmental pressure abroad. In case this import is ultimately destined for Dutch consumption the environmental pressure for the Netherlands takes partly place abroad. On the other side, export from the Netherlands has increased and that causes environmental pressure and land use within the Netherlands for consumption elsewhere in the world.

4.4.2 Greenhouse gas emissions in the Netherlands and abroad

Since Dutch export is energy-intensive, the CO_2 emissions in the Netherlands for the manufacture of export products is greater than the CO_2 emissions abroad for Dutch consumption. The import of greenhouse gas emissions (including non-CO_2 greenhouse gases) is approximately the same as the export of greenhouse gas emissions. This contrasts with many other Western European countries, the US and Japan, who are net exporters of greenhouse gas emissions (Figure 2.6). Dutch greenhouse gas emissions are mainly exported to Europe, the US, Japan and China.

Changes in import and export have not led to a shifting of greenhouse gas-related environmental pressure from the Netherlands to abroad from 1990 to 2004 (Wilting et al., 2006), although in 2005 and 2006 the emission of CO_2 in the Netherlands did decline because of more import of electricity. In the coming decades until 2040, according to forecasts there will be a shift of greenhouse gas emissions from the Netherlands to abroad. The Netherlands shall concentrate more on exporting services and therefore import a greater portion of the products that are used in the Netherlands. The exportation of products from the agricultural, industrial and energy sectors increases less rapidly because of this than does the importation of products from these sectors (CPB/MNP/RPB, 2006). The fact that CO_2 emissions as forecasted for the Netherlands will increase less rapidly than production in the coming decades is therefore not only the result of efficiency improvements, but also partially because of the increase in the emission that takes place outside of the Netherlands for consumption in the Netherlands. In case the imported products which are produced less efficiently in other countries, global emissions will be higher than in the case these products were produced in the Netherlands.

4.4.3 Land use in the Netherlands and abroad

Land is appropriated for production in the Netherlands. Agriculture is by far the largest land-using economic activity in the Netherlands with more than 60% of the entire acreage. Land use for other production activities is limited to approximately 3%, chiefly for business zones. Furthermore, infrastructure, which is necessary for production, uses more than 3% of the land in the Netherlands. Approximately 70% of the land use is attributed to consumption abroad via export, because a great deal of the agricultural production is exported. The land use for production in the Netherlands falls 10% in 2040 according to the trend scenario.

The present land use for Dutch consumption is about four times the area of the Netherlands, so main part of this land use takes place abroad (section 3.4.2). Furthermore, land use is required for imports that are used in Dutch production of goods that are exported again. These imports concern e.g. feed for cattle breeding, like soy.

5 Perceptions and actions by citizens and companies

The Second Sustainability Outlook (MNP, 2008 forthcoming) demonstrates that the international targets for climate, biodiversity and foreign aid will not be achieved without supplemental policy. The previous chapters demonstrate that a considerable increase in labour-efficiency and better production methods have provided for a continually greater and broader accessibility to products and services for Western consumers. These products also often become cheaper due to the continually lower trade barriers and because companies can manufacture them in places in the world where the lowest production costs are. More efficient production methods have, however, not led to a fall in greenhouse gas emissions or to a reduced land use resulting from consumption.

Policy options are formulated in the Second Sustainability Outlook in order to bring the international targets closer. This chapter addresses the question as to whether there is support for policy options in the Netherlands and some European countries which bring the targets closer by. Among these policy options are measures that should lead to lower environmental pressure by changing the behaviour of citizens and companies (see section 5.3). Prior to behaviour change, the global problem must be acknowledged by citizens and companies. In this chapter the reasons as to why such behaviour changes do not take place on their own are addressed, while many people are well aware what is necessary for this. The citizens as well as the manufactures look to government to take initiative to start the process of behaviour change by providing a level playing field and by breaking through the social dilemma. There are various thoughts as to the manner with which the government accomplishes this. The level of support for the different policy options are analysed in this chapter.

5.1 Perceptions and actions by citizens

In order to design a sustainable society, it is important that citizens and companies take the responsibility for the negative consequences of their actions (SER, 2000). Arriving at behaviour that supports sustainable development requires that one be aware of sustainability problems.

When Dutch citizens were asked to rank social issues in the order of importance that they should be solved, they indicated that beside old-age provisions and health care, the priority should chiefly be given to global sustainability issues such as war, hunger and violation of human rights (Table 5.1). This research was carried out by NMP ((Visser et al., 2007a). When citizens were also asked to consider the Dutch policy, the global and environmental issues disappeared from the priority list. Citizens apparently do not associate world problems with national policy.

Environmental issues descended on the social agenda until the end of 2006 (Visser et al., 2007a): except for the pollution of oceans, ecological issues did no appear in the top ten of a list of 64 proposed social issues. This impression is aligned with the slight amount of attention given to the environment until the last quarter of 2006. Thereafter, partially due to the film by Al Gore, the climate issue quickly rose to 10th place in April 2007. Social issues that are related to development

cooperation scored high as well, but preventing loss of biodiversity through less deforestation did not come higher than 26th place in 2007 either (see Table 5.1).

Table 5.1 Ranking of social issues in 2007, 2006, 2005 and 2003

Top 10 Social issues	Theme (a)	Scale (b)	Ranking			
			2007	2006	2005	2003
War and terrorism		G	1	1	1	3
Hunger	D	G	2	3	4	5
Human rights	D	G	3	4	5	6
Old-age provisions		N	4	2	2	2
Tension between religions		G	5	6	*	*
The Netherlands more tolerant and more social		N	6	11	9	14
Pollution of oceans, rivers and lakes		G	7	7	6	4
Health care		N	8	5	3	1
Child labour	D	G	9	8	15	11
Greenhouse effect/ Climate change	C	G	10	17	19	9
Other relevant issues						
Drinking water in developing countries	D	G	11	10	14	17
Prosperity in developing countries	D	G	13	12	11	8
Being more efficient with oil and gas supplies	C	G	17	26	20	24
Replacing oil and gas with other energy sources	C	G	18	19	*	*
Contagious diseases	D	G	19	14	17	19
More democracies	D	G	22	23	*	*
Illiteracy	D	G	23	16	23	13
Deforestation	B	G	26	31	24	20
Assured supply of energy	C	N	28	35	*	*
GMO	B	G	45	41	34	28

(a) Biodiversity (B), Climate (C), Development cooperation (D),
b) The survey used to inquire about the topic: Global (G) and the Netherlands (N).
* Not measured.
Source: (Visser et al., 2007a; Visser et al., 2007b)

In principle, citizens are well aware of which behaviour changes are related to tackling the environmental problems. One would expect that citizens with a high prioritization of environmental problems and a society-oriented world perspective or value-pattern (see Appendix 2) would demonstrate a higher degree of environmentally friendly behaviour. However, the relationship between ‘perceptions’ and ‘actions’ cannot be demonstrated. Household energy usage does not show a correlation with prioritizing of the climate problem or with the motivation to save energy. The amount of the entire household energy usage in the Netherlands is for approximately two thirds determined by social economical factors, of which income is by far the most important (Vringer et al., 2007).

Environmentally friendly behaviour frequently requires more sacrifices than does environmentally unfriendly behaviour, not only in a financial sense, but also through, for example, loss of comfort, convenience, and breaking routines. More specifically, consider commuter traffic whereby a transition from using a car to taking public transport can mean a great deal in terms of departure time, comfort and habits. Additionally, the loss of status associated with a certain consumption pattern can also be seen as a sacrifice. This means that citizens, except for a small group of trendsetters, do not easily

change their behaviour, even if many see the societal benefit of the behaviour change. This explanation for the lack of individual problem-solving behaviour, while at the same time the public nature of the problem is acknowledged, is often placed under the heading of 'social dilemma'. A social dilemma is defined as a situation where each individual always receives a higher payoff for defecting than for cooperating, but everyone would be better off if all cooperate than if all defect (Dawes and Messick, 2000). Therefore, in such a situation changing individual behaviour from defecting to cooperation would benefit the collective, but this only accounts if everyone (or at least a significant number of others) will act cooperatively as well.

It is of importance that a coordinating party steps up to break through the social dilemma. A government is often needed to establish and maintain rules for a large group of people in order to compel desired behaviour at an individual level for the interest of the collective. This is possible by bringing about a behaviour change through setting standards or charging goods and services. Approximately 70% of Dutch citizens think that the government should take the initiative for solving important social issues (MNP, 2004; Aalbers et al., 2006).

5.2 Perceptions and actions by companies

In a comparison between Dutch AEX companies and 1000 significant international competitors with more than 100 indicators for diverse sustainability aspects, more than 80% of the Dutch AEX companies scored better than the average for the global industry sector (Dutch Sustainability Research, 2006b). With this, Dutch companies stand in first place in 2006; in 2004 and 2005, the Netherlands took third place. European enterprises score on average better than the Asian and North American companies (Dutch Sustainability Research, 2006b). This can be accounted for by the corporate social responsibility (CSR) in Dutch and European companies more often make up a part of the operational management itself (Cooymans, 2007). In American companies, CSR often consists of donations to charities and other 'good deeds'.

In contrast to the nationally operating companies, the internationally operating companies have more to do with global sustainability issues, such as child labour, lower salaries, poor working conditions and severe environmental pollution. This does not only involve the international operational management, but they are also subjected to greater societal pressure from NGOs. At times, behaviour change is enforced through public opinion.

A number of large Dutch multinationals actively respond to issues concerning energy, climate change, fighting poverty and work conditions in developing countries (CDP, 2006). Large energy companies work on alternative energy sources, dealing more efficiently with energy and improvements in efficiency. Other companies have the policy of taking into account the consequences that livestock breeding, fishery and logging have on global biodiversity, by posing requirements for sustainability on supply chains. A number of companies contribute to the Millennium Development Goals (MDGs); these are often coupled with company activities or operational management elsewhere in the world, for example by supplying logistical means, medical help and education in developing countries (Dutch Sustainability Research, 2006a).

The Dutch banking sector manages almost 1.9 trillion euros in total. The investment capacity of large institutional investors (pension funds and insurance companies) is almost 1 trillion euros. Financial institutions can exercise influence on the sustainability achievements of their clients (companies and organizations) by way of extending credit, financing projects and investments. The sustainability investment capacity of large institutional investors amounts to approximately 5% of their total invested capacity.

The large pension funds (ABP, PGGM and PME) signed the *Principles for Responsible Investment (*PRI) in 2006. The PRI is voluntary and provides guidelines for normal investment decisions to integrate environmental and social aspects with corporate governance. Through their large investment capacity, pension funds can be important for corporate social responsibility (CSR) when potential investments are screened for sustainability criteria.

Currently, most banks offer companies and individuals the possibility to save and invest in sustainability. The ability for sustainable investments and savings by individuals increased by 20% in 2006 to 11 billion euros, through which the market share of sustainability saving and investment further increased to about 3.5% (VBDO, 2007). Moreover, large banks have established guidelines to manage social and environmental issues (Equator Principles) for socially responsible project financing in developing countries. The banks that have associated themselves with this initiative cover approximately 75% of the worldwide project-financing above 10 million dollars (NovioConsult and Van Spaendonck/CREM, 2007). Additionally, large Dutch banks have their own guidelines for financial transactions, such as for palm oil plantations or genetically manipulated organisms (GMO). More recently, there has been the development of sector-specific criteria for extending credit for trade flows, for example coffee, cacao and soy.

Pension funds and banks in the Netherlands, as well as in other countries, are usually insufficiently transparent concerning their investments in sustainability (VBDO, 2006; Van Gelder and Scheire, 2007). There is even less insight into the impact their investments have on sustainable development. The importance of the financial sector's transparency is that citizens and companies can make socially responsible choices. The fact that there is an increasing need for transparency here in the Netherlands emerged from recent discussions about investments by Dutch banks and pension funds in cluster bombs and, for example, from a discussion between the Dutch Cancer Society and an investment institution, when it turned out that there were tobacco manufacturers in their share funds.

Managers of the larger SMEs (with 5 to 100 employees) were also asked to rank a number of social issues (Hoevenagel et al., 2007). The study demonstrated that more than half of these managers think that the following social issues require a solution: improvement in education, reliable utility services and remaining competitive in science and technology (Table 5.2).

In order to prevent managers from ranking the issues as citizens, they were asked to draw a relationship between the issue and their own company. From the ranking of social issues, it seems that SMEs have different priorities than citizens. The top ten social issues almost exclusively consist of Dutch issues, the solution of which would contribute to a stronger competitive position for Dutch companies (profit). Corporate social responsibility is the 14th priority. In contrast, citizens give priority to social issues that have to do with People and Planet (Table 5.1). Additionally, citizens differ from companies concerning the desired direction in which the world should develop and government's role in this (see section 5.4).

Table 5.2 Prioritizing of social issues by the larger SMEs compared with that of citizens in 2006

Top 10 social issues	Scale*	Ranking companies	Ranking citizens
Improving the quality of education	N	1	29
Reliable utility services	N	2	28
Remaining competitive in science and technology	N	3	39
Reduced traffic	N	4	49
Lowering tax obligation	N	5	25
Improving competitive position compared with abroad	N	6	46
Better organization of governmental finances	N	7	34
Being more efficient with oil and gas supplies	G	8	26
Reliability of government	N	9	30
Reducing ambiguity of norms/ more tolerant and more social	N	10	11

* The survey used to inquire about the topic: Global (G) and the Netherlands (N)
Sources: Companies (Hoevenagel et al., 2007), citizens (Visser et al., 2007a). 'Companies' consists of the larger SMEs in the Netherlands.

Corporate social responsibility (CSR) is the concern for the effects of an activity by a company on society (SER, 2000). CSR can contribute to the efficiency of operational management, the saving natural resources and the opening of new markets (Cooymans, 2007). As such, CSR is an instrument that allows companies to operate more sustainable. CSR per definition goes further than current legislation and regulation and occurs on a voluntary basis. In the smaller SMEs (less than five employees), 60 to 70% of the companies are reasonably or extremely familiar with CSR (Hoevenagel, 2007). This group consists of approximately 85% of the SMEs. Of the larger SMEs, 80% of the managers are positive about CSR. These companies associate CSR with: an integrated consideration for People-Planet-Profit (65%), a fair personnel policy (60%), or environmentally friendly operational management (50%).

On average, the larger SMEs practice about half of the more frequently occurring CSR measures (Hoevenagel et al., 2007). Depending on the type of measure, 60 to 90% of the companies put the measures into practice. They cost the companies approximately 1% of their sales. This chiefly involves activities that belong to contemporary entrepreneurship and are often geared toward internal personnel policy (equal pay for men and women, part-time work and hiring employees from within the region). These CSR measures are regarded as 'easy solutions'. Environmental- and people-oriented measures that require a bit more time and investment are applied by 20 to 40% of the companies. Approximately 30% of the smaller SMEs say they practice CSR (Hoevenagel, 2007).

Internationally operating SMEs and larger companies practice relatively more CSR activities than smaller SMEs (Hoevenagel et al., 2007). The same applies to family companies and companies with a longer history. A positive attitude by management, involvement by employees and activities by NGOs lead to more CSR activities (Quaak et al., 2007).

As was mentioned earlier, citizens who think that fighting climate change is important use just as much energy as citizens who do not think this. It is unknown if companies with a CSR policy perform better on this point than other companies.

Factors that play a role in chain responsibility are: the request by consumer and buyer, the pressure from NGOs and government, and the power and experience of the company. The absence of chain responsibility is chiefly attributed to the absence of a strong consumer demand (Quaak et al., 2007). Internationally operating companies, in contrast, increasingly try to pose demands on production via the production chain. This happens more and more in collaboration with other participants, such as NGOs. Companies work on making production more sustainable in various international joint ventures among governments, NGOs, participants in the chain and manufacturers (so-called public-private partnerships). An example of this behaviour is the criteria for sustainable production and import of biomass for non-food purposes as presented by the commission Cramer (project group sustainable production of biomass). Joint ventures are increasingly entered into in order to create a level playing field. Minimum standards for sustainability are developed and implemented via international multi-stakeholder initiatives, such as the 'Roundtable on sustainable palm oil'. Criteria have also recently been developed for fishery and cotton production and a set of principles and criteria for sustainable fishery as formulated by the Marine Steward Council (MSC).

Merely 5% of SME entrepreneurs associate the practice of CSR with posing demands on suppliers (Hoevenagel et al., 2007; NovioConsult and Van Spaendonck/CREM, 2007). For years companies in the do-it-yourself branch, clothing manufacturers and coffee roasters have been publicly addressed by social organizations concerning sustainability problems that occur further up the chain. Supermarkets increasingly address direct suppliers about requirements that the products delivered must meet. This concerns not only the physical characteristics of the product, such as the presence of pesticides on fruit, but also the manner with which the products are produced, such as child labour, honest pay, no discrimination and proper health care regulations. The requirements in the chain can turn out to be negative for suppliers (often in developing countries) when suppliers are insufficiently supported, or the procurement values offer insufficient room for companies to meet the requirements (price, delivery time, etc.). The support of suppliers is therefore a specific component in chain responsibility (Hoevenagel et al., 2007; NovioConsult and Van Spaendonck/CREM, 2007).

Chain responsibility presents a number of dilemmas that have to do with the fact that Dutch companies are part of international production chains. But the differences in the interpretation of CSR among countries play a role. The trade-offs among people, planet and profit are greater in developing countries and the possibility for verification of how the environmental and social circumstances are safeguarded further up the chain is sometimes problematic. The absence of a level playing field can lead to suppliers switching over to other clients when strict requirements on suppliers are posed. Legislation and regulation is needed to be able to address manufacturers and suppliers about responsible chain management. A great deal of this is often absent in developing countries.

Companies often have an ambivalent attitude concerning environmental and sustainability policy because it can lead to additional limitations for operational management. Companies think that one-sided and voluntary behaviour change is too expensive in their appraisal of costs and benefits and this can affect their competitive position. This is comparable with the social dilemma for citizens. Taking a competitive position into consideration, companies also think that the same measures should be

established for all competitors, resulting in a level playing field is maintained or created. But the enforcement of rules undermines the voluntary character of CSR.

A few Dutch companies have recently made an appeal to implement a progressing environmental policy and to set sustainability and innovation high on the political agenda. According to them, the government should demonstrate some initiative and should come up with a consistent policy and long-term goals. Progressive companies can profit from this. Companies should also be more involved in the implementation of the policy. The 'green procurement' (see text box) by government is also seen by companies as a component of government's ambition concerning the issue of sustainable development.

Sustainable procurement by government

Governmental organizations procure approximately 30 billion euros worth of products and services annually. The government can set the tone in markets through this by being more prominent. The state's objective for 2010 is to see that 100% of its procurements and tenders are sustainable (Ministry of Economic Affairs, 2007). An ambition of a minimum of 50% applies for provincial and municipal governments. From the Monitoring of Sustainable Management of Governments 2006, it turns out that 50% of the core departments' procurements for company clothes, bus transport, catering, service cars, printed matter, buildings, green provisions, IT hardware and cleaning supplies were sustainable procurements. This product group consists of 10 to 15% of the entire procurement volume.

5.3 Civil policy support

Citizens as well as companies expect action from government to tackle the sustainability problems. Citizens expect government policy to break through the social dilemma and companies expect policy that creates a level playing field. There shall almost always be resistance to new policies because they usually lead to additional costs for citizens and companies. The current level of support by citizens was researched on a limited set of measures for the purpose of the second sustainability outlook (Verhue et al., 2007). The level of support from companies was not researched.

The options that are charted in the sustainability outlook and those that could contribute to addressing the development issue, fighting climate change and stopping the loss of biodiversity, can be implemented through various policy measures. The options (see Table 5.3) were translated to specific policy measures for the study, with different levels of applicable costs and benefits that could potentially deliver a significant contribution to attaining the goals. The options, measures and levels of cost-benefits are represented in (Verhue et al., 2007). To get an impression of the degree of consensus in various EU member states, the study was not only performed in the Netherlands, but also in Germany, France, Italy, Poland, Sweden and the United Kingdom (UK) (Verhue et al., 2007).

Table 5.3 Options for which measures are included in the study of citizens' level of support

Biodiversity
- Less land use for agriculture (worldwide) in order to counteract loss of biodiversity
Climate change
- Reduction of CO_2 emissions by increasing energy-efficiency
- Reduction of CO_2 emissions by electricity generation
Foreign aid
- Less death though disease and hunger in developing countries through direct assistance
- Help focused on better access to education in developing countries
- Provided with better infrastructure through investments in developing countries

It is not surprising that a majority of citizens from the Netherlands and the European countries studied set a value on tackling the greenhouse effect, loss of biodiversity and supporting development cooperation when this does not cost anything (Table 5.4). Reducing the loss of biodiversity and infrastructure improvement in developing countries score the lowest. Of all the countries studied, the level of support for measures is the lowest in Poland.

The relatively low score on biodiversity corresponds with the low priority that citizens give to this issue (see Table 5.1). The level of support diminishes when citizens must make sacrifices for the solutions to the issues. The intensity of this decline is dependent on the type of instrument or measure that is implemented, the level of the costs and the expected effect.

Table 5.4 Civil support (percentage) for a number of options, when no costs are associated with them (Source: Verhue et al., 2007)

	Biodiversity		**Greenhouse effect**		**Development aid**	
	less land use	**saving energy**	**electricity generation**	**death from disease**	**better education**	**better infrastructure**
Netherlands	61	76	76	73	73	56
Germany	68	87	86	83	82	46
France	69	89	89	84	87	48
Italy	60	83	80	80	79	61
Poland	53	69	73	74	72	58
UK	66	86	85	84	84	60
Sweden	71	82	82	84	85	45

The consumption of meat and dairy involves the use of a relatively large amount of land, because agricultural land is required for growing livestock fodder. A levy on meat and dairy in order to reduce this land use raises resistance in the Netherlands as well as in other European countries. A tax,

increasing the price of meat by approximately 50%, has the greatest level of support in Italy (49%), the UK (53%) and Sweden (62%). There is no majority level of support for a reduction in the use of land by implementing genetically modified crops (GMO), even if GMO does not effect the price of food. Just under half of the Dutch citizens (47%) accept permitting genetically modified crops for fodder. The resistance to this measure is greater in other countries; the average level of support lies just under 40%. The level of support for genetic modification of crops in the Netherlands is greater than the price increase for meat and dairy. Implementation of GMO for crops destined for human consumption does not have much of a level of support in any of the countries studied.

Loss of biodiversity can also be prevented by purchasing vulnerable nature reserves outside of Europe. There was a majority of support found only in Sweden (52%) for an additional tax of approximately €5 per person per month for the purchase of nature reserves outside of Europe. The level of support for this measure is 40% in the Netherlands. However, an earlier study showed that there is an ample level of support among Dutch citizens (76%) for increasing the share of sustainable hardwood to 100% in order to fight deforestation (Mulder et al., 2005). Incidentally, the level of support does not substantially increase if this measure were implemented on a European or global level. The measures inquired about also have a limited effect on the land use.

In contrast to measures to maintain biodiversity, there is a relatively high level of support for policy aimed at fighting climate change. In all the countries studied, an ample majority of citizens chose for additional measures that lead to a reduction of CO_2 emissions in addition to maintaining the current policy. The level of support is particularly for reduction of CO_2 emission by using other fuel combination for the production of electricity. The level of support is not as great for energy-saving measures, such as obligatory insulation of existing homes and stricter emission-requirements for manufacturers. However, along these lines, a majority for the reduction of CO_2 emissions can also be found in most of the countries. The measures' reduction potentials are based on Dutch data (Daniëls and Farla, 2006; Daniëls et al., 2006).

In the countries studied, over two thirds of the citizens support sets of measures that yield a reduction in CO_2 emissions of at least 10% (the Netherlands), 12% (UK), 13% (France, Italy, and Sweden), or 14% (Germany), even when the costs of these measures are taken into consideration. In Poland, just under two thirds of the citizens support an emission reduction of 5%. For sets of measures that provide higher reductions than those mentioned above, the level of support decreases to a smaller majority or a minority, because the cost increase and also less popular measures would therefore have to be implemented, such as a levy-tax on car fuels. An earlier study on the level of support among the Dutch population for CO_2 reduction measures also revealed that there was a large majority in favour of a substantial reduction of CO_2 emission (Mulder et al., 2005).

The set with a CO_2 reduction of 10%, for which the level of support is the highest in the Netherlands, includes five measures. Of these, two measures together cause the bulk of the total reduction in CO_2 emissions. The first measure implies that the government imposes limitations on companies regarding CO_2 emissions during production. On average, this makes consumer goods more expensive by about 1%. The other measure implies a substantial levy-tax on non-sustainable electricity, which may cause the electricity bill to increase by up to 25%. In addition, the set includes three measures that have a relatively small effect, but are supported because the costs of these measures are limited and in addition, the costs are partly recovered by lower energy costs. These measures imply obligatory insulation of existing houses, energy-efficiency standards for electrical home appliances and

subsidizing economical cars combined with a tax on less economical cars. Taking into account the decrease in energy cost, for an average household the cost of this set of measures will be about €10 per month.

In most of the countries, with the exception of Italy, it seems that there is a slight preference for energy-saving by companies above measures that involve the citizen more closely, such as obligatory insulation of existing houses and energy-efficiency standards for electrical home appliances and cars, even if the costs of these measures are returned or partially returned. This might have to do with the greater visibility of the last category of measures. This can also possibly be explained by the fact that a few consumer goods severely increase in price in the last category of measures, while energy-saving by manufacturers would raise the prices of the consumption set to a limited extent in its entirety. Table 5.5 presents the level of support in the various countries for sets of measures that yield a reduction in CO_2 emissions of 10%, 12% and 13%. The sets presented are those for which on average the level of support was highest in the countries studied.

Table 5.5 Level of support for sets with energy-saving measures that lead to different levels of reduction of CO_2 emissions.

	CO_2 reduction 10%	**CO_2 reduction 12%**	**CO_2 reduction 13%**
Measures			
Obligatory insulation of existing houses	limited requirements	limited requirements	more stringent requirements
Energy-efficiency standards for	electrical home appliances	electrical home appliances and cars	electrical home appliances and cars
Measures by firms	standards for CO_2 emissions	standards for CO_2 emissions	standards for CO_2 emissions
Levy on unsustainable electricity; electricity bill increases by up to	25%	35%	40%
Level of support			
Netherlands	69%	65%	62%
Germany	84%	79%	74%
France	76%	69%	68%
Italy	79%	77%	74%
Poland	40%	34%	30%
UK	72%	69%	63%
Sweden	68%	71%	70%

(Source: Verhue et al., 2007)

In all of the countries studied, the generation of electricity from renewable sources (biomass, wind and sun) is preferred. Natural gas came in second, followed by nuclear energy, coal with CO_2 storage and coal without CO_2 storage. Other European studies, such as the Eurobarometer, have revealed that renewable energy is considered to be the most attractive and nuclear energy and coal the least attractive (The Gallup Organization, 2007). Citizens in France and Sweden think nuclear energy is about as attractive as natural gas, whereas nuclear energy is viewed in Germany, Italy and Poland as relatively unattractive. Polish citizens prefer coal (with or without CO_2 storage) to nuclear energy.

But when the differences between the costs of generating electricity with the different sources of energy to achieve a specific CO_2 reduction are taken into account, the differences in preference largely disappear. In every country, the attractiveness of renewable sources of energy is largely offset by their relatively high costs. Costs have the least influence on the level of support in the Netherlands and Sweden. Cost has the most influence in Poland and the UK, where the current costs for electricity are relatively high. Were costs to be taken into account, Poland and Italy would have a clear preference for renewable sources of energy to nuclear energy. Currently, there is no electricity generated by nuclear energy in either country. In most of the countries, the support for coal with CO_2 storage is comparable with that for nuclear energy. Only in Poland is the support for coal with CO_2 storage comparable with that for renewable sources of energy (Table 5.6).

Over 75% of Dutch citizens would prefer to reduce the share of coal (without CO_2 storage) used to generate electricity from 25% to 5%, which would amount to a CO_2 reduction of approximately 10% of the total Dutch emissions. Citizens are prepared to accept the higher cost. It doesn't really matter to them whether coal is replaced by nuclear energy, renewable sources of energy or coal with CO_2 storage.

In Germany, Italy and the UK over 75% of the citizens are also prepared to pay more for electricity in order to achieve a 10% reduction of CO_2 emissions from coal by partially replacing coal with renewable sources of energy, nuclear energy or CO_2 storage. In Poland, the support for this measure is lower, but still clearly above 50% (Table 5.6).

Table 5.6 The level of support among citizens for changes in electricity generation that lead to a 10%[a] reduction in CO_2 emissions and the associated cost.

	Replacing coal with renewable sources		Replacing coal with nuclear energy		Coal in combination with CO_2 storage	
	Cost increase[b]	Level of support	Cost increase[b]	Level of support	Cost increase[b]	Level of support
Netherlands	7-12%	80%	2-10%	77%	2-8%	76%
Germany	5-8%	90%	2-8%	85%	2-7%	86%
France[a]	4-5%	84%	not measured		1-4%	81%
Italy	5-10%	84%	2-8%	76%	2-5%	79%
Poland	10-20%	71%	5-20%	61%	5-15%	72%
Sweden[a]	1-2%	86%	0-1%	85%	0-1%	86%
UK	9-18%	84%	3-15%	82%	3-12%	82%

[a] Because of the high share of nuclear energy and/or renewables, in France and Sweden the share of coal used to generate electricity is not sufficient to achieve a 10% reduction. The level of support and cost figures displayed for France and Sweden apply to a CO_2 reduction of 6% and 3%, respectively.

[b] Increase of electricity bill as a percentage compared with 2004 (Eurostat, 2007). The specified range reflects the ambiguity of the cost estimate (see Verhue et al., 2007). For each measure, it is assumed that the costs per ton of CO_2 reduction are comparable in each country. Because the current cost of electricity differs between the countries (low in Poland and the UK, high in Sweden), the relative cost increase is also considerably different.

(Source for level of support: Verhue et al., 2007)

The level of support for a combination consisting of the set of measures geared toward energy-saving and the set of measures that would reduce CO_2 emissions during the generation of electricity, has not been studied. A majority level of support for a combination consisting of both sets that together would lead to a 20% reduction is unlikely. When both sets of measures that have the highest level of support separately are then combined (CO_2 reduction by using renewable energy to generate electricity and emission limitation at firms), then it might be possible to have a majority level of support for a reduction in CO_2 emissions of a few percentage points more than the 10% that would be achieved by the individual sets of measures.

A majority of citizens in the Netherlands as well as the other countries are prepared to pay more taxes to increase the level of government's annual development aid spending by 20%, as long as the results are clear. A lot of importance is attached to saving lives by combating hunger and disease and increasing access to basic education. There is less of a level of support for development aid that only delivers results over the long term, such as infrastructure improvements (Table 5.7). Noteworthy is that the extent of the achieved effect, meaning the number of people reached, hardly has any impact on the level of support. The level of support would, however, decrease were the costs to increase.

The results show that the citizens are indifferent whether development aid is provided by their own country or within an international context (EU or UN). However, in order to achieve the effects of development aid such as those included in the study (see Table 5.7), several countries would have to increase their development aid budgets. Moreover, the requirements that countries must fulfil to receive development aid (good management and respect of human rights) should be slackened, so that even the least developed countries can receive development aid. Because the majority of the countries believe applying these criteria to development aid is important, the level of support in many countries would be 15-20% higher were the requirements upheld.

Table 5.7 Level of support: among citizens for an increase in the budget for development aid with 20-40% for various effects [a]

	Current level of expenses for development aid (% GDP)	10-20 million less deaths from hunger and diseases	25-100 million children with better access to education	Improvement of the entire infrastructure within 20-30 years
Netherlands	0.8%	46 - 51%	46 - 55%	30 - 35%
Germany	0.4%	55 - 62%	53 - 61%	23 - 30%
France	0.5%	51 - 58%	50 - 63%	22 - 27%
Italy	0.3%	61 - 67%	59 - 67%	41 - 50%
Poland	0.1%	65 - 72%	63 - 69%	49 - 56%
UK	0.5%	44 - 53%	47 - 58%	25 - 32%
Sweden	0.9%	56 - 63%	57 - 67%	28 - 32%

[a] For the calculation for the level of support, it was assumed that there were no requirements made concerning good management and respect of human rights.
(Source: Verhue et al., 2007)

5.4 The perspectives on the future by citizens and companies

It was established in section 5.1 that the environmental pressure from consumption is chiefly dependent on income and is much less correlated with environmental awareness, problem perception and value-orientation. In addition, it seems that there is no difference among groups of people who are in the same socio-economic situation (income, family composition, education, etc.) when it comes to the level of support for measures (see Vringer et al., 2007). Age, education and income scarcely influence the level of support either (Verhue et al., 2007). A specific policy that is focused on different target groups is consequently less plausible. Citizens and companies do seem to differ when it concerns the question of how society should develop (world perspectives, see Appendix 2). The same question was also asked in eight European countries.

From surveys it turns out that directors of SME companies prefer a free-market economy (A1: Global market). This preference translates into reducing governmental regulations and making the job market flexible, in combination with investments in improving preconditions, such as education, research and infrastructure (Hoevenagel, 2006). Citizens in the Netherlands think little of this world perspective (Table 5.8). On the contrary, citizens prefer a world perspective with a government that is close to them, but which also contributes to the solution of global issues. People prefer to see that regulations in the areas of health costs, disability insurance, state pensions and similar collectives are implemented by government. Citizens want a better balance between work and leisure, and are prepared to accept less of an income for more leisure time. More than 40% of the population in the Netherlands prefers the world perspective ‘Caring society’ (B2).

Table 5.8 Perspectives on the future for the Netherlands by citizens and SME entrepreneurs

Perspectives on the future for the Netherlands	Citizens		SME entrepreneurs
	2003	2006	2005
Global market (A1)	6%	8%	37%
Secure society (A2)	27%	25%	21%
Global solidarity (B1)	22%	23%	23%
Caring society (B2)	45%	44%	19%

The preferred world perspective by citizens has also been researched in other countries. In all the European countries that have been studied, with the exception of Poland, a majority of the population has a preference for a world with more solidarity, in which government plays a relatively large coordinating role (B1 or B2). The preference in other European countries for a Global market (A1) is greater than in the Netherlands (Table 5.9). Poland, as an emerging European economy, is the strongest market-oriented of all the countries studied. In the southern countries and Sweden, the preference for a Secure society (A2) is less than in the Netherlands, Germany and the UK; the opposite holds true for Global solidarity (B1).

Table 5.9 Preferences of European citizens for perspectives on the future

		Global market (A1)	Secure society (A2)	Global solidarity (B1)	Caring society (B2)
Netherlands	2003	6%	27%	22%	45%
	2005	8%	20%	30%	41%
	2007	8%	25%	23%	44%
Germany	2005	19%	15%	36%	29%
	2007	19%	18%	26%	36%
UK	2005	18%	23%	30%	29%
	2007	12%	25%	19%	44%
France	2005	15%	13%	41%	31%
	2007	16%	14%	44%	27%
Italy	2005	15%	15%	44%	27%
	2007	11%	12%	42%	35%
Spain	2005	13%	9%	46%	32%
	2007	-	-	-	-
Sweden	2005	-	-	-	-
	2007	20%	12%	35%	32%
Poland	2005	-	-	-	-
	2007	29%	33%	16%	22%

6 Conclusions

6.1 The Netherlands in a global context

As in any other country, the Netherlands is economically embedded in a global context: on the one hand, domestic consumption is fed by imported products and production within the country, while on the other hand, national production not only nourishes domestic consumption, but also contributes to exports for consumption abroad. As a result of these international interrelations, environmental pressure related to domestic consumption and production occurs throughout the world.

In the last three decades, average economic growth in the Netherlands was 2.4% per year, significantly lower than the average global growth of the world economy at 3% per year. However, due to much lower population increases, economic growth per capita was higher than the global average: 1.8% per year in the Netherlands and 1.4% per year for the world economy. However, per capita economic growth in the Netherlands was lower than in most other countries of Western Europe, North America and Japan. South and East Asia experienced a relatively high per capita economic growth of more than 4.5% per year on average in the last three decades, while the annual per capita growth in Sub-Saharan Africa was negligible in that same period. The strong per capita growth in South and East Asia means that global income inequality among countries has decreased in the last decades, although inequalities within countries may still be high.

The strong economic growth in South and East Asia also causes a rise in their share of global greenhouse gas emissions. Approximately 50% of the greenhouse gases are still emitted in proportion to the consumption in rich countries of Western Europe, North America, Oceania and Japan. In Western Europe and the Netherlands, the level of per capita greenhouse gas emissions for consumption is almost 2.5 times the global average level, while per capita emissions in North America come to about five times the global average. Although Japanese greenhouse gas emissions per capita are higher than in Western Europe, Japan emits lower amounts of greenhouse gases per euro consumed, which is due to differences in the consumption pattern, more (energy-) efficient products and more efficient production methods. In North America and Oceania, the greenhouse gas emissions per euro consumed are higher than in Western Europe, alternatively showing energy-intensive consumption patterns and relatively inefficient production. Consumption in the Netherlands is very efficient in terms of greenhouse gas emissions: in Western Europe, only Norway and Denmark emit lower amounts of greenhouse gases per euro than the Netherlands. Differences among Western European countries relate to varieties in the consumption pattern.

By virtue of imports related to domestic consumption, everyone uses land that is needed to sustain production of the consumer goods. The per capita land use for Dutch consumption is about the same as the global average per capita land use: 0.8 hectares (2001). However, disparities in land use among rich countries are striking. In North America the per capita land use for consumption is more than three times higher than the world average, while in Australia and New Zealand it is almost ten times higher. Dutch consumption is relatively efficient with respect to land use: for every euro spent on consumption, land use is lower than in all the other regions, except for Japan. This relates not only to

the amount of land domestically available (since imports are included in the calculations), but rather to the actual consumption patterns in the various countries.

6.2 Consumption, environmental pressure and behavioural change

Consumption is the ultimate cause of various environmental loads, such as greenhouse gas emissions and land use. Environmental load occurs, on the one hand, when a product is used for consumption: while, on the other hand, this load also occurs during the production of the consumer goods and services. Currently, more than 55% of the greenhouse gas emissions related to Dutch consumption takes place in the production processes, and this share is projected to increase to about 70% in 2040. This so-called indirect environmental load of consumption partly occurs within the geographical borders of the Netherlands, but also partly in other countries through imported products, the production of which causes environmental pressure abroad. The Netherlands is a densely populated country where land is scarce. As a consequence, land use for Dutch consumption is largely taken up abroad. Increases in consumption in the coming decades will also lead to more land use abroad, especially through the import of wood. As a result, Dutch consumption contributes to the environmental problems that relate to intensifying land use elsewhere in the world, most notably the loss of biodiversity.

As a result of a substantial increase in private consumption levels in the Netherlands, greenhouse gas emissions and land use related to Dutch consumption has also increased considerably in the past decades. However, greenhouse gas emissions and land use related to Dutch consumption have not increased as much as consumption expenditures in the Netherlands in the last 50 years, a trend that is projected to change course in the coming decades (see Table 6.1). This is mainly the result of efficiency improvements in production benefiting Dutch consumption. Moreover, improved product energy efficiency (in particular, improved insulation of buildings) has also contributed to a decrease in greenhouse gas emissions during product use.

Table 6.1 Developments in consumption and related environmental pressure 1970-2040

Average annual change (*% per capita*)	**1970-2005**	**1990-2005**	**2005-2040**
Consumptive expenditures	1.8	2.2	2.9
Greenhouse gas emissions for consumption	1.0	0.6	0.5
Land use for consumption	-	0	0.6

Most Dutch citizens are very well aware of the currently most important environmental problems and many indicate that they are prepared to contribute to solutions, including some (modest) financial sacrifices. However, only very few people are willing to make behavioural changes for public environmental benefit, e.g. altering consumption patterns. The individual costs and effort associated with changing behaviour are often perceived to be too high and citizens expect the government to take measures to break through this so-called social dilemma, for example, by enforcing standards or taxes.

For climate change more specifically, the majority of the population in the Netherlands and most other European countries support general policy measures that would achieve an approximate 10%

reduction in CO_2 emissions; this happens in addition to emission levels related to present policies already in place. Most people are also prepared to absorb price increases related to achieving this reduction but generally, measures beyond immediate scope are preferred, such as those focused on industrial producers. In the end, costs related to any measure strongly determine support levels. Public support to reduce land use to protect biodiversity is lower, which is largely related to a low inclination to alter food consumption patterns and to accept measures aimed at doing so.

6.3 Production, environmental pressure and corporate social responsibility

Environmental pressure related to Dutch industrial production for most environmental themes is becoming increasingly disconnected from economic growth (with the notable exception of greenhouse gas emission), indicating a trend towards the greening of the industry. Three main issues can be identified as possible drivers for this development.

First, a shift from manufacturing to services can be identified, not only in the Netherlands but in most other countries as well. This shift stems from the notion that as income grows, a higher share of income will be used for the purchase of services. While the service sectors are often seen to be less polluting than the traditional manufacturing sectors, this shift has limited explanatory power with respect to industrial greening. To some extent it is a statistical artefact due to the outsourcing of service activities by the manufacturers to specialized companies or services divisions in the service sector. Moreover, the increasing share of the service sectors in the economy denotes not so much an actual shift, but rather a disparity in growth rates, because in these sectors productivity increases are smaller than in manufacturing and agriculture. Moreover, it should be noted that environmental impact of the services sectors is not necessarily low. Services also make use of various resources and cause emissions of various pollutants, for example, due to heating, the use of appliances and transport. The conclusion that the shift to services is a proper explanation of actual industrial greening should be avoided with respect to these notions taken collectively.

Second, globalisation is often identified as an explanation for industrial greening, because environmental pressure related to production shifts to outside the country with the relocation of business activities to other countries. When this production is ultimately destined for Dutch consumption the related environmental pressure is also shifted abroad. On the other hand, exports from the Netherlands have also increased, which causes environmental pressure and land use in the Netherlands for consumption elsewhere. Currently, greenhouse gas emissions related to imports and exports are more or less in balance, but forecasts indicate that in the future greenhouse gas emissions abroad related to imports will be larger than domestic emissions for exports. Therefore, a possibly skewed balance between imports and exports is currently not a major explanation for decoupling in the Dutch economy, but will be increasingly so in the future.

Third, the most important factor identified is that Dutch production is becoming increasingly more efficient due to technological developments and learning-by-doing. These issues relate to: 1) the high level of application of end-of-pipe technologies, decreasing various types of polluting emissions, 2) upgrading of products through enhanced design, adding value to products in relation to the materials used, and 3) increased process efficiency, making more efficient use of materials, for example,

through recycling. In practice, it is not easy to disentangle the effects of product-oriented improvements and process-oriented improvements. Aggregately, these effects can be referred to in terms of eco-efficiency. This ever-increasing eco-efficiency can be considered an important factor for explaining the greening of the industry identified.

Multinationals are subject to relatively high public pressure and scrutiny from NGOs, which possibly explains high levels of involvement with various global sustainability issues, such as child labour, low wages and poor working conditions. Dutch multinationals generally score high on international sustainability benchmarks. In order to further improve these scores, companies require the government to realise a level playing field on sustainability issues, which ensures their competitiveness in relation to other firms in the Netherlands and preferably in other parts of the world as well. Furthermore, taking up entrepreneurial responsibility in the production chain can assist in making this chain more sustainable, because it will help companies to make specific choices leading to more sustainable products. In small and medium-sized enterprises, corporate social responsibility (CSR) chiefly involves activities internal to the firm, often related to personnel matters. Voluntary environmental measures are not applied very often, presumably because of relatively high efforts (in terms of time and money) in relation to the main activities of the firm.

6.4 Policy implications

Sustainability problems have an increasingly global character; this holds too for the opportunities to find solutions. While developments far away can have an impact at home, the inverse is also true: it makes sense for citizens to take up responsibilities to improve the environment because embedding in the global network translates this action into an impact elsewhere in the world.

As indicated above, many Dutch residents and companies indicate that they are willing to (financially) contribute to solutions to tackle climate change, but only very few are willing to make their own behavioural changes for the public environmental good. Both citizens and companies expect the government to take the initiative to solve important environmental problems in order to deal with this discrepancy. In general, there are various ways for a government to do this:

a.) Policies may be focused on removing or reducing the gap between private costs and public benefits, notably by using financial instruments such as subsidies (bonuses for ‘good behaviour’) or levies (penalties for ‘bad behaviour’).

b.) The government may take responsibility for providing public goods, such as a clean environment, and by imposing generic environmental measures, which ‘strike equal’ for all citizens or companies. Examples of these are standard-setting or product charges.

c.) The government may set a good example for other stakeholders, for instance, through strict green standards for public tenders and purchases (green procurement). Such activities can have a significant spin-off, making environmental investments by private parties more attractive.

In the assessment described in this report, four main policy lines are set out in the context of climate change and biodiversity loss:

- Make use of the willingness-to-pay by consumers. Tax measures can ensure the endowments required, while the increased budget can be used for environmental investments. A particularly interesting way to make such environmental investments is by public green procurement, i.e. setting strict green standards for public tenders and purchases. Such activities could have a significant spin-off, making environmental investments by private enterprises more attractive.

- If the individual inertia to take action is interpreted in terms of routine behaviour, it may be useful for a policy maker to break through this routine, either by imposing strict obligatory regulations (in the case of unwillingness), showing alternative perspectives (in the case of lack of knowledge) or facilitating behavioural change (in the case of high transaction effort or cost required). This can be done, for example, by ensuring wide availability of environmentally friendly technologies, ensuring feedback tariffs for distributed sustainable energy production and organising recycling stations, etc.

- If individual firms are reluctant to make their production processes more sustainable because other firms are also perceived as not being willing, it may be useful for the government to bring firms together in a ‘coalition of the unwilling’, with the explicit intention of collectively seducing them to take individual action together with other firms. The ‘covenant’ as instrument is already applied in this context. An international level playing field for firms requires international institutions that are responsible for the harmonisation of regulation, for example, at the European Union level. A promising way to improve the sustainability of production chains, which is currently applied for some production chains, is by international agreements between firms, NGOs and governments to set up criteria for sustainability of the production chains.

- In order to transfer small-scale initiatives to large-scale effects, credible international governance structures, which take care of a sustainable management of materials and resources and offer better management of the global environment with greater concern for the issues of poverty will also be necessary. Such structures could involve public policies and national governments, but private initiatives such as international eco-labelling and credit funding could also be very useful, provided that not only sustainability effectiveness is ensured, but also the credibility of the institutions for proponents as well as sceptics of globalisation.

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Appendix 1: OECD trend scenario

The trend scenario used in this report is based on the ‘baseline’ from the second Environmental Outlook by the OECD. In this scenario, economic growth is based on the trend from 1980 to 2001. The most significantly motivated forces for economic growth are the growth in labour force, labour productivity and trade. Labour supply is determined by population size and labour participation. The ‘medium variant’ from UN projections is used for the population size (stabilization of 9 billion in 2050 for the world). Global population growth takes place chiefly in non-OECD countries. The participation grade in OECD countries is fairly constant at 60%. A slow convergence to the same participation grade is adopted for non-OECD countries. The annual labour productivity growth is simultaneously converging worldwide toward a long-term value of 1.75%; the differences in productivity growth shall be halved in 35 years. There are no new agreements regarding world trade and it is assumed that there shall be a gradual stabilization of trade relationships. Trade continues to increase, but not more rapidly than the growth of the economy.

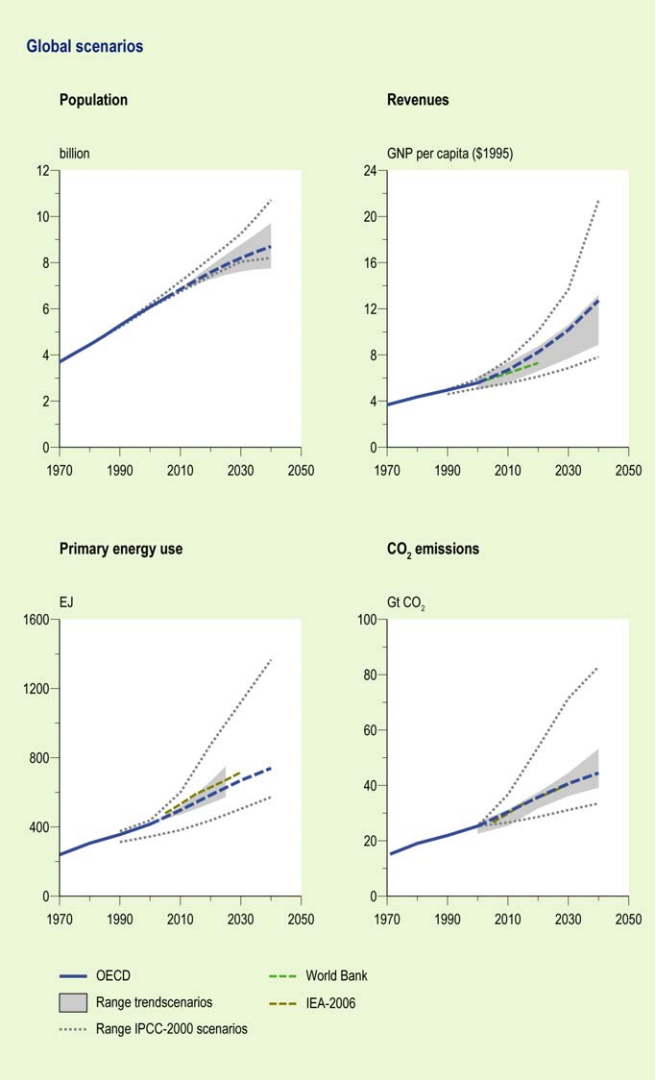

Figure A.1 *OECD trend extrapolation for population, income, energy usage and greenhouse gas emissions in comparison with different scenarios.*

The OECD trend extrapolation lies within the range of different policy-deficient scenarios that were recently published in diverse domains. As demonstrated in Figure A.1, the OECD path for global population growth lies between a high path of approximately 10 billion people in 2040 and a low path of approximately 7 billion. Population projections are uncertain even in the short-term because of delays in the underlying dynamics. The uncertainty in income projections is somewhat greater in general. This is illustrated in Figure A.1, where the uncertainty range is based on the growth paths in the IPCC SRES scenarios and recently published scenarios in the context of the Energy Modelling Forum (De la Chesnaye and Weyant, 2006). The OECD path can be regarded as a relatively rapid economic growth scenario in comparison with this range. In the area of energy and emissions, the OECD path shows a growth that is consistent with other scenarios in the literature, such as in the US Department of Energy and the IEA (2006). The assumptions about improvements in energy efficiency and the productivity of agriculture are relatively optimistic in the OECD Baseline (OESO 2008).

Appendix 2: World perspectives

The MNP distinguishes four socio-cultural situations, called world perspectives. The four socio-cultural situations are derived from four potential global future scenarios (story lines) by the IPCC (2000) and from the Dutch public advisory offices (the Netherlands Bureau for Economic Policy Analysis, the Netherlands Institute for Social Research, the Netherlands Environmental Assessment Agency, the Netherlands Institute for Spatial Research, the Transport Research Centre, The Agricultural Economics Research Institute) differentiated at European (De Mooij and Tang, 2003) and national levels (Van Egmond et al., 2007). A scenario is not a prediction of how a future world will look, but a constant retranslation of correlated developments within differentiated (extreme) dynamics. The correlated developments that are important for the four socio-cultural situations in the Sustainability Outlook are the distribution issue (individualism versus solidarity, x-axis) and the interrelationship issue (globalization versus regionalization, y-axis). In the IPCC scenarios and in the retranslation for the Netherlands by the public advisory offices (Van Egmond et al., 2007), the people's values or those of companies have played no explicit role in the story lines. Instead, the framers of the scenarios have reasoned from significant developments in society and numerical characteristics to arrive at the effects.

A world perspective is a compact summarization of story lines from significant economic, socio-cultural, technological and institutional developments for the Netherlands. By combining the world perspectives with the ultimate goals of people along with people's values, it is assumed that the implicit becomes explicit in the scenarios. This appendix describes how the world perspectives were framed and how citizens' preferences for a world perspective were determined by means of a survey. The questions are represented in Aalbers et al. (2006).

Development of the world perspectives

How were citizens' preferences for a world perspective established? The descriptions are so complex that they could not be explained to the respondents in their entirety. Therefore, the Dutch Institute for Public Opinion and Market Research in collaboration with the Netherlands Environmental Assessment Agency translated the four scenarios into an equal number of socio-cultural situations (world perspectives) for the Netherlands using language and images that are understandable for citizens (Figure A.3). The world perspectives had to be intrinsically consistent, objective and neutral, consisting of no value judgement and described optimistically. That meant that the positive side of the negative effects had to be described. Additionally, the world perspectives were placed in a broader context. The themes involved not only issues such as energy, private and public transport, agriculture and industry, but also included demographic, socio-economic and socio-cultural developments (Aalbers et al., 2006).

A conscious choice was made to not only present the world perspectives in the form of texts, but also to use visual material. The advantages of this are that the world perspectives could be conveyed in a shorter time (one would receive an image of the world perspectives without having to read texts) and

the essence of the world perspectives could be conveyed to a broader group than when only texts are used, for example to people who have difficulty reading).

The world perspectives are entitled: A1 the performance society, A2 the closed, secure and liveable society, B1 the international and national communal welfare and B2 a society with community spirit.

The following three steps were taken for the translation of the world perspectives in stimulus material for use in the survey:

1. In the first phase, the scientific descriptions of world perspectives were brought back to their important characteristics. The most important characteristics of the scenarios were established in a workshop with scenario experts for this step. On the basis of this, in agreement with the scenario experts, a draft text and a draft image (collage) of every world perspective was developed in language (Figure 3.1.1.) and images (Figure 3.1.2.) understandable to a citizen. The descriptions and the images were made as specific as possible so that they resound with the citizens' imagination. Afterwards, the texts were sent back to the scenario experts and adjusted.
2. In a second step, this stimulus material draft was presented to citizens in qualitative interviews which tested to see if this stimulus material elicited the associations that related to the underlying scenarios. The stimulus material was adjusted during this qualitative phase.
3. In a third step, a quantitative pilot was performed during with which the stimulus material that was adjusted in step 2 was presented to a group of respondents and the stimulus material was tested on a greater scale (N=179) to see if they elicited the reactions that relate to the associated world perspective.

Description of the world perspectives in the surveys

A1 'The performance society'
A free market, to promote economic growth and individual welfare

'As long as our economy is doing well, we and other areas of the world (including the poorer areas) are also doing well. We must make sure that we continue to grow, perform, move forward faster, and become more attractive and better. Competition between countries, people and businesses is good, it stimulates quality and efficiency and keeps prices competitive. It also offers more opportunities for self-development. Performance and earning money are important. We wish to lead a luxurious, comfortable and, most of all, stimulating life, in an environment that offers many opportunities and challenges. Too much interference from a patronizing government is not appreciated. Increased efficiency also means a smaller government and therefore increased privatisation and fewer people on benefit. Everyone must take care of himself, and stand up for himself. We'll just take care of our own business; you must do it on your own!,

A2 'The closed, secure and liveable society'
Retaining our welfare and culture

'We worry about our security and welfare. We must stand up for ourselves more and not allow our own culture, norms and values to be watered down. Politicians must listen carefully to people's problems. <country of respondent> is not <country of respondent> any more. Increasing terrorism and open borders pose a threat to us all. Politicians must solve these threats; the government's key task is

to protect us. Our own problems are more important than those of Europe and the rest of the world. There is no united Europe anyway; the opinions, visions and interests of the countries are far too divergent. We are not responsible for solving other people's problems; moreover, we don't even know if we can help others. The welfare state is no longer feasible in today's reality, and makes people lazy. Leave more to the market: everybody gets what he deserves. We don't want to pay taxes if we cannot see how they benefit us. In this manner we retain what we have and can lead a good and comfortable life,

B1 'The international and national communal welfare'
Care and welfare throughout the world and our own society

'Money alone does not make you happy, the quality of life (your own life and the lives of others in the world) is important, too. You are prepared to do something for somebody else in society and also to take responsibility for this. You are prepared to give up something to achieve this. Social issues such as security, the care for the elderly and children, hunger in the third world, and the environment cannot be solved by the market alone. Government and social institutions must make arrangements for this. Collective facilities are vital. Freedom and material welfare are important, but within certain accepted limits,

B2 'A society with community spirit'
Care and welfare in our own, immediate social living environment

'We want to bring back the 'human measure' in our lives. We can worry about the whole world and Europe, but as individuals we have little influence in those areas. They are much too far away. What is far more important is that we - and our immediate social living environment - are doing well, and that there is more attention for each other. The government is closer to the people; the local government plays a major role. There is no real need to take everything one step further, to make things more challenging, or to go for higher, more or faster. We are more attuned to one other and voluntary work also plays an important role in fulfilling the many needs in the field of care. We can confront others with their behaviour, and there is increased social control. We need a better community spirit; we need to propose our own initiatives to provide for others and to improve the quality of our own working and living environment. We must stop living alongside one another without any real contact; we must be able to make sacrifices for others without demanding something in return. We must regain faith in one other,

Appendix 3:
GDP of countries and the relation with the poverty level

Based on the definition of minimum purchasing power by the Social and Cultural Planning office of the Netherlands, the poverty level in the Netherlands is approximately 6000 US dollars (corrected for purchasing power parities). If the relatively extensive collective of provisions in the Netherlands (such as health care, education and infrastructure) are also included, the poverty level accounts 18,000 to 19,000 US dollars. In 2003, merely one in six world inhabitants had a purchasing power that was higher than this level. The calculations of these figures are presented in this appendix.

The level of GDP (Gross Domestic Product, consisting of the added value of the production in a country) for 181 countries per capita is presented. This GDP is corrected for differences in price levels among countries by using Purchasing Power Parities (PPP). For example, bread in Africa costs fewer euros than bread in the US. The PPP data originate from the IMF (2006). The PPP corrected GDP is a commonly used measure for the comparison of the material welfare level. Therefore, there is no judgement made about the well-being level (Human Development Index, HDI). Along with the GDP, life expectancy and education level are included in the HDI.

Establishing the relationship between the poverty level in the Netherlands and GDP

The poverty level as defined by the Social and Cultural Planning office of the Netherlands was a basic assumption. The poverty level from the Social and Cultural Planning office deviates from the poverty level policy (see Soede, 2006). In contrast with the politically established poverty level policy, the Social and Cultural Planning office has defined an economically substantiated poverty level for the Netherlands. Additionally, a basis poverty level was assumed, with which only housing, food, clothing and a small part of transport and personal care is affordable. This level is € 8,000 per year for a one-person standard household. Along with that the Social and Cultural Planning office also presents a second poverty level, in which a small budget is included for recreation and leisure time. This poverty level (basic + increase B) amounts to € 9,130 per year for a one-person household and is called ‘modest but adequate’ in the Social and Cultural Planning office report (Soede, 2006). The basic + increase B comes in the neighbourhood of the poverty level policy, which is the basis for the minimum welfare.

The figures from the Social and Cultural Planning office of the Netherlands about the poverty level are comparable with the Statistics Netherlands data of the real disposable income (variable h273) in the computerfile of the consumer expenditure survey from the year 2000 (Soede, 2006b). The poverty level for an average Dutch household was calculated by using the equivalence factors according to Siermann et al. (2004) and the average household composition that appears in the 2000 consumer expenditure survey (CBS, 2003)[5]. With this, the poverty level comes to € 4,932 (basis) or € 5,629 (basis + increase B) for real disposable income per person per year. The average real disposable

income per person amounts to € 12,555 (CBS, 2006b). The extent of the poverty level amounts to 39% and 45% of the average real disposable income for the basis poverty level and the poverty level with an increase, respectively. The mentioned amount of € 12,555 real disposable income per person (2004) strongly deviates from the € 30.351[6] GDP per person in 2005 (IMF, 2006). The GDP per person for 2005 is distributed in different types of expenses as follows (see also CBS, 2006a, page 27 e.v.):

Household consumption	€ 14 833	(49%)
Government consumption	€ 7 311	(24%)
Investments	€ 5 865	(19%)
Import/Export balance	€ 2 341	(8%)
Total:	€ 30 351	

To determine the poverty level in terms of GDP, the following assumptions were considered:

1. The poverty level for household consumption is determined by lowering the average consumption per person (€ 14,833) to 39% (basis) and 45% (basis + increase).
2. For the consumption by government, it was assumed that these already represent the minimum needed. This means that the poverty level for government consumption is equal to € 7,311.00.
3. A lowering of the investments in proportion to the lower consumption. In other words: a lower level of consumption requires fewer investments in order to provide that lower consumption.

The poverty level for the Netherlands, in terms of GDP, then comes to $ 18,424 and $ 19,196 (PPP corrected) per capita for basis and basis + increase B, respectively.

[5] The equivalence factor for an average household of 2.27 people (CBS, 2003) amounts to 1.4.
[6] The PPP corrected dollar amount for the Netherlands is equal to € 0.99