About the Councils for the Environment and Infrastructure

The Councils for the Environment and Infrastructure (Raden voor de Leefomgeving en Infrastructuur, RLI) advise the Dutch government and Parliament on strategic issues that are concerned with our overall living and working environment. Three separate councils work together under the RLI umbrella: the Council for Rural Areas; the Council for Transport, Public Works and Water Management; and the Council for Housing, Spatial Planning and the Environment. The Councils are independent, and offer solicited and unsolicited advice on long-term issues of strategic importance to the Netherlands. Through their advice, the Councils aim to contribute to a broadening and deepening of the political and public debate, and to greater quality in decision-making.

The Councils operate according to a joint work schedule and are supported by the RLI Secretariat.

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Brakes off!

Advisory report on accelerating the transition to a sustainable energy system in the Netherlands

Contents

Part 1 Advice

1 Introduction: the Netherlands is losing ground

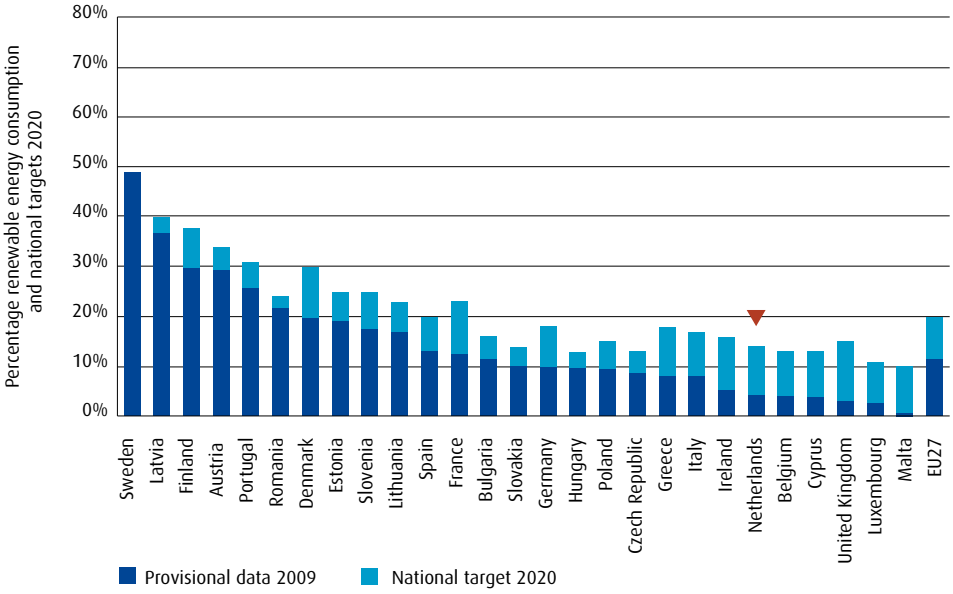
The transition to a sustainable energy system in the Netherlands must be accelerated. The slow rate of progress thus far exposes the country to economic risks and missed opportunities. This advisory report considers ways in which the energy transition can be accelerated.

At the national, European and global levels, efforts are being made to establish a better balance between human welfare, the quality of the human environment and economic returns. A more sustainable society calls for the transition to a sustainable energy system: one which is highly efficient and largely reliant on renewable sources.[1] In pursuit of this aim, the Councils for the Environment and Infrastructure identify two priorities: to achieve greater energy savings and to increase production from renewable sources at both the central and distributed (local) level.

The Councils note that progress in rendering the Dutch energy system more sustainable has been extremely slow. The Netherlands has consistently lagged behind other European member states and continues to do so. The share of renewable energy in the Netherlands' energy consumption remains low compared to that in other countries (see Figure 1). The challenge of meeting the targets for 2050 is therefore that much greater. The United Kingdom is in a comparable position: it must make significant efforts to meet the established target in terms of renewable energy, but has already begun to do so on the basis of a road map (Department of Energy and Climate Change, 2011a), new government investments and a broad range of policy measures. The wider framework is provided by the Climate Change Act 2008, which formally establishes the objective of achieving an 80% reduction in greenhouse gas emissions by 2050, compared to the reference level of 1990. Legally binding limits on greenhouse gas emissions, currently for the period 2023 to 2027, have been set in the Fourth Carbon Budget (Department of Energy and Climate Change, 2011b).

1 A glossary of terms is included as Appendix 1.

Figure 1: Share of renewable energy in gross final energy consumption in 2009, and national targets for 2020 for all European Union member states

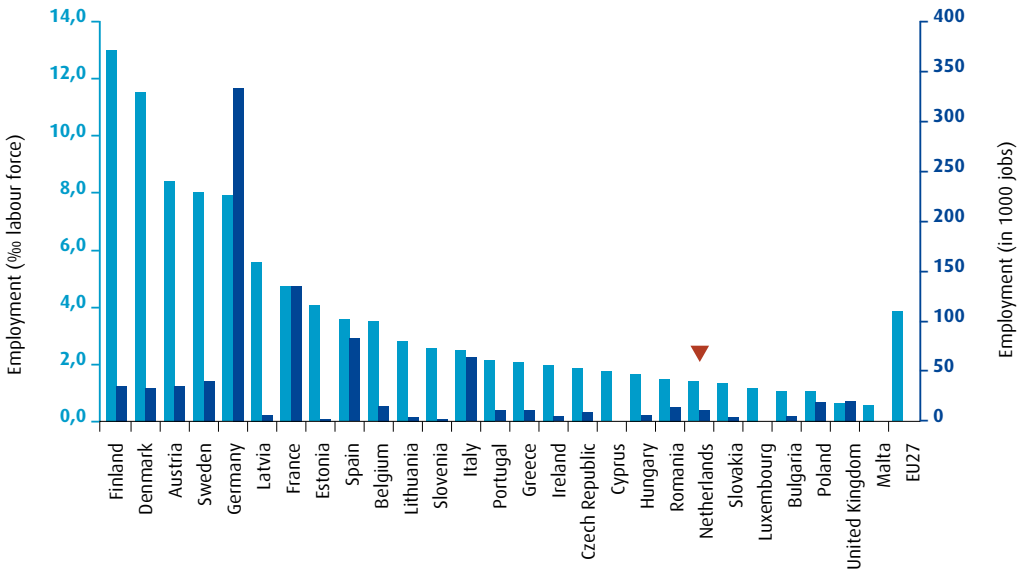


Source: data adapted from Eurostat, European Commission.

In February 2011, the European Council once again confirmed that greenhouse gas emissions are to be reduced by between 80% and 95%, based on the 1990 base level, by the year 2050. The challenge faced by the Netherlands is already great. In view of the announced targets, the Councils expect it to become even more so. During the period 2000 to 2010, the Netherlands' annual per capita CO_2 emissions caused by the use of fossil fuels and cement production fell by 2.9%. This decrease is below the average of 4.5% achieved by the 27 member states of the European Union (EU27), and the 10.3% achieved by the fifteen countries which were member states in 1995 (EU15). (*Compendium voor de Leefomgeving*, 2011).

The rate at which the Netherlands reduced national energy use between 2000 and 2008 averaged 1% per annum (*Compendium voor de Leefomgeving*, 2011). Without this reduction, energy use in 2008 would have been approximately 9% higher. Nevertheless, the energy-intensity of the Dutch economy remains high and the reduction was minor in the European perspective. The energy-intensity of the Dutch

Figure 2: Employment in the renewable energy sector in all European Union member states, 2009



Source: EurObserv'ER, 2010.

economy fell by 11.4%[2] during the period 1998 to 2009, while that of the EU15 countries fell by 15.9%[3] (Eurostat 2011).

The Netherlands is also lagging behind most of Europe in terms of employment in the renewable energy sector (EurObserv'ER, 2010) and the investment climate for renewable electricity projects (Boston Consultancy Group, 2010). With 12,400 jobs (1.4 per mille of the labour force) in the renewable energy sector in 2009, the Netherlands occupies 21st place in the European ranking (see Figure 2). Germany not only has a large number of people working in actual generation from renewables, but also in the development, production and export of renewable energy technologies. The Netherlands' current trailing position is considered in further detail in Part 2, Chapter 1.

2 From 196 to 174 kilogram oil equivalent per 1000 euros gross domestic product.

3 From 177 to 149 kilogram oil equivalent per 1000 euros gross domestic product.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Choose to accelerate the energy transition now

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The Councils consider the Netherlands' current position to be undesirable and therefore advise the acceleration of the transition process. This recommendation is based on three main motives:

1) Failure to pursue the transition with due vigour will expose the Netherlands to ever greater economic risks and leave it unable to exploit new economic opportunities

It is becoming increasingly clear that the pursuit of 'green' economic growth and a more sustainable national energy system will create more economic added value and social prosperity in the long term than the path currently being followed (European Climate Foundation, 2010; European Commission, 2011; SEO Economic Research, 2010). In the Councils' opinion, it would therefore not be prudent for the Netherlands to focus solely on managing the costs of the energy transition. It should also seek to maximise the potential returns in the form of new economic activity and new employment.

The Councils believe that the decades ahead will see products and services become subject to ever higher sustainability requirements. Governments will impose ever more stringent energy performance norms, while private sector organisations will also include sustainability criteria in their business-to-business contracts. If other European countries succeed in achieving greater sustainability – and the Netherlands' most important trading partner, Germany, has already made significant progress in doing so – the demand for sustainable products and services will have a growing influence on the Netherlands' export position. If the Netherlands fails to keep pace, the countries which can indeed produce in a sustainable manner will strengthen their competitive position and reap the rewards. The growing scar-

city of fossil fuels which can be extracted in a cost-efficient manner and the rising carbon price will render a sustainable energy system less expensive in the long term than one which remains largely based on the use of fossil fuels (European Climate Foundation, 2010; European Commission, 2011).

Although the risks and opportunities of the coming decades can not yet be quantified with any certainty, the Councils consider the acceleration of the energy transition to be the most appropriate way of ensuring economic readiness.

2) There is now a significant societal dynamic which the government should exploit in order to make up lost ground

The Councils note that there are already many local and regional initiatives which seek to increase energy savings and promote the production of energy from renewable sources. In other words, there is a significant 'societal dynamic' (Hawken, 2007; Hajer, 2011; Rotmans, 2011). The Councils further note that several regional and local authorities have a level of ambition considerably higher than that of central government, and that the initiatives undertaken by these authorities, the private sector and societal organisations are increasingly mutually reinforcing. Examples include the 'greening' projects undertaken by residents' associations with the (financial) support of local and regional authorities. Moreover, the Councils note that the various parties are increasingly forming partnerships and alliances. In an essay commissioned by the Councils, Rotmans (2011) contends that the transition as a societal phenomenon has now achieved the critical mass required to proceed to the desired acceleration phase. It has reached the 'tipping point' which offers a significant window of opportunity to push forward with the energy transition in the Netherlands. The required societal momentum seems to be in place. The Councils recommend that full use is made of this momentum, whereby opportunities to exploit the vigour and enthusiasm of society at large are consciously created and acted upon.

3) The Netherlands is bound by international agreements which require it to limit the climate effects of human activity

The acceleration of the sustainable energy transition is also necessary if the Netherlands is to meet its international obligations with regard to reducing greenhouse gas emissions. The Councils expect the agreements at European level to give rise to even more stringent national targets for 2050. Affirmative action on the part

of the Dutch government will, in the Councils' view, make it easier to meet these targets. This point is examined in greater detail in Part 2, Chapter 2.

Recent government publications, such as the Energy Report 2011, the Draft National Policy Strategy for Infrastructure and Spatial Planning, the amended Gas Act and Electricity Act, and the Green Deal document, include elements which are relevant to the national energy transition. The Councils welcome every step which is likely to make the country's energy supply more sustainable. In the Councils' opinion, however, the acceleration of a full transition to sustainable energy calls for much more to be done. The Councils' view the Green Deal as a somewhat haphazard collection of initiatives which are in many cases similar to others already in existence elsewhere. As such, the Green Deal does very little to remove the obstacles at the national level in a way which will benefit all initiatives. The suppliers' renewables obligation announced in the Green Deal would appear to be its most concrete measure. The various recent government publications are discussed in greater detail in Part 2, Chapter 4.


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Recommendations to resolve the causes of delay 3

3.1 Develop a long-term vision for the sustainable energy supply in 2050

The lack of a political long-term vision, including accountable targets, for a sustainable energy supply in 2050 has contributed to varying, inconsistent policies by successive governments. Government communication about the importance of the energy transition has been similarly inconsistent, whereupon the private sector and the general public regularly underestimate its necessity. Frequent shifts in policy increase the uncertainty faced by project initiators or financiers, and therefore have a negative effect on the investment climate. The 'bottom-up' movement towards sustainability has a powerful dynamic but will only lead to the desired upscaling if it is supported by clear frameworks and clear direction on the part of central government (Rotmans, 2011; Hajer, 2011).

> Recommendation: **Establish a binding and consistent target for sustainable energy supply in 2050, preferably within a European context but at least at the national level. Include firm and measurable interim targets (for 2030 and 2040) in terms of carbon dioxide emissions, the share of renewable energy in national energy production and consumption, energy efficiency and integrated spatial planning.**

The Councils consider it desirable for the Netherlands to take more affirmative action to align itself with the rate of change seen elsewhere in the European Union, not least because doing so will create new export opportunities for clean technology and other innovations. A European route will ensure a level playing field and create mechanisms for more cost effective production of renewable energy, both in the Netherlands and elsewhere.

3.2 Establish a long-term strategy for the fossil energy sector and energy intensive industry

The Netherlands has an energy regime which consists largely of parties with major interests in the extraction, supply and use of fossil fuels, and energy produced from fossil fuels. This energy regime will experience many of the costs of the energy transition but will benefit from the returns to a lesser degree. At the same time, the current fiscal system favours the fossil sector over the renewables sector (see Section 3.5). The major interests and influence of the current regime act as a brake on a rapid energy transition, as has become evident during the government's *EnergieTransitie* project, for example. Since 2004, the emphasis of this project has been on gradual innovations rather than radical breakthroughs, due in part to the dominant involvement of the regime players. Niche players have not been given enough opportunity to fulfil their potential (Rotmans, 2011; Van Soest, 2011). The Councils therefore conclude that a successful transition demands careful consideration and management of the likely consequences for the fossil fuel sector and energy-intensive users.

> Recommendation: **Establish a charter between government, the private sector and societal organisations which provides a long-term strategy for increased sustainability within, and a reduction in the dominance of, the energy-intensive industry and the fossil energy sector in the Netherlands. The agreements in this charter will in the first instance be voluntary but can be made mandatory if compliance proves unsatisfactory.**

The Minister of Economic Affairs, Agriculture and Innovation seems the appropriate person to initiate this process. It is important to realise that, even in an accelerated transition, the interests of the fossil energy regime will remain dominant for some time to come, having a significant influence on the Dutch economy. It is therefore necessary to adjust the interests of the established parties and to create an 'escape route' which leads to the target situation of a sustainable energy system in 2050. The government must acknowledge the possibility that the changes which the transition demands of the private sector will not always be commercially viable. The strategy must therefore establish how all signatories to the charter are to respond. The agreements will be voluntary in the first instance, but it should also be made clear that binding legislation will follow if they are not met. In this context, the Councils refer to the agreements made with the greenhouse horticulture sector, and to the success-

ful transformation of DSM following the discontinuation of coal-mining in Limburg to become a multinational company active in healthcare, nutritional products and synthetics.

3.3 Apply a broader 'framing' for the energy transition

The current framing[4] of the debate about the desirability and necessity of the energy transition, and of climate policy in general, is one in which (scientific) knowledge, commercial interests, public opinion and political standpoints intermix. Van Soest (2011) states that private interests and the free market philosophy are becoming increasingly dominant in the current framing. Moreover, scientific knowledge is easily presented or interpreted in a manner which supports certain private interests. This is one of the factors which has sown significant doubt in the public's mind as to whether the climate is changing at all and the extent to which any change is attributable to human activity, despite a significant body of scientific evidence which supports both contentions. The *framing* of the debate has therefore become a barrier to the energy transition.

> Recommendation: **Adopt a broader frame for the debate about the desirability and necessity of the energy transition in the Netherlands.**

The Councils call for a broader approach in which not only climate change but also other motives, in particular economic reasons, are acknowledged and valued. Greater emphasis on knowledge and a pragmatic discussion about the limitations of scientific knowledge are desirable. Once the wishes, opinions, preferences, facts, visions and interests have been clearly identified, it will be possible to conduct a more transparent debate. This broader 'framing' will then provide the basis for clear and unequivocal communication by all levels of government, presenting the message that a reduction in energy consumption and the transition to production from renewable sources are both desirable and necessary. It is not necessary for all parties to have precisely the same motives, provided effective coalitions can be created.

4 *Framing* is the process of influencing public opinion in one particular direction.

3.4 Encourage new markets for the application of innovative sustainable energy technology

Studies such as the European Climate Foundation's *Roadmap 2050* (2010) reveal that the energy transition can largely be achieved using currently available methods and techniques. However, this is not to say that the use of such methods will be commercially viable at present. In practice, the private sector can experience difficulty in developing innovative ideas into commercially viable products. The literature often refers to the phase in which this difficulty is most acute as 'the valley of death'. At this stage the demand for the new product may remain limited, and securing the required development funding can be difficult (Advisory Council for Science and Technology Policy, 2011). Moreover, sustainable innovation projects are often less attractive to investors or lenders than more traditional non-sustainable projects (SEO Economic Research, 2009).

> Recommendation: **Promote markets for energy efficiency and renewable energy.**

The Councils recommend that:

- all levels of government act as 'launching customers';
- the national government establishes a 'green investment company' in association with lower levels of government, pension funds, banks and other investors, to provide direct capital or loan guarantees for innovative sustainability projects;
- all levels of government apply more stringent standards to the products and services which do not already fall under the European system of carbon emissions trading, to include buildings;
- central government introduces a suppliers' obligation with respect to the share of renewable energy.

3.5 Remove the barriers created by historic institutions and legislation

Institutions and legislation which have developed over time often present a number of institutional and organisational barriers to the energy transition. Much of the legislation governing the electricity market, for example, is based on the concept

of centralised generation. It can therefore impede the development of small-scale local generation using renewable sources. Similarly, the interests of sustainable energy generation are not given sufficient weight in the 'balance of interests' applied when assessing a spatial planning permit application, thus leading to projects being delayed. The current fiscal regime also stands in the way of the energy transition. Most government interventions in the energy market (79%) benefit fossil energy, which currently represents the largest share of the national energy mix (see Table 4 in Part 2). In 2010, the government's financial interventions on the demand side of the market totalled 4.6 billion euros, of which 163 million euros (3.5%) was used to promote energy efficiency or the use of renewables. A total of 5.6 billion euros was devoted to fossil energy and only 1.5 billion euros was spent on renewable energy or energy efficiency measures in 2010 (CE Delft & Ecofys, 2011).

> Recommendation: **Promote the energy transition by means of financial interventions and fiscal measures. The principle of 'the polluter pays' should gradually be intensified to ensure a cohesive package of financial interventions in the energy market.**

Ter Haar (2009) demonstrates that further growth of environmental taxation will make a substantial contribution to greater sustainability without posing any risk to the stability of treasury revenue. The government can gradually phase out any non-sustainable fiscal subsidies or discounts, including the direct Energy Tax concessions. Reforms must be undertaken in the European context to the greatest extent possible, since harmonised European taxation is most effective and serves to preclude many problems in terms of unfair competition.

> Recommendation: **Thoroughly review the institutions and legislation which stand in the way of the energy transition, reconsidering the original reasons for their establishment.**

In Chapter 5 (Table 6) and Appendix 2, the Councils offer various examples of the obstacles created by current legislation and their effects in practice.


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Part 2 Analysis

The Netherlands' trailing position

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The Councils for the Environment and Infrastructure note that the Netherlands' progress towards a sustainable energy system has been extremely slow to date. We are therefore trailing behind many other European countries which have made much faster progress. Since the 1990s, successive governments have implemented policy addressing climate change and the energy transition. However, it would seem that the measures taken in pursuit of that policy have not had the desired effect.

Reduction of carbon dioxide emissions lags behind and energy use increases

Table 1 places the key characteristics of the current Dutch energy system within the European context. The use of fossil fuels remains dominant. Annual per capita carbon dioxide emissions further to the use of fossil fuels and cement production fell by just 2.9% between 2000 and 2010. This decrease is below the average of 4.5% achieved by all 27 European Union member states during this period (the EU27), and well below the 10.3% achieved by the EU15 countries which formed the European Union in 1995[5] (*Compendium voor de Leefomgeving*, 2011). The 7%[6] reduction in the Netherlands' greenhouse gas emissions noted between 1990 and 2009 is entirely attributable to lower emissions of gases other than CO_2 (notably CH_4, N_2O and various fluorine compounds). During the same period, total emissions of CO_2 actually increased by 6,9%[7]. This was largely due to the increased use of fossil fuels for transport, mobility and the production of electricity.

The reduction of energy end-use is of crucial importance in achieving a sustainable energy system. Unlike the EU27 countries, in which use fell by an average of 0.1%

5 On 1 January 1995 the European Union comprised 15 member states.

6 From 213 Mton CO_2-equivalents to 198 Mton CO_2-equivalents (using IPCC calculation method).

7 From 159 Mton CO_2 to 170 Mton CO_2 per annum (using IPCC calculation method).

between 1998 and 2009, the Netherlands saw its end-use rise by 1.4% during the same period. Energy end-use is a specific term which refers to the result of a rise in energy consumption offset by the pace of energy savings. During the period 2000-2008, the average rate of consumption reduction in the Netherlands was 1% per annum (*Compendium voor de Leefomgeving*, 2011), without which end-use would have been almost 9% higher in 2008.

Table 1: Comparison of indicators for the Netherlands, the EU15 and the EU27

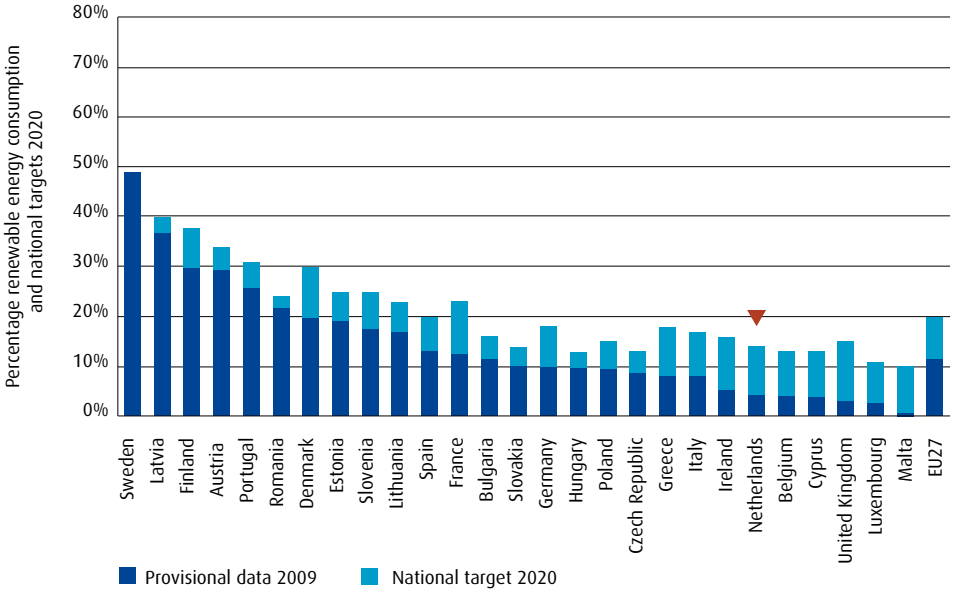
	NL	EU15	EU27
Per capita annual CO_2 emissions further to use of fossil fuels and cement production (2010)	10.6 ton	7.9 ton	8.1 ton
Reduction in per capita annual CO_2 emissions further to use of fossil fuels and cement production (2000 to 2010)	2.9%	10.3%	4.5%
Share of fossil fuels in gross energy consumption (2009))	95%	76%	77%
Increase in gross energy consumption (1998-2009)	8.3%	-0.6%	-1.1%
Energy-intensity of economy expressed in kilogram oil equivalents per EUR 1000 GDP (2009)	174	149	165
Reduction in energy intensity of economy (1998-2009)	11.4%	15.9%	17.5%
Share of renewable energy within the fuel mix (2009)	4.2%	11.2%	11.6%
Progress towards achievement of EU 2020 targets for use of renewable energy, expressed as a percentage (2009)	30%	55%	58%

Sources: *Compendium voor de Leefomgeving,* 2011 (CO_2 emissions); Eurostat 2011 (all other information).

Low production of energy from renewable sources in a European context

The Netherlands' production of energy from renewable sources is rising gradually but slowly, the main sources being wind and biomass. Domestic demand for renewable 'green' electricity showed a further increase in 2010 to reach approximately 25% of overall electricity consumption. However, domestic production of renewable energy (at 9% of total domestic end-use) is not sufficient to meet this demand. The Netherlands must therefore import renewable electricity in the form of 'Guarantees of Origin'.

Figure 3: Share of renewable energy in gross final energy consumption in 2009 and national targets for 2020 of all EU member states

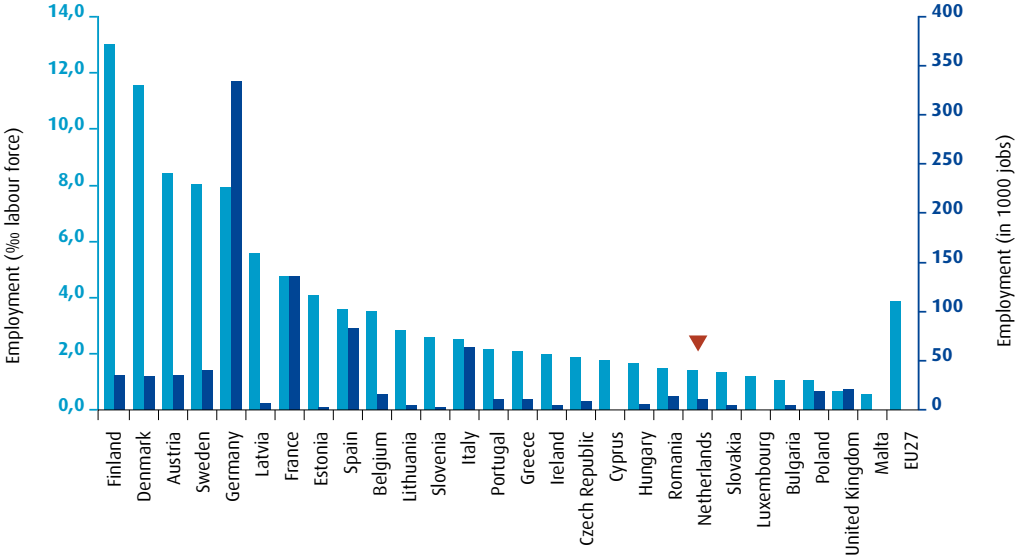


Source: adapted from Eurostat, European Commission.

The share of Dutch electricity consumption derived from renewable sources is low compared to the rest of Europe (see Figure 3). The Netherlands therefore faces a significant challenge if it is to achieve the targets set for 2050. The Councils anticipate that this process will become even more challenging. In February 2011, European Council once again confirmed that the target reduction in greenhouse gases by 2050, compared to the 1990 base level, will be between 80% and 95%.

The Netherlands is also trailing behind most other EU member states in terms of the number of people employed in the renewable energy sector. In 2009, the total sector (i.e. in all 27 countries of the European Union) provided employment for over 900,000 people and achieved a turnover of approximately 120 billion euros (EurObserv'ER, 2010). Germany has the greatest number of people employed in the sector, with over 333,000 jobs in either direct production or the development and production of installations for both domestic use and export. With 1.4 per mille of the labour force (12,400 jobs) in this sector in 2009, the Netherlands occupies 21st place in the European ranking (See Figure 4.)

Figure 4: Employment in the renewable energy sector in all EU member states, 2009



Source: EurObserv'ER, 2010.

In 2010, Denmark, China and Germany led the world ranking in terms of turnover derived from clean energy technology, expressed as a percentage of GDP. The Netherlands was in eighteenth place, behind Belgium, India and the United States (WWF & Roland Berger, 2011). Various studies have concluded that the Netherlands does not have a favourable investment climate for renewable energy production (see Table 2).

Table 2: The Netherlands' position in world rankings relating to the economic aspects of renewable energy

Indicator	Year	Position	Among	Source
Employment in renewable energy as a percentage of the total labour force	2009	21	EU27	EurObserv'ER, 2010; Eurostat
Turnover from clean technologies as a percentage of GDP	2010 2008	18 17	List of EU27, G7 and BRIC countries	WWF & Roland Berger, 2011
Patent applications for renewable energy technology	2010	Fifth place for geothermal energy, otherwise not in top 12	List of 28 OECD countries	OECD, 2011
Investment climate ('investment friendliness') renewable energy[a]	2010	Poor	Netherlands (10%) United Kingdom (40%), France (60%), Germany (90%), Spain (90%)	Boston Consultancy Group, 2010
Attractiveness of renewable energy market[b]	2011 2006	18 (45)[c] 9 (55)	List of 35 countries[d] List of 20 countries	Ernst & Young, 2011
Investment climate for wind energy	2011 2006	16 (51)[c] 9 (57)	List of 35 countries List of 20 countries	Ernst & Young, 2011
Achievement of EU targets for share of energy derived from renewable sources	2009	22	EU27	Eurostat

a Assessed on investment yield, investment security, continuity of government policy

b Weighted index based on indices for wind, sun, biomass and other renewable energy sources

c 'Country Attractiveness Index'

d All countries which held higher ranking positions than the Netherlands in 2006 remained higher in 2011. In the meantime, China, Canada, Greece, Sweden and Ireland had overtaken the Netherlands.

Motives for accelerating the energy transition

2

The Councils consider the Netherlands' current trailing position to be undesirable. The country faces economic risks and may miss opportunities due to the slow progress in rendering its energy system fully sustainable. The societal dynamic required to accelerate the energy transition now seems to be in place. Moreover, the transition must be achieved if we are to meet the obligations imposed by international agreements, whether current or forthcoming.

2.1 Exploiting economic opportunities

In the Councils' opinion, it would be prudent for the Netherlands not to focus solely on managing the costs of the energy transition. Also attempts must be made to maximise the returns in terms of new economic activity and new employment.

A rapidly growing global market for clean energy technology

The transition to a sustainable energy system offers significant economic opportunities for Europe and for the Netherlands. Between 2008 and 2010, the Dutch clean energy technologies sector[8] saw growth of 15% per annum, but even so did not keep pace with the growth of the global market for clean energy technology, which during the same period grew by 31% to reach a total value of 179 billion euros (WWF & Roland Berger, 2011). The Innovation Platform (2010) has projected that the market will continue to show strong growth during the years ahead, reaching a total value of between 800 billion and 1200 billion euros by 2020.

8 These figures relate to two segments of the clean technologies sector: energy efficiency and renewables.

Good economic prospects for clean technologies in the Netherlands

The Innovation Platform further projects that the production value of the Dutch clean technologies sector will grow from 2 billion euros in 2008 to between 8 and 14 billion euros in 2020 (Innovation Platform & Roland Berger, 2010). The sector's contribution to the national economy is expected to increase significantly thereafter. According to the Innovation Platform, the Netherlands enjoys an excellent starting position in several areas, including the biochain and offshore wind generation, largely due to the available knowledge base, the country's geographic location and topography, and its good infrastructure. The growing importance of clean technologies in the Netherlands will also have an indirect positive effect in other sectors, including chemicals, agriculture and the development of high-tech systems. The value of this effect is estimated to be between 20 billion and 35 billion euros per annum in 2020. Based on its existing economic activity and its good knowledge position, the Netherlands will be able to take full advantage of the growth potential, provided the government helps to establish a stable investment climate.

Several Netherlands-based companies, including Imtech, GDF SUEZ, Strukton, Van Gansewinkel and Eneco, are already deriving an increasing proportion of their turnover from the sustainable energy market. Moreover, there is a growing number of companies which operate exclusively on this market, such as Qurrent, Peer+ and HoSt. Many such companies rely heavily on export sales. On the other hand, many products and services based on technology originally invented in the Netherlands are being further developed elsewhere, in countries which have a (more) favourable investment climate, to be sold on to yet other countries. A strong home market is essential for creating a broader basis for innovative Dutch companies wishing to exploit the growth market for clean technologies (PricewaterhouseCoopers, 2011). In the Councils' opinion, a well-developed home market in combination with a clear government vision for a sustainable energy supply in 2050 will do much to enhance the Netherlands' innovative strength in this sector, which in turn will be very important in safeguarding the innovative strength of other (top) sectors.

The transition to a sustainable energy system in 2050 is also expected to have a positive net effect on economic activity and employment in the Netherlands. A report published by SEO Economic Research(2010) estimates that the net increase in employment by 2050 could be in the order of 1.5%, compared to a 'business as usual' scenario. However, the effect in terms of employment will not be the same across all sectors and all regions. There will also be some job losses, notably in the fossil-based energy sector.

For the Councils, the most important question is not when the final barrel of oil will be extracted from the ground to provide our energy. A more important question is how the Netherlands can achieve the necessary transition well in advance of that moment, and can take full advantage of the economic opportunities which present themselves. By way of analogy, the Stone Age did not come to an end because the world ran out of stones, but because bronze and iron proved more attractive and offered greater added value.

2.2 Avoiding the economic risks

The energy transition is an international undertaking. It therefore creates export opportunities. However, the Dutch private sector (in its entirety rather than only those companies directly engaged in energy or environmental activities) runs the risk of losing its competitive edge and market share due to the slow pace of progress towards sustainability.

Risks for Dutch exports

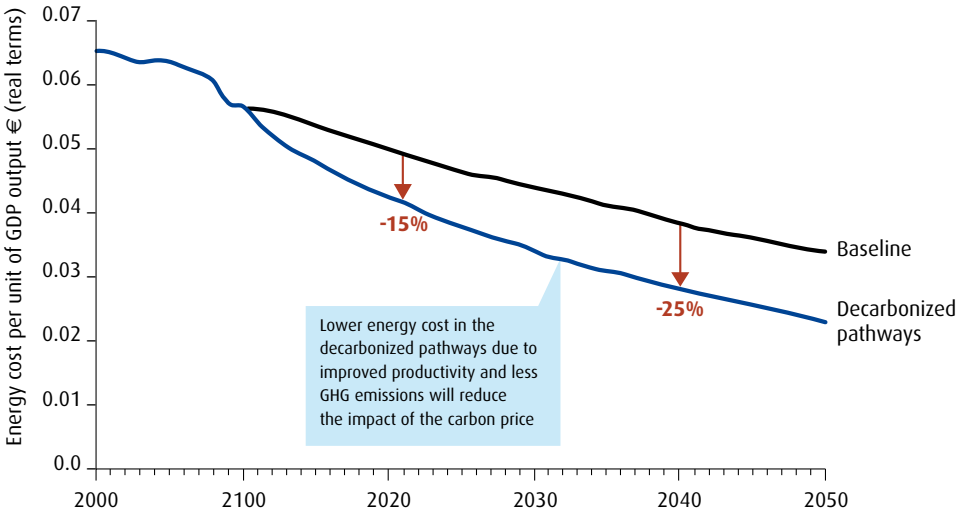
The Dutch economy is notable for its open character. Approximately one third of its national income is derived from trade. In 2010, the export quote was 72.6% (House of Representatives, 2010a). Of all Dutch exports in 2010, 74% were to other European Union member states (Statistics Netherlands/CBS, 2011). Germany is our most important trading partner by some distance, accounting for 24% of the Dutch export trade. If other countries press ahead with the energy transition – and the process is already well advanced in Germany – the demand for sustainable products and services will have a significant effect on the Netherlands' export position. If the Netherlands takes too long to complete the transition, those countries producing in a more sustainable manner will enjoy a competitive edge and will be able to reap the economic rewards.

The risk of a higher energy bill

The growing scarcity of fossil fuels which can be extracted in a cost-effective manner and the ongoing increase in carbon prices will make a sustainable energy system less expensive in the longer term than one which continues to rely on fossil fuels (European Climate Foundation, 2010; European Commission, 2011). The European Commission estimates that the average reduction in fuel costs for the entire period 2010 to 2050 will be between 175 billion and 320 billion euros. The Roadmap 2050, published by the European Climate Foundation in 2010, states that the net value of

the reductions offset by the investment costs will be in the order of 80 billion euros per annum in 2020, rising to 350 billion euros per annum in 2050. The Foundation also forecasts a decrease in energy costs per unit of GDP (see Figure 5). These projections seem reasonably robust in all possible scenarios. The European Commission notes that the benefits (financial and otherwise) for Europe will be far greater if an effective global approach to climate change fails to materialise, as this would result in a stronger increase in oil and gas prices.

Figure 5: Decrease in energy costs per unit of GDP



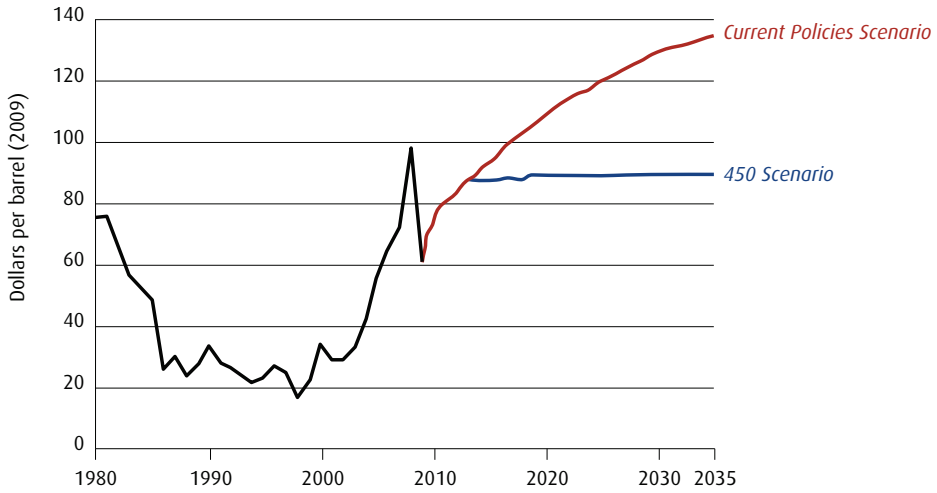
Source: European Climate Foundation, 2010.

In its World Energy Outlook 2010, the International Energy Agency demonstrates that the transition to a sustainable energy system (termed the '450 scenario') will serve to stem the rising costs associated with using the remaining oil reserves, as opposed to a scenario in which the energy system remains largely based on the use of fossil fuels (the 'Current Policies Scenario' in Figure 6).

In 2009, fossil fuels represented 95% of the Dutch fuel mix, compared to an average of 77% in the European Union as a whole (Eurostat, 2011). The Dutch fuel mix includes more oil and gas than that of any other member state (Netherlands Environmental Assessment Agency/PBL, 2011). The Dutch economy is therefore more susceptible

than other European countries to the effects of rising oil and gas prices, increases in carbon prices and increases in the other (external) costs associated with the use of fossil fuels.

Figure 6: Oil price development in two alternative energy scenarios



Source: International Energy Agency, 2010.
(1 barrel = 159 litres)

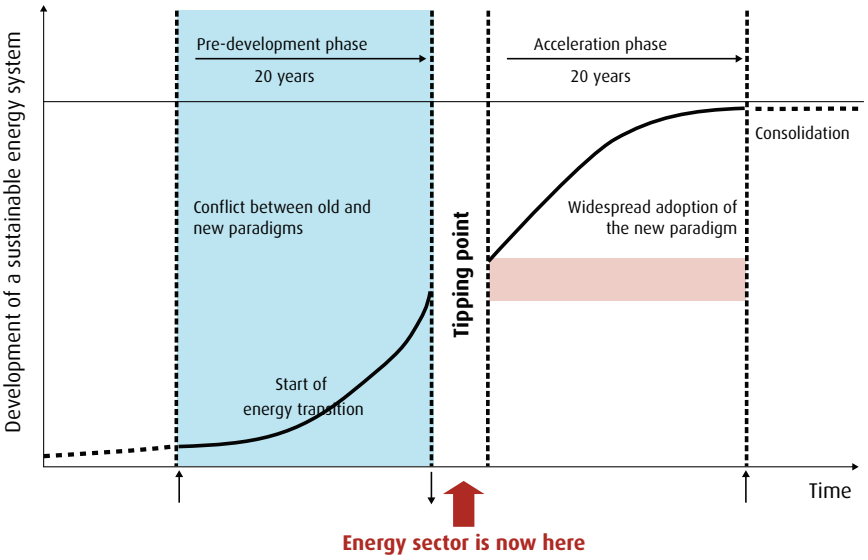
In any transition, there are threats and opportunities for both newcomers and established parties. There will be conflicts of interest in the short term, but without an acceleration of the energy transition there will be a greater risk of a further deterioration of the Netherlands' investment climate and of its competitive position in the longer term. Although it is as yet uncertain precisely what form the opportunities and risks will take in the decades ahead, the Councils believe that an acceleration of the energy transition is now the best way forward from an economic perspective.

2.3 Make use of the societal dynamic and the ambitions of decentral government

The Councils note that there are already many local and regional initiatives geared to reducing energy use, increasing efficiency and generating electricity from renew-

able sources. There is a significant societal dynamic (Hawken, 2007; Hajer, 2011; Rotmans, 2011). The Councils further note that some regional and local authorities are demonstrating a considerably higher level of ambition than central government (see Box 1), and that the initiatives at local level, involving public sector authorities, private sector organisations, the societal midfield and members of the general public, are showing ever more cohesion and integration. Examples include the initiatives undertaken by owners' associations with the support of local or provincial authorities. The Councils also note that the various parties are increasingly opting to form partnerships and alliances. For example, central government has helped to establish the regional initiative of the Noordoostpolder wind farm by bringing the project within the scope of the National Coordination Regulation and by ruling that the connection costs can be recouped from the general transport charges.

Figure 7: Phasing of the energy transition



Source: Rotmans, 2011.

box 1

Examples of the societal dynamic and the high level of ambition among regional and local authorities

- 110 residents of Vogelwijk, a district of The Hague, contributed 500 euros each to have an inactive wind turbine owned by Eneco brought back into service. A competition for local primary school pupils was held to name the turbine.
- LochemEnergie is a local initiative designed to help local residents become energy self sufficient.
- The Oost-Nederland Bio-Energy Cluster brings together all parties in the local bio-energy production chain.
- HoST, a company specialising in renewable energy technology based on biomass, has developed a small-scale fermentation plant which converts manure into energy and can be used at the local (farm) level.
- ProRail, the company which manages the national rail infrastructure, has introduced the 'CO_2 Performance Ladder' with which the companies tendering for contracts are assessed in terms of their sustainability performance. Tenders can therefore be awarded not only on the basis of price, but also on the criteria of environmental impact, quality and total lifetime costs.
- ASN Bank has commissioned the *Stuurgroep Experimenten Volkshuisvesting* (Housing Experiments Steering Group; SEV) to examine the legislative restrictions which discourage banks from extending loans to residents' or owners' associations, and the most appropriate form of contract for such loan agreements.
- Over one hundred farms and businesses in the Noordoostpolder region have joined forces to develop a wind farm which will meet the energy requirement of over 900,000 people in 2014.
- Suiker Unie has begun construction of a biomass fermentation plant alongside its sugar refinery in Hoogkerk. The installation will produce 'green' gas which will be used to heat 7000 local homes.
- Co-Operatie Zuid is a bottom-up project which assists companies and organisations in Amsterdam-Zuid to create the preconditions for renewable energy production.
- Urgenda and The Better World Platform have formed a purchasing collective for solar panels: *Wij Willen Zon* ('We want sun').
- The first large-scale deep-earth geothermal heating system for private homes has been created in The Hague.
- TexelEnergie is a cooperative which wishes to make the island of Texel self-sufficient in electricity and thermal energy by 2030. Membership of the cooperative is open to all members of the Dutch public, including those who do not actually live on Texel.
- *Zon op je Dak* ('Sun on your roof') is a subsidy scheme run by the Province of Noord-Holland and the City of Amsterdam, encouraging homeowners and owners' associations to install solar panels.
- The Rotterdam Climate Initiative aims to achieve a 50% reduction in the city's CO_2 emissions by 2025 (compared to the 1990 reference level).
- In Zaanstad, the local authority has announced the intention of becoming a fully sustainable and climate-neutral town by 2020.
- The Province of Utrecht is acting as guarantor for loans taken out by companies in the small and medium-sized enterprise sector and non-profit organisations, including owners' associations, for investments in renewable energy.
- The Friesland Provincial Authority has issued a document which establishes 'sustainable development' as the guiding principle of all policy decisions and implementation.

The Councils expect products and services to become subject to ever more stringent sustainability requirements in the decades to come. In the first instance, this development will be further to agreements made at European Union level and within other international forums. These agreements will require governments to impose stricter energy performance norms (e.g. on new buildings) and to include sustainability criteria in their own public sector purchasing and procurement policy. Similarly, private sector organisations will increasingly include sustainability criteria in their business-to-business contracts for all types of goods and services. The sustainability of a company's operations will also be a factor when banks consider an application for a business loan. In this context, one example of the high level of ambition within the private sector is the Sustainable Living Plan announced by Unilever in late 2010. The company wishes to reduce the greenhouse emissions of its products throughout their life cycle. The target is a 50% reduction by 2020 (compared to the reference level of 2008). To achieve this ambitious objective, Unilever will impose a number of requirements on its own suppliers and vendors.

In an essay commissioned by the Councils, Rotmans (2011) states that the transition may be seen as a societal phenomenon which has now reached a 'tipping point'. In other words, the critical mass required to enter the acceleration phase has now been achieved (see Figure 7). The indicators of this tipping point are:

- numerous and diverse local initiatives;
- the increasing use of renewable resources at both central and local level;
- increasing societal demand for clean energy production;
- the emergence of new alliances within the energy sector;
- new consumer service concepts aimed at facilitating energy efficiency and green energy production.

The tipping point is marked by a turbulent period in which many new initiatives are undertaken, even though the most effective approach is not yet known and there remains a lack of clear direction. Nevertheless, this phase provides an important window of opportunity to accelerate the energy transition itself.

It seems that there is now sufficient societal momentum in the Netherlands to allow the transition to proceed far more quickly. The Councils advise that full use is made of this momentum, whereby opportunities to exploit the vigour and enthusiasm of society at large are consciously created and acted upon.

2.4 Compliance with international agreements

The acceleration of the transition process is also required because the Netherlands is a signatory to various international agreements under which it is committed to reducing greenhouse gas emissions. The most important of these agreements are listed in Table 3.

In signing the Kyoto Protocol, the industrialised countries agreed to reduce the emission of greenhouse gases by an average of 5.2% between 2008 and 2012, compared to the reference level of 1990. The precise reduction targets differ from one country to another. The Netherlands is expected to cut its emissions by 6%.

Table 3: International energy and climate obligations

Greenhouse gas emissions	European Union – sectors covered by the carbon emissions trading system: -21% (base level 2005) European Union – sectors not covered by the carbon emissions trading system: -16% (base level 2005) Kyoto Protocol: -6% between 2008 and 2012 (base level 1990) European Union target for 2050: -80% to -95% (base level 1990)
Renewable energy	14% of energy end-use to be derived from renewable sources by 2020
Energy consumption	European Union: (non-binding) target of -20% by 2020 (base level 2006)
Biofuels	European Union: 10% of energy use for transport and mobility to be derived from renewable sources (biomass or alternatives) by 2020

De Staat van het Klimaat 2010 ('State of the Climate 2010'), a report submitted to the State Secretary of Infrastructure and Environment in April 2011, reaffirms the necessity of a fundamental reduction in greenhouse gas emissions caused by human activity (Platform Communication on Climate Change, 2011). The Councils anticipate that various European directives will require the Netherlands to achieve a significant reduction in greenhouse gas emissions by 2050, with stringent targets applying in the interim period. The Councils conclude that affirmative action to accelerate the transition at this stage will make it easier to meet these targets, and at lower cost.

Why limited progress has been made to date

3

Dutch writer Jan Romein (1893 - 1962) coined the term *De Wet van de Remmende Voorsprong*, which has been translated as the 'Law of the Handicap of a Head Start'. It would seem to apply in the current situation. For many decades, the Netherlands has been able to create economic prosperity thanks to its excellent international competitive position in the petrochemicals sector and energy-intensive industry. It has been able to make extensive use of fossil fuels, including natural gas extracted in the Netherlands itself or its territorial waters. This situation is drawing to a close.

The Councils see several reasons for the Netherlands failing to keep pace with other countries in their pursuit of the energy transition. Those reasons are not primarily technological. Existing methods and techniques are seen as adequate to achieve a sustainable energy system by 2050 (European Climate Foundation, 2010). Rather, the lack of progress is due to societal and institutional factors. In the Councils' view, government policy is bound hand and foot to the existing system of fossil interests, technologies, infrastructure and institutions, all of which stand in the way of innovation.

3.1 Unstable government policy discourages investment

In interviews conducted by the Councils, the initiators of sustainability projects often cite the inconsistency of government policy as the main factor standing in the way of their projects. This finding has been confirmed by research. For example, Meijer (2008) states that the lack of consistency and perspective within Dutch energy policy is the main source of the uncertainty experienced by innovative enterprise.

The lack of a long-term political vision, and the associated accountable targets, resulted in successive governments adopting and implementing various policies in

pursuit of sustainability. Because they have presented different messages in their communications about the importance of the energy transition, the private sector and the general public have often been led to underestimate its necessity as well as its benefits. To give one example, in the space of barely ten years various governments have implemented four entirely different incentive schemes to promote the generation of electricity from renewable sources. First there was a system of tax exemptions under the *Regulerende Energiebelasting* (Regulatory Energy Tax; REB). This was followed in 2004 by the *Regulering Milieukwaliteit Elektriciteitsproductie* (Environmental Quality of Electricity Production Regulation; MEP), which in turn was withdrawn in mid-2006 to be replaced by the *Stimuleringsregeling duurzame energieproductie* (Incentive Regulation for Sustainable Energy Production; SDE) in 2008. This provision has now been amended and supplemented to become the 'SDE+'. Policy changes have also affected the budget available, the eligibility criteria and the focus on specific technologies. Such changes increase the uncertainties faced by private project initiators and investors, particularly if the projects in question have a long payback period. Where there is a higher investment risk, investors expect a higher minimum investment yield. The frequent shifts in policy have therefore had a negative effect on the investment climate for renewable energy in the Netherlands (see also Box 2).

box 2

Stable policy and access to the capital market are essential

If the Netherlands is to meet the mandatory European targets for 2020, significant investment in sustainable energy technology is now required. In a study commissioned by the Holland Financial Centre, Ecofys calculates the figure concerned to be between 70 billion and 100 billion euros. The main investments will be 14 to 15 billion euros in offshore wind energy, 4 to 6 billion euros in onshore wind energy, and 24 to 35 billion euros in increasing the energy efficiency of the existing built environment (both residential and non-residential buildings). Ecofys bases these figures on the assumption that the Netherlands will itself produce all the renewable energy required to meet the target of a 14% share of total end use in 2020. At present, it is not possible to draw any more than approximately 5 to 10 billion euros from the international capital market because the investment risks in the Netherlands are seen as relatively high while the capital requirement elsewhere in Europe is at a comparable level. The high investment risks in the Netherlands are caused by inconsistent government policy, and in particular the restrictions of policy on subsidies and incentives (Ecofys, 2011).

The bottom-up movement towards sustainability has a powerful dynamic but can only reach maturity and lead to the desired upscaling if central government supports the process by means of clear frameworks and equally clear direction (Rotmans, 2011; Hajer, 2011).

3.2 The major interests and influence of the fossil energy regime stand in the way of the transition

In any transition, there will be an existing regime consisting of parties with established interests. In addition, there are likely to be niche players at a lower level of scale who wish to experiment with both technological and non-technological innovations. While the existing regime wishes to maintain and consolidate the status quo, the niche players seek fundamental change. In effect, they want an entirely new regime. The dynamic between the existing regime and the emerging niche players can be seen as a power struggle. The course and progress of the transition will depend in part on how the established regime attempts to defend itself and the resources it uses to do so (Rotmans, 2011).

The Netherlands' current energy regime is largely made up of parties which have major interests in the extraction, supply and use of fossil fuels, or the energy derived from fossil fuels. This regime will experience all the costs of the energy transition but will benefit from the returns to a far lesser degree. The major interests and influence of the regime stands in the way of the transition, as amply illustrated by the *EnergieTransitie* project. Since 2004, and largely due to the dominant involvement of the regime players, the emphasis in this project has been on gradual innovations rather than any radical breakthroughs. Niche players have not been given adequate opportunity to show their potential (Rotmans, 2011; Van Soest, 2011; VROM Council and the Dutch Energy Council, 2004).

The energy system as it is today has taken shape over the course of more than one hundred years. Central government and the companies in the fossil fuel sector have made significant investments in the oil and gas transport infrastructure, particularly following the discovery of oil in the (then) Dutch East Indies, and later the major Groningen Gas Field in the Netherlands itself. Within ten years of this find (in 1959), natural gas had become the most important energy source in the Netherlands. The successes of the past may stand in the way of finding better options for the

future. We could well see a 'lock-in' effect: the evolution of the energy system has created a market situation which is difficult to break out of. Organisations, culture and legislation are all interwoven within the current energy system and will prove resistant to change. This will make it all the more difficult to introduce new systems, even if they are potentially superior.

box 3

High dependence on fossil fuels in the Netherlands

The Netherlands' domestic energy use is very much dependent on fossil fuels. Much of the Netherlands' economic prosperity is attributable to fossil fuels. In 2008, the state earned 14.8 billion euros in revenue from natural gas. Between 1998 and 2008, the proportion of total national revenue derived from the sale of natural gas rose from 8% to 9.2% (Statistics Netherlands/CBS 2008). The government's dependence on this source of income is therefore very high. The revenue derived from taxes and duties on the use of energy, mostly that derived from fossil fuels, is also substantial. In 2008, the 'green tax' revenue[9] totalled approximately twenty billion euros, or 14% of the total income from taxation. This is a particularly high proportion in the European perspective (Ter Haar, 2009).

In addition to the producers and suppliers of fossil fuels, the Netherlands has a significant number of energy-intensive large industrial users, including companies in the metals and chemicals sectors. The government has actively promoted the development of energy intensive industry since the early 1960s. The De Pous Memorandum of 1962 set out a route for the development of a large energy-intensive industrial sector, prompted by the discovery of the Groningen gas field and the prospect of cheap nuclear energy. Energy intensive industry contributes approximately 2.2% of GDP (Ecofys, 2009). Profitability in this sector is very much dependent on low energy prices. Inexpensive electricity is currently obtained through large-scale continuous production, with low marginal costs, at the traditional coal-fired and nuclear generating stations. The increasing scarcity of fossil fuels which can be extracted in a cost-efficient manner and the ongoing rise in carbon prices mean that a sustainable

9 Income from taxes levied on activities which have an adverse environmental impact, including energy taxes.

energy system based on renewables will prove less expensive in the longer term than one which continues to rely on fossil fuels.

3.3 The current framing of energy and climate policy is too restrictive

In recent decades, climate policy has largely been based on scientific evidence. In the scientific field, there is general agreement regarding the probability of global warming occurring as the direct result of greenhouse gas emissions, and particularly those caused by the use of fossil fuels. Van Soest (2011) states that the current framing of energy and climate policy is based on private interests and the free market philosophy. It has become too easy for scientific knowledge to be presented in a manner which supports certain private interests. Partly as a result of the current framing, there is considerable uncertainty in the minds of the general public regarding climate change and the part played by human activity. Many people have been led to believe that reducing greenhouse gas emissions will not mitigate climate change, that renewable energy is unnecessary and expensive, that wind turbines can never be cost-efficient but must always be subsidised, and that there is absolutely no need to reduce overall energy consumption. As a result, opposition to climate policy has become greater within certain sections of society, despite the huge body of scientific evidence that the climate is indeed changing and is doing so due to human activity. As the framing of the societal and political debate changes, the rationale behind the energy transition has been cast into significant doubt.

Although the Dutch government has acknowledged the importance of rendering the energy system fully sustainable and has stated the intention of aligning itself with the European course in doing so, its communications about the energy transition have thus far been cautious or non-committal. Practical objections and the short-term cost of renewable energy sources have been given greater weight than the longer term perspective, in which there is less reliance on fossil fuels, lower total energy costs and significant economic opportunities on the international market for clean technologies. In Germany and the United Kingdom, the framing of the climate and energy debate is more concerned with the desirability and necessity of the transition than with any doubts which still exist among either the public or the politicians. This situation is reflected by the messages presented to the public by the governments concerned, and by the actual policy choices they have made (see Box 4).

box 4

A long-term vision has increased societal acceptance in other European countries

Germany has opted to produce and publish a long-term vision with regard to sustainable energy, which includes explicit targets for 2050 and various points in the meantime. Legislation has been passed whereby renewable electricity has priority on the national grid. This, in combination with the feed-in tariff structure, offers developers and investors a robust market for renewable energy. This clear and unequivocal embedding of renewable energy within the energy system as a whole has helped to create a positive attitude towards renewable energy among the German public. The United Kingdom has also established long-term targets and interim targets, and has introduced a system of emission ceilings and carbon credits which will enable those targets to be met.

3.4 Sustainable technologies may fall victim to 'the valley of death'

Several studies, including the *Road Map 2050* (European Climate Foundation, 2010), suggest that it will be possible to achieve the energy transition using existing methods and techniques, at least for the most part. However, this is not to say that their use will also be commercially viable.

Innovation processes consist of three main phases: research & development, demonstration, and commercialisation. Traditionally, the government's involvement is greatest in the early phases, and it is assumed that the market can undertake the final step – commercialisation – unaided. In practice, however, many companies experience difficulty in developing their innovations to become fully viable commercial products. The literature terms the phase in which this difficulty is most acute 'the valley of death'.

In this phase it can often be difficult to secure the necessary funding (Advisory Council for Science and Technology Policy, 2011). The company must now begin upscaling the product, although market demand is (still) small, and the development of that demand remains uncertain. Many innovative companies are relatively young and do not have the required capital reserves. Banks are averse to lending if

the returns are uncertain. Venture capitalists are unwilling to become involved if the business plans (or the entrepreneurs themselves) are not convincing, if the risks do not appear to be manageable, or if there is no clear indication of the moment at which they can sell their shares and recoup their investment.

SEO Economic Research (2009) concludes that innovative sustainability projects are less attractive to banks and venture capitalists than more traditional, non-sustainable projects. The capital market regards sustainability projects as a relatively new phenomenon, as complex and technical, with a significant research component. Moreover, the payback period of sustainability projects is generally longer than that of other forms of investment, and they demand a higher start-up investment which makes them less attractive to the (international) capital market. In times of economic uncertainty, the safer investments generally take priority and are likely to be made in those countries with a better investment climate.

3.5 Historic institutions and legislation as obstacles to the transition

In some cases, the institutions and legislation which have developed over many years stand in the way of the energy transition. It is necessary to review and reconsider their purpose and value, taking the societal importance of the energy transition fully into account.

Much of the legislation governing the electricity market was established at a time when centralised production was the dominant concept. These rules and regulations can therefore stand in the way of the development of decentralised, local generation using renewable sources. As the Draft National Policy Strategy for Infrastructure and Spatial Development (House of Representatives, 2011d) confirms, the production of electricity from renewable sources demands more physical space. Current spatial planning legislation does not attach sufficient weight to renewable production within the 'balance of interests'. This slows down permit application procedures and prolongs the time it takes for sustainable projects to materialise.

Table 4: Government interventions in the energy market, fiscal year 2010

	Targeting fossil energy use (in million EUR)	Targeting the energy transition and renewable energy production (in million EUR)
Government interventions on production/supply side		
Fossil and nuclear energy	1200	
Renewable energy production		1300
Subtotal	**1200**	**1300**
Government interventions on end use/demand side		
Fuel duties – exemptions for kerosene	1695	
Energy Tax – reduced rates for gas and for bulk consumers	1499	
Fuel duties – exemptions for shipping/inland waterborne transport	440	
Fuel duties – reduced rate for 'red' diesel for specific groups of users	236	
Energy Tax – reduced electricity rates for bulk consumers	252	
Fuel duties – reduced rates for LPG	223	
Energy Tax – exemptions for energy-intensive industry	88	
Temporary subsidy for insulating glazing		43
Refund of Energy Tax paid by churches and non profit organisations	34	
Motor Vehicle Tax: zero rate for extremely fuel efficient vehicles		34
Subsidy for market introduction of energy innovations (greenhouse horticulture sector)		28
Sustainable heating systems for existing residential buildings / Temporary Energy Scheme Market and Innovation		27
Reduced VAT on insulation materials/installation		13
Energy Tax – exemptions for energy-intensive industry	8	
Subsidy on energy efficiency advice for home owners		7
Investment scheme for energy efficiency measures		5
Subsidy scheme for environmentally friendly technology		4
Energy and Innovation subsidy scheme; reduced grid connection tariffs for heat pump owners		2
Subtotal	**4475**	**163**
Total	**5675**	**1463**

Source: adapted from CE Delft & Ecofys, 2011.

The largest proportion (79%) of government interventions in the energy market targets fossil energy (see Table 4), which has a large share in the Netherlands' energy mix. In 2010, the government's financial interventions in energy end use totalled 4.6 billion euros, of which 163 million euros (3.5%) was used to finance projects to promote energy savings and the use of renewable sources. On the supply side, the government subsidised the fossil sector by 1.2 billion euros and the renewables sector by 1.3 billion. A total of 5.6 billion euros was therefore devoted to fossil energy, while 1.5 billion euros was spent on renewable energy or energy efficiency (CE Delft & Ecofys, 2011). In short, there is no level playing field between fossil-based and renewable energy.

In addition to the various exemptions and the reduced rates of fuel duties, the regressive structure of the Energy Tax results in inadequate incentives for users to reduce their energy consumption. The current structure with its various tax bands makes energy relatively less expensive for the large-scale users (see Table 5).

Some but not all of the external costs of both fossil and renewable energy are charged on within the energy prices paid by consumers. The most significant external costs are assumed to be those associated with carbon emissions (CE Delft, 2010). In developing its scenario for a fully sustainable energy system in 2050, the International Energy Agency (2010) has worked on the basis that the carbon price will rise from 22 dollars per ton in 2009 to 120 dollars per ton in 2035. Studies by the European Climate Foundation (2010) and SEO Economic Research (2010) use this carbon price as an indicator of the external costs of CO_2 emissions.

The main instrument for internalising the external costs of carbon emissions produced by large users is the European Emissions Trading Scheme (ETS). In recent years, the price of emission certificates within this system has fluctuated between 10 and 20 euros per ton. This amount is too low to compensate for the Energy Tax revenue which is lost due to the application of the lower tax bands. In 2010, the total tax subsidy against external costs of energy use was in the order of two billion euros (CE Delft & Ecofys, 2011).

Table 5: Rates of Energy Tax and equivalent carbon price, 2010

	Typical user	Electricity use (kWh)	Rate (euro/ kWh)	Euro/ ton CO_2	Gas (m^3)	Rate (euro/ m^3)	Euro/ ton CO_2
Band 1	Households	0 - 10,000	0.1114	197	0 - 5,000	0.1629	92
Band 2	SME, service providers	10,000 - 50,000	0.0406	72	5,000 - 170,000	0.1411	79
Band 3	Glasshouse horticulture, SME, public sector	50,000 - 10 million	0.0108	19	170,000 - 1 million	0.0391	22
Band 4	Industry (including part of ETS sector)	> 10 million, non-commercial	0.0010	2	1 million - 10 million	0.0124	7
Band 5	Non-commercial	>10 million, commercial	0.0005	1	> 10 million	0.0116	7
Band 6	Energy companies, steel, aluminium (ETS)	-	-	N/A	> 10 million, non-commercial	0.0082	5
					Disctrict heating, commecial	0.16	90

Sources: Government Gazette, 31 December 2009, no. 20631; CE Delft, 2010.

Users who fall into the highest Energy Tax band (domestic consumers) will gain greatest financial advantage from generating their own renewable energy, since they pay most for electricity purchased from the grid. For users in lower tax bands, generating their own renewable energy is less cost-effective. For households, this option becomes even more financially attractive because surplus renewable energy can be sold to the grid at the current unit price (including Energy Tax). A limit of 5,000 kWh applies. The regressive structure of Energy Tax therefore provides a greater or lesser incentive for localised production, depending on the band into which the user falls.

The government is making important moves but more must be done

4

Dutch energy policy is not static, as demonstrated by the many policy proposals made by the current government (see Box 5). In the Councils' opinion, these proposals include important elements which will indeed help to push the energy transition forwards. However, in the light of the five main causes of limited progress to date, the Councils believe that yet more must be done in order to make up the lost ground. In this chapter, we examine the main government proposals with particular reference to the reasons for the limited progress to date, as described in Chapter 3.

Long-term vision

In its Energy Report 2011, the government commits itself to achieving a low-carbon economy by 2050. The report refers to the European ambition of reducing greenhouse gas emissions by between 80% and 95% (compared to the 1990 reference level). The Councils consider it likely that Europe will require the Netherlands to meet interim targets in 2030 and 2040 which are significantly more stringent than the 2020 target. In its 2011 document *Roadmap for moving to a low-carbon economy in 2050*, the European Commission states that it will be cost-effective to set reduction targets of 40% by 2030 and 60% by 2040. Nevertheless, the Energy Report 2011 does not offer any indication of how – or indeed *if* – the Netherlands intends to work towards these targets. Clear policy frameworks and a comprehensive long-term strategy for the period 2020-2050 are lacking.

The Councils note a similar omission in the document *Kabinetsaanpak klimaatbeleid op weg naar 2020* ('Government approach to climate policy on the road to 2020'), in which the government states that the reduction target for sectors which do not fall within the European emissions trading system will 'probably' be met. The Councils welcome the fact that it has been agreed, in principle, that any policy-related shortcomings within a particular sector must be resolved.

box 5

Policy documents issued by the current government which are most relevant to the energy transition

- Amendment of the Gas Act 1998 and the Electricity Act 1998 to be effected on 2 December 2010 (Bulletin of Acts, Orders and Decrees, 2010).
- Enforcement of the energy label for buildings (House of Representatives; 2010b).
- Action Plan for greater energy efficiency in the built environment (Ministry of the Interior and Kingdom Relations, 2011).
- Annotated agenda of informal TTE Council meeting[10] on 2/3 May (House of Representatives, 2011a).
- Announcement of SDE+ 2011 (House of Representatives, 2011b).
- Government approach to climate policy on the road to 2020 (House of Representatives, 2011c).
- Energy Report 2011 (Ministry of Economic Affairs, Agriculture and Innovation, 2011a).
- Draft National Policy Strategy for Infrastructure and Spatial Planning (House of Representatives, 2011d).
- To the top: business policy in action(s) (House of Representatives, 2011f).
- Green Deal (Ministry of Economic Affairs, Agriculture and Innovation 2011b).

It is not appropriate to expect them to be compensated by positive developments in other sectors. However, this document says nothing about the achievement of the renewable energy targets for 2020. The Councils also note the absence of any strategy setting out what the actors must do prior to 2020 in order to ensure that the targets for the period 2020 to 2050 can be achieved. Interim targets and a strategy for the period 2020-2050 should be included in the Netherlands' forthcoming response to the European *Roadmap for moving to a low-carbon economy in 2050*.

The government clearly regards the reduction of energy consumption as a means to an end rather than an end in itself. It therefore chooses not to formulate any separate targets or objectives. However, reducing consumption is an extremely important factor in achieving a sustainable energy system. In the Councils' opinion, a separate target must be formulated.

10 European Council of Ministers for Transport, Telecommunications and Energy.

To improve energy efficiency, the government has opted to rely on various approaches, including:

- standardisation at European level, e.g. the Energy Performance of Buildings Directive and the 'Ecodesign' directive;
- the 'Green Deal', which encompasses various agreements between the government, the private sector and the general public with regard to reducing energy consumption;
- energy efficiency in industry, largely further to (voluntary) covenants;
- reduction of consumption in the built environment (Ministry of the Interior and Kingdom Relations, 2011).

The Councils welcome these policy initiatives and the attention which is being devoted to energy efficiency. Nevertheless, they maintain the view that clear and accountable targets will serve to emphasise that the government regards the reduction of consumption as a priority within the energy transition.

Current interests

The amendment of the Gas Act 1998 and the Electricity Act 1998 (Bulletin of Acts, Orders and Decrees, 2010) gives the producers of renewable energy priority access to the transport grid. The Councils view this as an important step in facilitating capacity development for renewable electricity. They further regard a suppliers' renewables obligation, as proposed by the Dutch Energy Council (2011), as a promising way of upscaling the production of renewable energy in the longer term. It therefore falls to the government to examine how the suppliers' renewables obligation announced in the Energy Report 2011 can best be implemented.

The Energy Top Team (2011) recommended that an Energy Steering Group should be appointed to advise on the most effective use of the limited resources and specific instruments which are available. The government has adopted this recommendation (House of Representatives, 2011f). In the Councils' view, careful consideration must be given to the membership of this steering group, which should include both representatives of the established energy regime who are willing to embrace change and newcomers (niche players).

Framing of energy and climate policy

If the government makes clear and unequivocal statements about the route towards a sustainable energy system in 2050, and commits itself to that route by means of

clear and measurable targets, the societal debate about the desirability, necessity and feasibility of the transition will be cast in a different 'frame'. The new framing will enable a pragmatic, businesslike approach. It will provide greater security for those who wish to undertake initiatives in pursuit of the transition. Such a clear commitment to sustainability is not apparent from the current policy documents. It is, however, essential if the societal dynamic is to be facilitated, and if the energy transition is to be accelerated.

Innovative sustainable energy technologies

The *Stimuleringsregeling voor Duurzame Energie* (Incentive Regulation for Sustainable Energy; SDE) has been amended and updated to become the 'SDE+'. One major improvement is that greater renewable energy production capacity can now be achieved without any increase in the subsidy budget. This is due to the more competitive character of the new provision. Nevertheless, the Councils believe that an active innovation policy is required to promote the development of technologies which are still some distance from market.

The Energy Top Team's advisory report (2011) covers the entire energy sector, of which renewable energy forms part. Most recommendations are concerned with innovation. The Councils share the view that an innovation policy for the energy sector is essential. Innovation must be geared towards the achievement of the transition to a sustainable energy system. Technologies for renewable production or those which enhance energy efficiency require support not only during research and development but also in making the step to market. The Councils are therefore gratified to note that the government's response to the advisory report (House of Representatives, 2011f) considers ways in which the financial obstacles to innovation can be removed. We further advise that innovation in the fossil sector and the energy-intensive sectors should form part of a broader long-term perspective addressing sustainability and of the role of fossil production during the transition itself.

Institutional barriers

In June 2011, a parliamentary motion was tabled by Ms C. van Veldhoven (House of Representatives, 2011e) calling on the government to include provisions in the Taxation Plan 2012 whereby the financial and fiscal support provided in respect of certain user groups' energy consumption will be phased out in a cost-neutral manner. The government opposed the motion, referring to the Energy Report 2011 which states that many of the current financial and fiscal arrangements are based on sound

arguments, be they policy-based, economic or legal. In many cases, the arrangements are further to European legislation or international treaties. The government states that the Energy Tax exemptions extended to producers are justified because their electricity would otherwise be subject to double taxation. The European carbon emissions trading system attaches a financial value to the main external effects of generating electricity from coal and gas. The government considers it essential to maintain a level playing field for production companies throughout Europe, whereupon any 'greening' of the taxation system can only be undertaken on the basis of a direct comparison of the Energy Tax liability faced by Dutch companies and that of their counterparts in other member states.

In this context, the Councils take the view that the government should apply the principle of 'the polluter pays' to an even greater extent. This will require supplementary greening measures, at the European level if considered necessary, including measures affecting the Energy Tax.

The Energy Report 2011 states that the government must address the obstacles to onshore wind energy presented by current spatial planning legislation. The Draft Policy Strategy for Infrastructure and Spatial Planning (House of Representatives, 2011d) acknowledges the spatial challenges related to energy supply as a matter of national importance, and announces that a further policy document which specifically addresses onshore wind energy is to be published in 2012. It will include a map showing (potential) locations of large-scale wind farms, the target being onshore production of 6000 MW per annum by 2020. The Councils welcome the fact that the government is taking a more active approach in resolving the spatial obstacles to wind energy production. In order to shorten the various planning and permit application procedures, it is necessary to re-assess the various interests within spatial development against the importance of renewable energy production as part of the energy transition.

The Councils believe that existing provisions, such as the European Energy Performance of Buildings Directive (EPBD), the national *Wet milieubeheer* (Environmental Management Act) and the Energy Performance Coefficient (EPC) schedule, offer a good framework for the mandatory measures required to bring about essential changes. It is however necessary to enforce such norms and requirements at the national level. In this context, the Councils welcome the government's announcement (House of Representatives, 2010b) of measures to enforce compliance

with the energy label system within the built environment. The recent amendment of the system by which the rental value of residential property is assessed (Bulletin of Acts, Orders and Decrees, 2011) removes a significant obstacle to investments in the energy efficiency of such property, although the effect is restricted by the maximum amount of rent allowance ('rent benefit') which can be claimed by lower-income households.

To increase energy efficiency in the built environment, the government is to follow the action plan produced by the Ministry of the Interior and Kingdom Relations (2011). The plan states, and in the Councils' view is correct in doing so, that there has yet to be any radical break in the established trends. In Chapter 5 (Table 6), we present a number of recommendations which will supplement the policy proposals included in the ministry's action plan.

Elaboration of the five essential pathways towards the acceleration of the energy transition

5

If the Netherlands is to accelerate its energy transition, various pathways must be pursued in parallel. The Councils have identified five such pathways, corresponding with the five causes of limited progress to date. Recommendations in respect of each are presented below.

5.1 A stable pathway towards a sustainable energy system with interim targets

Recommendation: **Establish a binding and consistent target for sustainable energy supply in 2050, preferably within a European context but at least at the national level. Include firm and measurable interim targets (for 2030 and 2040) in terms of carbon dioxide emissions, the share of renewable energy in national energy production and consumption, energy efficiency and integrated spatial planning.**

The societal dynamic can only develop effectively if there are clear frameworks and direction

The bottom-up movement towards sustainability has a powerful and motivated dynamic (Hawken, 2007), but will only reach maturity and lead to the desired upscaling if central government facilitates the process by means of clear frameworks and a clear direction (Rotmans, 2011; Hajer, 2011). In the Councils' opinion, this requires the establishment and legislative embedding of a clear political long-term vision for the transition to a highly efficient energy system which is primarily based on renewable sources.

This long-term vision will emphasise the urgency of the policy, will offer investors the necessary security, and will persuade the general public of the necessity of the transition. The vision will give rise to robust preconditions and measures to support and facilitate initiatives on the part of the general public, the private sector and lower levels of government.

A threefold target is required

The cornerstone of climate policy at both European and national level is the European carbon emissions trading system. This is a potentially effective instrument, and one which respects market forces in that the external costs of carbon emissions are internalised. However, the required scarcity of emissions rights has yet to be created and the carbon price does not adequately reflect the external costs. It is too low to have any significant influence on the decisions of either the producers or the consumers of energy. The Councils would like to see the Netherlands exerting its influence within Europe to call for a reduction of the number of emission credits in circulation, and for a higher carbon price to reflect the emissions reduction target established by the European Union for 2050. The trade in carbon emissions will then have a greater influence on the decisions made by larger energy-intensive companies. However, approximately half of all Dutch carbon emissions are caused by users which do not fall into this category: the small and medium-sized enterprise sector, the utilities sector and domestic households. These sources do not take part in the current emissions trading system and are less sensitive to price incentives.

Accordingly, the Councils consider it essential to establish firm targets for CO_2 reduction, for the use of renewables, and for the reduction of energy consumption. Interim targets for energy efficiency will also provide the necessary framework for the further development of performance norms for buildings, vehicles, electrical appliances, etc.

Follow the European direction

The Netherlands' energy transition must be pursued within the framework of the European course towards a sustainable, low-carbon energy system. Alignment with the European course will bring many advantages. As an export-based economy – and approximately three quarters of the Netherlands' total export earnings are derived within the European Union – the European route offers further export opportunities for clean technology and innovations. Following the European route will also help to ensure a 'level playing field', while there will be advantages of scale enabling the targets to be met at lower cost.

As stated in the advisory report *Make room for renewal* (RLI 2010) the societal costs of the transition can be reduced by several hundred million euros by making use of flexible mechanisms within the overall framework of the European Renewable Energy Directive (2009/28/EC). In practice, this would entail the Netherlands importing more renewable energy. Nevertheless, the Councils consider a substantial domestic production essential to ensure security of supply, technological development at the national level, and the ability to exploit market opportunities.

Public sector authorities can support each other by means of administrative agreements

Central government must actively monitor the transition process and must be able to adjust policy and its implementation to address interim developments. The long-term vision will gain in strength if the relevant ministries and all lower levels of government are required to assess their respective policy directions against the long-term objectives and targets. Administrative agreements could be used to establish the respective responsibilities of central government and regional or local authorities in meeting the interim and long-term targets.

5.2 The interests of the fossil energy regime will remain significant even in an accelerated transition

The fossil energy sector is an extremely important sector for the Netherlands

The fossil energy regime in the Netherlands includes those companies which produce electricity from oil, coal or gas, the companies which distribute that electricity, companies in the petrochemicals sector, and other energy-intensive industry. Specific sectors such as transport and logistics are also part of the fossil regime. The Councils acknowledge that the interests of this fossil energy 'complex' will remain significant for a very long time to come, even in the context of an accelerated energy transition, and will therefore continue to have a marked influence on the Dutch economy.

The transition to a sustainable energy system requires consideration of the future form of the fossil energy complex, and how that future form will be achieved. In the Councils' view, these questions have not yet been adequately addressed. An initial step has been taken by *Stichting Energie Dialoog* Nederland (2009), a forum which seeks to promote discussion about all aspects of energy, including sustainability. The

forum partners have sought ways in which to improve the sustainability of energy use among the energy-intensive companies. The Councils state that these questions should be examined in a broader context. It must be accepted that some of the adaptations which private sector companies are required to make may not be economically or commercially viable. Alongside the long-term vision for the energy transition, there must also be a long-term strategy for the fossil energy complex which sets out how such problems are to be resolved.

> Recommendation: **Establish a charter between government, the private sector and societal organisations which provides a long-term strategy for increased sustainability within, and a reduction in the dominance of, the energy-intensive industry and the fossil energy sector in the Netherlands. The agreements in this charter will in the first instance be voluntary but can be made mandatory if compliance proves unsatisfactory.**

The charter must distinguish between the suppliers and the (large) users of fossil energy. If the users seek and achieve greater sustainability on the demand side, those companies which derive their revenue in the fossil energy will be forced to find an alternative niche.

This process can best be initiated by the Minister of Economic Affairs, Agriculture and Innovation. In the first instance it may be appropriate to rely on voluntary agreements which can then be made mandatory if the desired results are not achieved. In this respect, the charter can be regarded as an adjunct to the Green Deal. Nevertheless, the Councils consider it important for the government to show that it 'means business' by establishing a legislative basis as soon as possible, whereby the desired changes can be enforced if necessary.

In this context, the Councils refer to the sustainability agreements made with the glasshouse horticulture sector and to the successful transformation of DSM following the discontinuation of coalmining in Limburg. The covenant with the glasshouse sector includes agreements whereby the government will support the desired restructuring and relocation of the sector in exchange for greater sustainability in production methods and improved energy efficiency. The company DSM (Dutch State Mines) was established in 1902 to exploit the coal reserves in Limburg. When those mines eventually closed, DSM became a successful (petro-) chemicals company and is now an extremely diversified global company active in healthcare products, nutrition and materials.

Attention for specific sectors

An important point for attention when developing the strategy is the future position of the Dutch gas sector and the national gas infrastructure. In the transition to an energy system in which production increasingly relies on renewables, the gas-fired generating stations will still have an important part to play. Neither wind energy or solar power have constant or guaranteed production. The gas-fired generating stations will continue to exist as reserve capacity which can be called upon as necessary. Gas-fired generating stations are particularly suited to this role because they can quickly adapt output to demand, and because natural gas accounts for the lowest CO_2 emissions per kWh output of any fossil fuel. The key question is how long this transitional situation will last. This depends on several factors, including how quickly new energy storage technologies can be developed and the progress made in establishing the pan-European electricity grid.

A related question is how the Netherlands can make best use of the sustainable biomass available. In the current situation, a significant proportion of the available material is used as an adjunct fuel in the traditional generating stations, i.e. alongside coal and gas. As stated in the advisory report published by the Energy Top Team (2011) this is a low-yield application. It is reasonable to assume that, as the transition progresses, more high-yield applications for biomass will be developed. The Energy Top Team calls for large-scale production of biogas. When formulating the long-term strategy for the fossil energy complex, it will be appropriate to consider the extent to which this ambition can be reconciled with the other possible uses of biomass, such as the production of biofuels. The availability of truly sustainable biomass may be so restricted that it can only be used for the high-yield applications (Netherlands Environmental Assessment Agency, 2011).

5.3 Renewed appreciation for scientific knowledge and for other motives for a transition

Climate change is not the only reason for wishing to promote the energy transition in the Netherlands. In this advisory report, the Councils call for a broader approach in which other motives, particularly economic motives, are acknowledged. It is not necessary for all parties to have precisely the same motives, provided effective coalitions can be created.

Recommendation: **Adopt a broader frame for the debate about the desirability and necessity of the energy transition in the Netherlands.**

A renewed appreciation for knowledge, facts and sciences is an important precondition of the transition. Without a sound knowledge base, the discussion will remain largely ideological in nature. There should be a greater emphasis on knowledge, accompanied by a pragmatic discussion about the boundaries of scientific knowledge. Identification and acknowledgement of the various interests will help to ensure an effective and unbiased discussion about the energy transition. Clarification of the facts, wishes, opinions, preferences, visions and interests will result in a more transparent debate.

5.4 Upscaling of innovative technologies is required

Bringing forward the energy transition requires the large-scale implementation of innovative technologies which are, as yet, in their infancy. These innovations must be brought to market. The sooner these technologies are made 'market-ready', the sooner they will feature in the business cases on which investment decisions, including international investment decisions, are made. The resultant investments will enhance the position of renewables in the energy mix and, where the technology concerned has been developed in the Netherlands, will benefit the national economy.

Recommendation: **Stimulate markets for energy efficiency and renewable energy.**

The Councils recommend that:

- all levels of government act as 'launching customers';
- the national government establishes a 'green investment company' in association with lower levels of government, pension funds, banks and other investors, to provide direct capital or loan guarantees for innovative sustainability projects;
- all levels of government apply more stringent standards to the products and services which do not already fall under the European system of carbon emissions trading, to include buildings;
- central government introduces a suppliers' obligation with respect to the share of renewable energy.

A green investment company

A green investment company, operating independently of central government, will be able to combine projects to achieve a level of scale which is attractive to institutional investors. It can also function as a centre of expertise and as an intermediary for the financing of energy transition projects. The Councils therefore recommend that the government should focus its own resources on the valorisation of knowledge and innovations, with a lesser emphasis on fundamental knowledge for the time being, since the immediate priority is upscaling.

A more normative set of instruments

In the built environment, it is possible to make significant reductions in energy consumption by applying a comprehensive package of measures. Those measures need to be of a more compulsory nature than is currently the case. One important component of this package will be the inclusion of energy performance norms in the Building Directive. These standards can then form the basis of various policy measures in other areas, such as the amount of transfer tax ('stamp duty') payable on purchase of a building, the tax-deductibility of mortgage interest or the notional rental value on which homeowners pay income tax. Table 6 presents several examples of financing and subsidy arrangements which can be applied to promote the energy efficiency of the built environment.

A reduction in both energy consumption and carbon emissions can also be achieved by encouraging changes in consumer purchasing behaviour. One means of doing so is by extending the energy label system. For example food products could carry a label showing the total energy required to produce and distribute them, or their carbon footprint. Mobility behaviour can also be influenced in order to reduce the emissions caused by travel and transport. The price of travel and fuel cost must be linked to the level of carbon emissions produced (Council for Transport, Public Works and Water Management, Council for Housing, Spatial Planning and the Environment and the Dutch Energy Council, 2008).

A suppliers' renewable obligation for the energy sector

Market parties must invest in renewable energy production based on sound business cases. As noted, above the recently amended incentive provision SDE+ represents a significant improvement compared to its forerunner in that it enables greater production capacity to be achieved without increase in the subsidy budget. The Dutch Energy Council (2011) suggests that a next step in achieving a greater proportion of renewable electricity in the energy mix should be the introduction of a suppliers'

renewables obligation. This would place responsibility for achieving the targets for renewable energy at the feet of the suppliers. There would be greater demand for renewable production and hence greater competition between the various production technologies. Alongside the market effect thus created, it will also be necessary to implement an innovation programme to promote the development of those technologies which cannot yet compete. This must be a very targeted programme addressing practical applications rather than theoretical knowledge.

5.5 The principle of 'the polluter pays' as the basis for government interventions

The fiscal system, as it affects energy production and consumption, has grown into its current form over the period of many years. This system is not ideal in terms of the desired acceleration of the energy transition. Taxes and levies which are based on environmental considerations do make a significant contribution to a sustainable economic structure. Despite the regulatory nature of environmental taxes, they can be structured in such a way as to ensure stability of national revenue (Ter Haar, 2009).

> Recommendation: **Promote the energy transition by means of a cohesive package of financial and fiscal interventions. Gradually intensify the use of the 'polluter pays' principle.**

A general point of departure must be that the external costs of energy use should be internalised in the price actually paid by the user. Where this is not yet the case, the fiscal system should be amended accordingly. The following steps must be taken:

- The Councils advise the ongoing intensification of the principle of 'the polluter pays' to form the basis of a consistent package of financial interventions addressing the energy market.
- The fiscal system should be reviewed and adapted as necessary. A coherent package of fiscal measures may enable the energy transition to be achieved more effectively, more quickly and at lower cost than is possible under the current system.
- Based on the principle of 'the polluter pays', the Councils consider it essential to reduce or obviate the differences in the rate of Energy Tax paid by the various user categories, whereby the regressive character of the system is largely abolished. The banding structure should be adapted to reflect the actual carbon emissions, whereby the external costs of energy use are included in the rates payable by all users. This will render investments in energy efficiency and renewable production more attractive, as it will reduce the payback period.

- The rate of Energy Tax payable by companies which operate largely on the domestic market (SME, business services, public sector organisations, etc.) can be raised. Any increase in the rate payable by international companies and those which fall under the European emissions trading system must be established at European level. This will avoid a situation in which these companies are 'priced out' of the Netherlands: it is important to maintain a level playing field to the greatest extent possible. One possibility would be to establish the minimum rate of Energy Tax at the European level.

  Recommendation: **Thoroughly review the institutions and legislation which present obstacles to the transition, reassessing the interests which prompted their original establishment.**

The government faces the challenge of ensuring that the societal ability to change and innovate develops in both depth and breadth, whereupon it will play an even greater role in bringing forward the desired transition. In this 'acceleration phase', the government must:

- Support and encourage the formation of new coalitions and alliances.
  There is currently little formal organisation within the sustainable energy sector, which therefore remains rather fragmented (Van Soest, 2011). Moreover, research indicates that there is little ongoing contact between the knowledge institutes and private sector organisations (Energy Top Team, 2011). Forming the right coalitions of niche players outside the existing regime and those parties within that regime who are well-disposed to change could bring about a breakthrough in this crucial phase of the energy transition (Rotmans, 2011). Accordingly, the Councils advise the government and the sector itself to set about organising those parties who will benefit from the energy transition, and to encourage the formation of new alliances between the government, private sector and knowledge institutes.
- Remove the obstacles created by current legislation.
  Table 6 presents various examples of the obstacles created by current legislation and their effects in practice. The list is far from exhaustive but is intended as an illustration of the problems which the initiators of sustainability projects face and ways in which the government could resolve those problems. A more detailed account of the obstacles and proposed solutions is given in Appendix 2.

The table is arranged according to the three main areas in which the obstacles are encountered: local energy initiatives, innovation and implementation, and centralised production using renewable sources.

Table 6: Examples of obstacles and proposed solutions

Obstacles to local initiatives addressing energy efficiency and generation from renewable sources	
Obstacle	**Advice/recommendation**
Financing	
• Investments in sustainability are not adequately reflected in the value of the property concerned, and hence in the owner's ability to secure a loan against that value. • In the case of collective initiatives (e.g. by a residents' association) it is difficult to obtain the necessary financing.	• Use the energy performance of the building as the basis of (or a leading criteria of) provisions such as property tax (rateable value) the Building Directive, transfer tax ('stamp duty') and other taxation models. • Facilitate collective loans and promote the legal ownership of energy installations and/or energy-efficiency measures by a legal entity such as a residents' association.
Investment yield	
• The installation of solar panels for personal use, but on someone else's roof (e.g. a school or sports hall) incurs an additional Energy Tax and VAT liability on private use. • The wording of the 'Not More than Otherwise' principle within the Heating Act leads to a lack of transparency in pricing for distributed heating systems, and limits the investment yield for the operators of such systems.	• Formulate strict conditions whereby the production of electricity for personal use but not on one's own personal property is not subject to (additional) tax liability. • Develop a transparent system for price regulation which encourages the use of collective distributive heating systems, preferably based on residual heat from other processes in order to increase energy efficiency.

Continuation table 6: Examples of obstacles and proposed solutions

Obstacles to local initiatives addressing energy efficiency and generation from renewable sources	
Obstacle	**Advice/recommendation**
Awareness and opportunity for action	
• Many (groups of) residents, particularly in the urban areas, are not aware of the importance of sustainable energy supply or the action they can take to increase sustainability. • Those who actually invest in sustainability measures are often not those who enjoy the incentive of lower energy bills and greater comfort.	• Introduce a comprehensive system of standards and labels; promote the inclusion of information about the CO_2 emissions and energy for which a product accounts. Promote the use of the 'smart energy meter' in the home. • Promote decisions with regard to sustainability measures in residential property, to be made at 'natural moments' such as modifications or major renovation. • Encourage energy companies, housing corporations and local authorities to invest jointly in the sustainability of residential property. Local or regional authorities could act as loan guarantors. • In addition to the recent amendment of the system by which the maximum rental value of a property is calculated, extend the legal and contractual opportunities for cost-sharing, e.g. by linking rent increases to a guaranteed reduction in energy costs, or by replacing the rent allowance with a housing costs allowance.
Complexity	
• Current legislation (the Splitsingswet) requires each local network to appoint a network manager. • Occupants of homes with a communal roof can credit the generated electricity against individual use only if all apartments within the complex are connected.	• Issue a greater number of exemptions and simplify the application procedure. • Enable 'virtual balancing' by means of a special provision for owners' associations.

Continuation table 6: Examples of obstacles and proposed solutions

Obstacles to innovation and the implementation of new technology	
Obstacle	**Advice/recommendation**
• There is a shortage of capital to support the process of development from idea to product.	• Use government resources for valorisation for this part of the development process. • Provide guarantees for loans extended by commercial parties. • Introduce a government accreditation scheme for good business cases in support of innovative start-ups.
• New technologies are assessed separately within each individual application procedure; this is inefficient and causes delays.	• Shorten the permit application procedures by focusing on the potential for reducing CO_2 emissions rather than on specific technologies. Create a list of standard technologies with the known or probable reduction value of each.
• Many companies apply the rule of thumb that investments must have a payback period of no more than two or three years. Many sustainable energy projects will not fall into this category and are therefore not undertaken. • The fiscal treatment of energy use gives large-scale users no incentive to reduce consumption.	• Enforce the Environmental Management Act (Activities Directive) which requires companies to invest in any energy efficiency measure with a payback period of five years or less. Improve the information about this regulation given to both companies and local authorities. • Base all fiscal measures on the principle of 'the polluter pays'. This will serve to promote the reduction of consumption as well as production from renewable sources.

Continuation table 6: Examples of obstacles and proposed solutions

Obstacles to the centralised generation of electricity from renewable resources	
Obstacle	**Advice/recommendation**
• Permit applications for wind turbines require too much detail even at an early stage, whereupon there is no opportunity to take technological advances into account during the application process.	• Simplify the application information by setting minimum values for the quantity of renewable energy to be produced and the reduction in CO_2 thus achieved, together with maximum values for space usage and noise production.
• Each offshore wind energy project requires a separate planning study, Environmental Impact Assessment and permit application procedure.	• Establish a national outline plan for all offshore wind farms, with the possibility of a centralised planning study and EIA to be conducted under the responsibility of the government. This is in line with the provisions of the National Policy Strategy for Infrastructure and Spatial Planning.
• Offshore wind turbines are subject to a statutory maximum operational lifetime, which means that the operator must reserve a budget for the dismantling and disposal of the entire wind farm at the time of its installation. Conventional generating facilities are not subject to a similar restriction.	• Match the duration of the permit for offshore wind farms to the anticipated working life of the installations. • Allow greater flexibility in the turbine's operational lifetime by allowing an extension of the permit to be granted (well in advance of the original expiry date).
• The costs of connecting a large-scale offshore wind farm to the grid fall to the developer or operator, while conventional generating plants are connected at public expense.	• Calculate the connection costs for all producers in exactly the same manner, develop a better division of costs, and apply a single tariff for each unit of electricity produced.

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Annex 1 Glossary

450 scenario: the situation in which the concentration of greenhouse gases in the atmosphere remains below 450 parts per million and the rise in average world temperatures is no more than two degrees Celsius by 2050.

Balancing: payment for renewable energy exported to the grid in the form of credits against the user's consumption of electricity drawn from the grid, at the provider's standard supply price (including taxes and transport charges).

BRIC countries: Brazil, Russia, India and China, which are emerging as major economic world powers.

Carbon credits: tradable certificates for CO_2 emissions.

Energy (consumption) reduction: achieved when the same activities can be conducted with less energy (energy efficiency), when opting to undertake alternative activities which demand less energy, and/or by conducting fewer activities which demand the use of energy.

Energy transition: a fundamental change in the structure, culture and methodology of the society system to achieve a sustainable energy supply. Here, 'structure' refers to the institutional organisation, economic structure, as well as to the physical infrastructure. 'Culture' refers to the overall set of perspectives, values and paradigms within the system. 'Methodology' embraces daily routines, formal rules, and the attitudes and behaviours of people within the system.

Energy use (gross): The sum of all energy products purchased by domestic and commercial users.

Energy use, (end): gross energy use minus the losses further to the transformation of energy from one form into another, e.g. electricity.

EPBD: Energy Performance of Buildings Directive, European legislation establishing the energy performance (efficiency) of buildings.

EPC: Energy Performance Coefficient, a numerical indicator of the energy performance of a building. Newbuild properties are now subject to mandatory minimum EPC values.

Export quote: the proportion of GDP represented by the Netherlands' international trade in goods and services.

Feed-in tariff: A pre-agreed price paid for renewable electricity supplied to the national grid.

Frame/framing: a specific approach, perspective or opinion of a certain issue based on a collective body of thought; also the manner in which such perspectives and opinions can be influenced through the presentation of the facts.

G7: the intergovernmental forum of industrialised nations. The current members are the United States, the United Kingdom, Japan, France, Germany, Italy and Canada.

Green taxes: all taxes, levies and duties on activities which have an adverse environmental impact, including Energy Tax(es).

Guarantee of Origin: a certificate affirming that a producer has generated 1 mega watt hour of electricity from renewable sources and has supplied that electricity to the grid. When the electricity is actually used, the relevant Guarantee of Origin is withdrawn from circulation to prevent its resale.

IPCC calculation method: the method of calculating the volume of greenhouse gas emissions employed by the Intergovernmental Panel on Climate Change, the United Nations organisation charged with researching all aspects of climate change.

Niche: a societal subsystem with a different structure, culture and methodology to that of the mainstream system, whereby that system attempts to meet certain societal requirements in a new way.

Not-More-Than-Otherwise (NMTO) principle: a provision of the Dutch *Warmtewet* (Heating Act) which requires the operators of distributed area heating systems to restrict the price of the heat they provide to the cost which would be incurred by the users of an identical building with an individual high-efficiency combination gas boiler.

Regime: the dominant structure, culture and methodology within a societal system.

Renewables/renewable sources: 'energy from renewable sources' refers to energy derived from non-fossil sources, i.e. wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases (Directive 2009/28/EC).

Split incentive: the situation in which the benefits of an intervention are enjoyed by a party or parties other than those who bear the costs.

Suppliers' renewables obligation: a requirement for energy producers to deliver a predefined quantity or share of energy derived from renewable sources. The system is facilitated by means of tradable energy certificates.

Sustainable energy system: a highly efficient energy system largely based on the use of renewable sources.

Tipping point: the point within a process of transition which marks the acceleration of that transition, with characteristics such as a broad range of local initiatives, increasing social pressure and the emergence of new partnerships and new services.

Valley of death: a critical phase during the development of an innovative concept to become a commercially viable product, marked by limited or unknown demand for the new product which may discourage (external) investment.

Valorisation: the process by which the social and economic value of scientific or technological knowledge is established.

Window of opportunity: a period in which it is particularly advantageous to take action.

Annex 2 Obstacles presented by current legislation: explanatory remarks

The examples of obstacles caused by current legislation and the possible solutions presented here are based on various interviews with parties who have been responsible for sustainability projects. Those projects relate to energy efficiency in the built environment, decentral (local) generation from renewables sources, and large-scale production of wind energy. These examples also form the basis of Table 6 in Chapter 5 of this report.

Local initiatives addressing energy efficiency and generation from renewable sources

Obstacle 1: The process of making the built environment more sustainable is currently very slow. Investments in sustainability measures are not reflected in the value of the property concerned.
Problem analysis: To render the existing stock more sustainable requires information regarding the energy performance of buildings and the opportunity for improvement. Owners and users (tenants) frequently lack such information. As a result, the energy-efficiency of a building plays only a very small part in establishing its market value. Although vendors are required to produce an energy label when selling an existing property, in practice few buyers actually ask for one and the labels have very little significance in advertisements or estate agents' listings. Investments in energy efficiency will often increase the rateable value of the property, but the Authority Financial Markets has ruled that such investments should not affect the value of the property for the purposes of securing a mortgage loan.

The Councils welcome the announced measures with regard to the enforcement of the compulsory energy label system and the agreements with market parties concerning the role of the labels in advertisements (House of Representatives, 2010b).

Recommendations

- **Introduce a standard rating system for the energy performance of existing buildings.**
- **Conduct an assessment of buildings based on this system. Use the information thus gained as the basis of a targeted policy.**
- **Enforce the use of energy labels further to the announcement made by the Ministry of the Interior and Kingdom Relations (House of Representatives, 2010b). In addition to the energy labels, an indication of the energy costs of the property should be provided.**
- **Ensure that investments in sustainability are taken into account in valuation models. Provide valuers and real estate agents with guidelines regarding the inclusion of energy consumption as a factor which affects (market) value.**
- **Introduce incentives for sustainability measures in existing buildings by means of the transfer tax ('stamp duty') and property taxes (local rates).**

Obstacle 2: Projects concerned with improving energy efficiency and/or generation from renewable sources in the built environment, where reliant on collective facilities, are hindered by the complexity of current subsidy arrangements, financing opportunities and fiscal liability.

Problem analysis: In projects involving local generation on communal roofs or walls, as well as the installation of energy-efficiency measures in apartment complexes or other residential property with shared facilities, the residents' association will face the following obstacles:

- The necessary investments must be approved by all members of the association, who will then incur long-term (individual) commitments. Project initiators require considerable powers of persuasion to get all members 'on board'.
- The allocation of costs and depreciation amounts demands frequent and detailed contact between all residents, as does the settlement of financial rights and obligations on a change of occupancy.
- The process of issuing individual loans and subsidies to each resident (in respect of their share of the renovation) involves a considerable administrative burden for both the resident and the financier.
- A residents' association which approaches a bank for a direct loan (as a legal entity) will often face the problem that no individual member may have a negative credit rating with the Bureau Kredietregistratie (BKR) (NICIS, 2011).
- Energy consumption in communal areas often falls within the lower marginal band of Energy Tax (VvE, 2011). There is therefore little incentive to reduce consumption.

- If the residents' association wishes to generate its own electricity, this is regarded as a commercial activity which carries a VAT liability.
- Residents of properties with a communal roof with solar panels may only claim credits against their own individual consumption if all units in the building are connected to the (solar) generation system. This is unnecessarily expensive and often impractical.

Recommendations

- **Produce objective information specifically for owners'/residents' associations, covering all aspects of renovation projects including sustainability and energy efficiency. This information should cover the technical possibilities and options, sources of finance and likely payback times, and the legal and fiscal implications.**
- **Create the possibility for an owners' or residents' association to take long-term legal ownership of the installation, whereby all costs are included in the service charges paid by individual members. The installation and financing arrangements will then be 'building-linked' rather than 'resident-linked'.**
- **Advise all owners' and residents' associations to engage a professional administrator to calculate the relevant (service) costs, and a professional manager to oversee the practical aspects of localised energy generation. Financiers will then have a clear and complete business plan on which to base their decisions, and can be confident of good management once the generation system is operational.**
- **Implement a system whereby regional and local governments are able to guarantee a portfolio of loans extended owners' associations.[11]**
- **Formulate strict conditions under which electricity generated for personal use is exempt from (additional) taxation, even where production does not take place on or within the user's own property.**
- **Make suitable areas of government buildings available for local generation from renewable sources.**

Obstacle 3: The form and effect of the 'Not More Than Otherwise' principle within the Warmtewet ('Heating Act') leads to a lack of transparency in the manner in which prices are set, and restricts the investment yield for the operators of collective heating systems.
Problem analysis: The prices which may be charged for heat supplied through a collective (area) heating system are restricted by the 'Not More than Otherwise' principle. In effect,

11 To achieve a leverage effect a government can also step in as guarantor for a certain percentage of a credit portfolio, for instance 15 per cent of a total portfolio worth 300 million euros, instead of a 100 per cent guarantee for a portfolio worth 20 million euros.

the occupant of a unit connected to such a system cannot be required to pay any more for heating than the occupant of an identical unit fitted with a high-efficiency gas boiler. The Warmtewet thus regulates the investment yield which will be enjoyed by the operator of the system. Moreover, the (one-off) connection costs for heat are linked to those for gas, which raises certain objections. The *Warmtewet* relates the maximum connection charges to the investment costs of a conventional installation over a period of thirty years. During that time, a conventional installation would have to be replaced at least once. A project developer would never include this reinvestment in the connection charges for a conventional installation, and this measure therefore discourages developers from opting for a collective heating system. The system of calculating maximum prices based on the Not More Than Otherwise principle is (too) complex and, as the Netherlands Competition Authority (NMa) has already noted, leads to high implementation costs (NMa 2010).

Recommendations

- **Develop a transparent system for price regulation, which encourages the use of collective heating systems (particularly those which rely on residual heat from other processes).**

Obstacle 4: Many (groups of) residents are not fully aware of the importance of sustainable energy supply or of the action they can take to increase sustainability.
Problem analysis: There is a low level of awareness among consumers with regard to their own energy use and the opportunities which exist to reduce that use. This problem is even more acute when the consumer has no direct influence over his or her energy consumption as is the case in residential complexes with communal facilities, whether rented or in private ownership. The social housing sector in particular lacks any direct price incentives to reduce energy consumption, although energy costs now represent an increasing proportion of the total rental charges.
Some of the recommendations presented below are already included in the Action Plan for the Reduction of Energy Consumption in the Built Environment (Ministry of the Interior and Kingdom Relations, 2011).

Recommendations

- **Ensure transparency of energy costs as a proportion of total rental charges.**
- **Support peer to peer projects (role models, best practices), e.g. using local television etc.**
- **Encourage the use of product labels showing carbon emissions and total energy use.**

- **Promote the widespread use of the 'smart meter', which stands unobtrusively in the living room and provides real-time information about energy use.**
- **Encourage the incorporation of sustainability measures in residential units at the 'natural moments' such as modifications and large-scale renovations.**

Obstacle 5: Split incentives in the rental sector.
Problem analysis: Measures designed to reduce energy consumption and increase the energy efficiency of rental property (whether residential or commercial) are subject to 'split incentives'. It is generally the owner or landlord who invests in such measures, while it is the occupant or tenant who derives the benefits in the form of lower energy bills and greater comfort. Opportunities to recoup the investments by means of rent increases are limited. The Councils endorse the recent amendment to the *Besluit huurprijzen woonruimte* (Bulletin of Acts, Orders and Decrees, 23 June 2011), the directive governing the system by which rents are calculated, whereby energy performance can be taken into account when calculating the maximum permissible rent.
Housing corporations which wish to undertake large-scale renovations require the consent and cooperation of their tenants. Those tenants experience the inconvenience of the building work, and will be expected to pay a higher rent thereafter. The reduction in energy costs will be largely unknown. The rent increase following renovation is restricted; it may not exceed the threshold value of the 'rent allowance'. As a result, some housing corporations have lowered their sustainability ambitions as they will be unable to recoup the costs of the more expensive measures.
Owner-occupiers considering the installation of additional sustainability measures are less susceptible to the effect of the split incentive. Even so, where the payback period is particularly long, it will remain uncertain whether any increase in the resale value of the property will cover the investment.

Recommendations

- **Expand the legal and contractual opportunities for cost-sharing, e.g. by linking a rent increase to a guaranteed reduction in energy costs or by replacing the current 'rent allowance' with a 'housing costs allowance' which specifically includes energy costs. (Useful case studies include the 'passive construction' scheme in Roosendaal, as reported in NICIS, 2011, and the 'Housing Costs Guarantee' described in Koedam & Klomp, 2009).**
- **Promote the efficient use of the 'natural' investment moments – renovations or changes of occupancy – to incorporate energy efficiency measures.**
- **Encourage joint investments in the sustainability of newbuild property by energy companies, housing corporations and local authorities.**

Obstacle 6: Current legislation (the *Splitsingswet*) requires local networks to appoint a separate grid manager.
Problem analysis: Small cooperatives engaged in localised generation are required to appoint a grid manager if their output exceeds a certain level (Electricity Act, Art 10 para. 3). An apartment complex with its own electricity generating system is likely to exceed the set limit. The current exemption arrangements are seen as too limited.

Recommendation

- **Issue a greater number of exemptions and simplify the application procedure.**

Innovation and the implementation of new technologies

Obstacle 7: There is a shortage of capital to bring innovative renewable energy technologies to market.
Problem analysis: New technologies addressing energy efficiency and/or generation from renewable sources must pass through the 'valley of death', a crucial phase in their development. The potential market has yet to be quantified, whereby it is difficult to make the step from niche to full commercial product. It is particularly difficult to attract risk capital for the upscaling of projects with a longer payback period.

Recommendation

- **Apply government resources targeting valorisation to this part of the development process as well.**
- **Introduce a system of official government accreditation of good business cases to support the creation of the company itself.**
- **Encourage government organisations at all levels to act as launching customers in order to facilitate the upscaling of new technologies aimed at energy efficiency and renewable energy generation.**
- **Provide guarantees for commercial loans. Establish a revolving fund in the form of a 'green' investment company involving both the public sector and the banks.**

Obstacle 8: New technologies are often assessed separately in each of several permit application procedures.
Problem analysis: The permit issuance system for energy measures is too specific given the innovative nature of the technologies concerned. Applications must be accompanied by detailed and complex information, whereupon their assessment demands specialist knowledge and considerable time.

Recommendation

- **Shorten the permit issuance procedures by focusing on the potential for increased efficiency and/or reduction in carbon emissions rather than on the specific technologies concerned.**

Obstacle 9: Many companies apply the rule of thumb that investments must have a payback period of no more than two or three years. Many sustainable energy projects will not fall into this category and therefore fail to come to fruition.
Problem analysis: Sustainability projects generally have a longer payback period than other forms of investment, and/or demand a higher initial investment. As a result, they do not enjoy priority when the company is reserving or attracting capital, partly because there is no sense of urgency. The return on investment in energy efficiency measures is restricted by the regressive nature of current Energy Tax provisions.

Recommendation

- **Enforce the Environmental Management Act (Activities Directive) which requires companies to invest in any energy efficiency measure with a payback period of five years or less.**
- **Improve the information about this regulation given to both private companies and local authorities.**
- **Base all fiscal measures on the principle of 'the polluter pays'.**

Centralised generation using renewable sources

Obstacle 10: Permit applications for wind turbines require too much detail (in the form of technical specifications) at the outset, whereupon there is no opportunity to adapt in line with technological advances made during the application process.
Problem analysis: The permit application and issuance procedures for wind energy are particularly lengthy, sometimes taking as much as fifteen years. By the time that the wind turbine is actually built, the technical specifications included in the original application may be outdated due to technological innovations in the meantime. New permit applications must then be submitted and the procedure begins all over again.

Recommendation

- **Simplify the application information by setting minimum values for the quantity of renewable energy to be produced and the reduction in carbon emissions this will achieve, together with maximum values for space usage and noise production.**
- **Alternatively, issue a series of permits of which only one will eventually be used.**

Obstacle 11: Offshore wind farms require separate planning studies and Environmental Impact Assessments.
Problem analysis: Anyone wishing to develop an offshore wind farm must implement a separate planning study and Environmental Impact Assessment, and must go through all stages of the planning permission application process, including the consultation and objections procedures.

Recommendation

- **Produce a national 'outline plan' for offshore wind farms, together with centralised planning studies and Environmental Impact Assessments conducted under the responsibility of the government. This is further to, and in line with, the provisions of the Draft National Policy Strategy for Infrastructure and Spatial Planning. Not only will this increase the viability of projects but will shorten the permit application procedures.**

Obstacle 12: The useful working life of offshore wind turbines is restricted by law, whereupon the operator must reserve a budget for their eventual removal at the time of installation.
Problem analysis: An 'offshore' planning permit for a wind turbine or group of turbines is subject to the condition that the applicant must provide a bank guarantee covering the costs of dismantling and removing the installations once the permit has expired. The precise amount of the bank guarantee will depend on the number of turbines involved and the estimated cost of their removal twenty to twenty five years into the future. The working life restriction of twenty years does not apply to conventional generating equipment on land.

Recommendation

- **Match the duration of the permit for offshore wind farms to the anticipated working life of the installations.**
- **Make the working life of wind turbines more flexible by allowing an extension of the permit to be granted, well in advance of the expiry date of the original permit.**

Obstacle 13: There is no level playing field between 'green' and 'grey' electricity in terms of connection to the grid.
Problem analysis: New conventional generating capacity is connected to the grid at public expense, even if the output is destined for export. The costs of connecting a large-scale offshore wind farm, by contrast, are paid by the developer/operator.

Recommendation

- All grid connections should be the financial responsibility of the national grid manager, TenneT.
- Where production is destined for the export market, there should be a more proportionate division of costs (according to the 'profit principle') between producer and customer. Apply a single tariff per unit of electricity produced.

Annex 3 Development of this advisory report

This advisory report is the culmination of a process of research and discussion which began in March 2010. During the ensuing months, the Council Committee convened on sixteen occasions, there were four meetings on specific topics attended by representatives of various organisations, a general round table discussion, and a meeting of senior (ministry) officials. Interviews were also held with individual experts. The meetings and interviews produced a substantial quantity of information which has been used to compile this advisory report. As the publication date neared, some experts were again asked for their comments on the draft version. The report also draws on two essays and a background memorandum:

- Netherlands Environmental Assessment Agency (2011), *Antwoorden op vragen RLI inzake advies naar een duurzame energiehuishouding* ['Answers to RLI questions further to an advisory report on the sustainable energy system'], The Hague.
- Rotmans, J. (2011) *Staat van de Energietransitie in Nederland* ['Status of the energy transition in the Netherlands'] DRIFT, Erasmus University, Rotterdam.
- Soest, J.P. van (2011) *Klompen in de machinerie: bewuste en onbewuste sabotage van de transitie naar een duurzame energiehuishouding* ['Clogs in the works: deliberate and inadvertent sabotage of the transition to a sustainable energy system'] De Gemeynt, Klarenbeek.

The essays and background memorandum can be downloaded from the website of the Councils for Environment and Infrastructure (www.rli.nl). They are currently available only in Dutch.

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