

Chapter 3

Contemporary practices: greenhouse scepticism?

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In this chapter...

... having looked ahead to 2050 in the previous chapter, we now return to the present situation in The Netherlands. Climate change has been addressed in Dutch environmental policies for over a decade. This chapter considers the societal response to these policies. Has the increased policy attention led to changes in the patterns of behaviour of firms, authorities and consumers? We can observe a widespread recognition and acceptance that climate change is a problem that has to be dealt with. But we can also see a gap between the willingness to act at the political level and the slow change in actual behaviour of target groups and the absence of climate change as an issue in their daily lives. This forms the national context in which climate policies are developed and it poses several challenges for developing long-term climate change policy. The analysis in this chapter will result in the formulation of a number of dilemmas that need to be addressed in thinking about such long-term strategies. In subsequent chapters the authors will reflect upon these dilemmas.

Introduction

The scenarios sketched in Chapter 2 are just two contrasting examples from a wide variety of conceivable routes towards a climate-neutral society. Whichever route is taken, they all embody manifold drastic transitions within the period of 50 years; technological, institutional, structural, behavioural and cultural.

Such societal transitions will require collective decision-making in the political system, but equally decisions and changes in behaviour by many actors in the sectors of society discussed above. Everyone will have to push in the same direction and that will not be easy to achieve. We know that societal responses vary from denying or ignoring the environmental and societal effects of climate change to adapting or trying to prevent them (Rayner, 1998). Not everyone will necessarily wish to prevent the impact of climate change and to carry the (potentially heavy) burden of a forced transition. Adapting to climate change or even ignoring it may fit very easily into the political culture of substantial groups in society, labelled as fatalists and individualists (Schwarz and Thompson, 1990) or as cornucopians in their attitudes to addressing environmental or climate change issues (see Thompson and Rayner, 1998). The fatalists' and individualists' response to threats of nature like climate change is that nature is capricious or benign. The cornucopians' response is that nature is intrinsically robust and overflowing with an abundance of resources. Both responses result in sceptical attitudes.

It may very well be that the political elite of western countries agrees upon the direction and pace of reaching climate goals. However, to get there, they depend heavily on the day-to-day decisions of many different actors, among whom there still is a distinct possibility of meeting scepticism and unfamiliarity with the issue. So the central question at this stage of this book is: what do we know about societal support, about awareness and about contemporary practices in efforts to change the behaviour of individuals and organizations in response to climate change? And if we are confronted with scepticism and unfamiliarity, can we deal with it? Or should we and can we design routes of transition independently of these groups' co-operation? What would that imply for policy scenarios?

In this third chapter we will evaluate the current societal support for climate change policies and the contemporary practices of various actors within society using a large number of studies and evaluations available for The Netherlands. We will examine whether, and if so how, climate change issues play a role in decision-making amongst societal actors in relation to their other interests. We will show that there is a gap between the willingness to set (modest) targets at the political level (as expressed in various national climate change policy documents) and the slow pace of change in the actual behaviour of target groups (both government agencies and in society). In the last section, we will conclude this chapter by identifying seven dilemmas that are relevant in exploring possible transformation processes and which will be taken into account in the following chapters.

Actors: who decides on innovations?

As Chapter 2 illustrated, a shift towards a climate-neutral society will require the efforts of industries, companies in the energy production and distribution sectors and agriculture. Substantial efforts will also be needed in the fields of transportation and household consumption. Making the transition to a climate-neutral society will not only affect the daily routines and technologies adopted in specific economic sectors, but also represent a challenge for complex processes of collective decision-making, for example in the areas of building and infrastructure projects.

Some of these transitions are large-scale innovations involving few decision makers. In such cases, businesses depend on co-operation with the national government for approval of projects and perhaps financial support (e.g. CO₂-recovery/storage or large-scale wind parks at sea). Decision-making may then be relatively well-ordered and rest mainly on techno-economic assessments, although local opposition may be encountered and public support might become a critical issue.

But in most cases the transitions depend on far less structured decision-making mechanisms, either involving individual firms or households that do not actually yet address the issues concerned (e.g. applying eco-design principles or using solar energy appliances) and for whom changing the relevant routines is more than just a matter of making a techno-economic assessment. As Table 3.1 shows, most of the transitions do not involve large-scale projects involving a few actors from business and central government, but fall into the category in the bottom right corner.

Table 3.1 *Scale of the innovative product and number of decision makers involved in transitions*

Scale of product	number of decision makers		
	<i>few, independent</i>	<i>few, mutually dependent</i>	<i>many, independent</i>
Large scale	<ul style="list-style-type: none"> ▪ application of wind (at sea) ▪ CO₂-recovery/storage ▪ bio-refinery 	<ul style="list-style-type: none"> ▪ infrastructure projects 	
	<ul style="list-style-type: none"> ▪ bio-industry ▪ 50% more eco-efficient aviation 	<ul style="list-style-type: none"> ▪ application of wind sustainable technological development policy 	<ul style="list-style-type: none"> ▪ application of biomass ▪ application of CHP ▪ hydrogen society
small scale		<ul style="list-style-type: none"> ▪ fuel cells in motor vehicles ▪ widespread re-use/recycling ▪ low impact construction ▪ supply of eco-designed appliances 	<ul style="list-style-type: none"> ▪ improving material efficiency ▪ improving energy efficiency ▪ application of sun ▪ eco-agriculture ▪ consumers' choices

This implies that achieving the goal of reducing emissions by 80 per cent mainly depends on the acceptance and willingness of many businesses, local institutions and individuals to contribute to the transitions. This in turn will depend on the perceptions these various groups in society have of their own contribution to the problem and of their own and others' responsibility and possibilities to address it. A complicating factor here is that the suggested options are mutually dependent. For example, the degree to which producers will apply eco-design principles will strongly depend on their perception of the responses of consumers to an increased supply of low-impact appliances and consumer goods. As another example, producers' choices in the quality of their energy supply (using renewable energy or not) will have an effect on the environmental profile of their products. This may lead to a growing demand for renewable energy, which will be a strong stimulus for the energy sector to invest in renewable energy. Manufacturers can decide either to leave the choice of modes of renewable energy to energy companies or to be selective at this point and to opt for green energy. In the liberalized energy market, as consumers, businesses may even decide on the modes of energy production, e.g. by producing solar or wind energy themselves. Such *interdependencies* and growing *independencies* may form either a barrier to transitions ('it is their responsibility') or a chance to accelerate the process of transition.

Having identified groups of actors that are likely to contribute to trend breaks, we will now roughly sketch the way these target groups are nowadays addressed by policies.

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Contemporary policies

The societal sectors mentioned have already been exposed for some time to environmental and energy policies; policies that have been successful in some fields but not in others. We will show that changes made by these target groups are only partly induced by regulatory pressure. With respect to activities and behaviour related to climate change, the day-to-day decisions of these sectors are often not addressed by compulsory regulations. Contemporary changes in policy and behaviour of these societal sectors are often induced by coercion, voluntary agreements, societal pressure, financial stimuli and market stimuli. In this section we will first discuss the policy strategies applied in the field of energy and environment that address industry, energy production, consumers and mobility. We will then go on to discuss developments in national and local climate change policies.

Environmental and energy policy

Energy policy targeted at *industry* can focus on the energy efficiency of production processes and distribution, possible co-operation in CHP and energy supply and the choice of renewable energy. The actual policy concentrates on improving energy efficiency through voluntary agreements mainly based on energy conservation methods. These agreements are intended to be incorporated in firms' environmental permits. Research has shown that these voluntary agreements are generally effective, although the level of annual efficiency improvement (approx. 1.7 per cent in the period 1989-1995) will not be sufficient in the context of reducing emissions by 80 per cent (Glasbergen et al., 1997, p3, p76). The most recent generation of agreements is intended to have a wider scope, including wider implementation of potential methods of improving energy efficiency: life cycle management, regional co-operation (industrial ecology), reduction of use of virgin resources and increased use of renewable energy. These methods are also stimulated in *industry-targeted* environmental policy, which also involves voluntary agreements, increased flexibility of permits, application and certification of environmental management systems, stimulation of eco-design, life cycle co-operation and promotion of products with low environmental impacts.

In the field of *energy production and distribution* the institutional changes resulting from the current energy policy with its dual targets (sustainability and creation of free energy markets) are clearly visible. The creation of free energy markets for electricity and natural gas requires a substantial re-institutionalization, which is just now taking place. The process involves privatization, resulting in a decline in the influence of local politics. It also implies scale enlargement and internationalization of energy companies, which will possibly affect the environmental policies and practices that these companies developed during the 1990s. On the other hand, new actors are entering the market place, such as retailers and housing agencies selling energy, sometimes solely green energy.

Current policy targets are to increase energy efficiency by 33 per cent in 25 years, the use of renewable energy for 10 per cent of energy demand in 2020 and application of clean technology, combined heat and power (CHP) and CO₂ storage when coal is used for electricity production. In 2001 emissions of CO₂ are still

increasing despite the success of the voluntary agreements on energy efficiency in achieving the agreed targets and the reduction in the domestic use of natural gas. Although there has been an increase in the use of renewable energy, it has not been sufficient to meet the policy objectives. Efforts to increase the application of renewable energy have met with a number of problems: local opposition (to wind parks), design and planning processes and procedures in the field of building that do not make provision for it, economic barriers (pay-back times) and lower prices for non-renewable energy due to liberalization and internationalization of energy markets. In general, the role of government is diminishing, but environmental policy still has an impact through its emission targets and the sector's involvement in the production of policy .

With regard to *consumption*, all consumer goods, transportation and domestic heating are relevant. Policy has already addressed the two latter aspects for some time. With respect to domestic heating, policy focuses on energy conservation, with the emphasis on financial and communicative strategies. The same financial and communicative strategies are employed to reduce car use. In addition, improvement in the capacity and quality of public transport should further reduce the environmental impacts of mobility. Addressing citizens as conscious consumers employing their 'purchasing power' is a more recent feature of environmental policy which is still in its infancy (Vermeulen, 2000). The second half of the 1990s saw greater use of green taxation, The Netherlands now having one of the highest levels of green taxes. Rising levels of energy taxes are in force for petrol, electricity and natural gas for heating.

Efforts to reduce the impact of *mobility* struggle with the stubbornness of this issue. Reducing the impact may involve the route of addressing motorists' behaviour (applying financial, communicative and physical strategies) or influencing choices of modes of transportation, design of infrastructure, development of clean means of transportation (through support for R&D and regulations). Although these issues are all far from new in the policy arena, on neither of these aspects can substantial improvements, let alone a reversal of trends, be reported up to now, as we are continuously facing increasing levels of mobility. One small positive effect of technological improvement can be mentioned here: the last decade shows stable levels of energy consumption per kilometre by cars, while cars have become larger. There is a rise in the use of public transport, but it barely exceeds the general increase of mobility.

Even more complicated are efforts to achieve more *structural changes*, for instance in the execution of infrastructure projects or large-scale building projects. In these projects decisions are made at the national level and strong businesses are involved. But procedures are long and include many opportunities for reconsideration, both of national policies and local policy implementation, which are likely to be availed of by one or other of the many actors involved. These complex decisions usually require the management of uncertainties relating to economic, societal and ecological effects. This combination of dealing with uncertainty and repeated opportunities for reconsideration can impede the success of such complex processes.

Developments in national climate policies

In addition to general environmental and energy policies, The Netherlands has had a specific climate policy since the late 1980s. As Box 3.1 shows, we face a conflict between ambition and reality in The Netherlands, where deficiencies in implementation lead to downshifting of ambitions. During the 1970s the Dutch media regularly reported new findings about the consequences of climate change. Between 1979 and 1984 the greenhouse theory was picked up by policy makers and framed as a CO₂ problem. Between 1984 and 1988 the climate problem rose to environmental priority status, with public attention and political statements of intent both peaking between 1988 and 1990, as was also the case with respect to other environmental problems (Dinkelman, 1995; Dresen en Kwa, 2000; Van der Sluijs, 1997). The Dutch national climate policy started with the international (1988) Toronto target of reducing CO₂ emissions by 20 per cent in 2005.

After 1990 it became increasingly clear that it wouldn't be possible to realize the original targets through domestic implementation. Figure 3.1 shows the actual emissions in the period 1980-2000 as well as the expected emissions in a global co-ordination scenario up to 2030. The Dutch National Institute of Public Health and the Environment (RIVM) forecasts that with current policies the emis-

Box 3.1

Main elements of Dutch climate change and energy-efficiency policies

Targets: -6% CO₂-eq. in 2008-2012, compared with 1990/1995;
 (e.g. -50 Mton CO₂-equivalents compared with unchanged policies);
 10 % renewable energy in 2020, 5% in 2010;

Main elements:

- Improvement of efficiency of production and stimulation of combined heat and power (applying long-term agreements with industries, CO₂ covenant with energy producers, a benchmarking covenant and various tax measures, such as tax reduction for investments).
- Improvement of efficiency of heating (applying energy performance standards for buildings, subsidies, knowledge transfer and agreements in the field of sustainable building, exemplary and demonstration projects).
- Tax on energy (small firms and consumers).
- Improvement of energy-efficiency of vehicles (applying European covenants and regulation).
- Improvement of efficiency of domestic appliances (using subsidies and regulations).
- Stimulation of energy recovery from waste.
- Stimulation of renewable energy (research, pilot and demonstration projects, subsidies and tax measures, accelerated liberalization of market for 'green energy').
- Increase of CO₂ absorption in new forests (in The Netherlands and abroad: FACE programme).
- Reduction of energy demand of small users: households and SMEs (energy tax and information).
- Deceleration of growth of mobility and stimulation of economic driving behaviour (tax measures, road toll information).

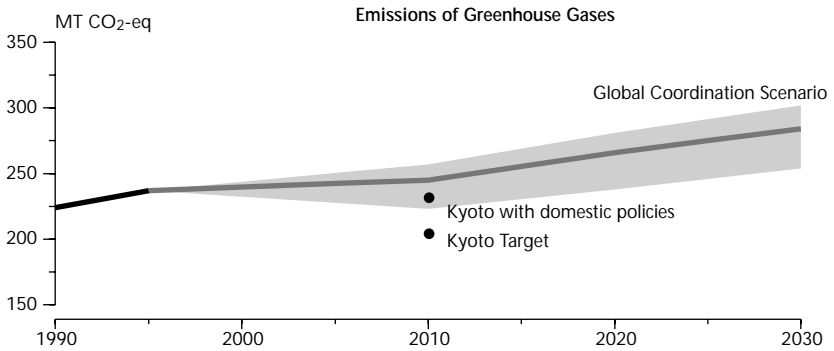


Figure 3.1 *Emissions of greenhouse gases in The Netherlands according to a Global Coordination Scenario. The shaded area depicts uncertainties in policies and societal developments (RIVM, 2000).*

sions of greenhouse gases will continue to grow. With the economic growth The Netherlands experienced over the last few years and current policies, The Netherlands can only meet its target under the Kyoto Agreement if an extra package of measures is implemented. Furthermore, reductions will have to be bought abroad (Milieuverkenning 5, 2000-2030).

The picture that emerges from this overview is, on the one hand, one of good intentions and a willingness for The Netherlands to be at the forefront of (international) climate policy-making. But on the other hand, it shows a country in a difficult position to realize its climate targets. The latter point can be explained by the economic structure of The Netherlands, with its energy-intensive industry and agriculture, the importance of transport (see also Chapter 2) and its enormous dependence on what happens internationally. In light of this situation and the awareness of the long-term necessity for far-reaching measures, in 1996 the Dutch parliament started (the first) parliamentary hearings on climate change. Parliament wanted to be in a better position to form its own opinion about the climate problem and the measures that were needed. The debate about the very existence of the climate problem and the uncertainties surrounding its causes and effects played a major role in these hearings. These hearings resulted in a political re-affirmation of the seriousness of the problem and the statement that the committee of enquiry considered a reduction of greenhouse gas emissions by 30-40 per cent in 2020 (compared to 1990 levels) to be possible.

Interestingly enough, research by Ester et al. (1999) highlights a remarkable difference between what decision-makers think the Dutch public wants and what the public say themselves about their preferences. Policy makers often complain about what they see as a gap between their habit of looking at strategic, global issues and the more locally-oriented environmental issues that occupy the minds of the general public. The argument is that citizens are only interested in environmental issues in so far as they affect their day-to-day lives. The research by Ester et al. shows that this perception is not entirely accurate. An example: all decision makers say they are well-informed about climate change issues but they believe that only a minority (35 per cent) of the public would say they are well-informed.

In fact 80 per cent say they are well-informed (whether this is correct is not important here). Even more interesting is the perceived willingness to provide extra resources for environmental protection. On this question, given a choice between seven general policy issues, 39 per cent of the policy makers put the environment in first or second place. They thought that only 7 per cent of the public would do so (and that 0 per cent would place it first). In fact, public support is far larger, as 27 per cent gave environmental protection a first or second place (Ester, 1999, p41-50).

This history shows that climate change is a widely recognized environmental issue in the national policy arena in The Netherlands. Furthermore, decision makers seem to underestimate the societal support for environmental policies. But at the same time, far-reaching targets for 'a climate-neutral society' are absent from official policy documents. Such a long-term approach to the climate problem has not been widely discussed in the political debate in The Netherlands up to now, although more recently some influential advisory bodies have been demanding more attention for this aspect (VROM Raad, 1998; AER, 1999; SER, 1999). At the end of 1998 the Dutch Environmental Advisory Council published an advice entitled 'Transition towards a low-carbon energy system' (VROM Raad, 1998). In this advice it called for structural steps in the long-term transition towards emission reductions of 80 per cent in industrialized countries. It argued that this long-term target should drive the policy process, in which structural steps towards these goals are fundamentally more important than short-term successes. In this context, the process in the COOL project (see Chapter 11) is another interesting sign of growing attention to long-term climate targets among stakeholders in The Netherlands.

Local climate policies

A similar conflict between ambition and actual practice can be observed at the local level. Local authorities can play an important role in realizing national climate policy targets, but can also make more ambitious policies. As in many other countries, municipalities in The Netherlands have responsibilities and decision-making powers which are essential for achieving the transitions discussed in Chapter 2. For instance, they have to issue permits for any new construction or form of land use. They are responsible for environmental permits for smaller firms. They have an important position in local traffic and public transport policies. But in all these fields their ability to pursue climate policy goals is limited because powers and responsibilities are in many cases shared with provincial and national authorities. In many cases, budgets have to be provided by national authorities. Climate change has received attention in many municipalities in recent years. Some have incorporated it in Local Agenda 21 projects, where municipalities have discussed environmental policies with local stakeholders. Other municipalities have committed themselves to the International Climate Alliance of 1999, in which 109 Dutch municipalities (which is 20 per cent of all municipalities in The Netherlands) agreed to develop policies aimed at 50 per cent reduction of greenhouse gases in 2010 compared to 1987 levels. Members co-operate in developing possible policies and exchange information.

Although climate change discussions in Local Agenda 21 and participation in the Climate Alliance can be seen as positive signs, we must not overestimate their impact. An evaluation of the local climate policies of 51 municipalities in 1999 showed that in many cases consideration of climate change in strategic policy formulation is no guarantee of changes in greenhouse gas-related activities by local actors. There are small groups of communities actively engaged in implementing climate change strategies, but research shows that in most cases possible actions in the field of construction, traffic and green energy are not taken in practice. In many instances, basic information on sources of greenhouse gases is lacking, developments are not monitored and plans are not even developed (Burger, 1999). Frequently, a few attractive examples of activities, such as subsidizing solar hot water systems, are highlighted but there is rarely a comprehensive strategy. Research into planning procedures for large building locations and urban reconstruction projects reveals that, despite existing local policy plans, environmental and energy policies are not integrated in development procedures from the start of such projects. Many of the existing 'demonstration examples' were promoted at a later stage by actors (like energy agencies, energy companies or consultancies) who were initially not included in the process of plan development (Van der Waals et al., 1999; Van der Waals et al., 2000).

The main barrier at this stage of development of local climate change policies is (what is called) external integration of climate change issues in other fields of local policy, like traffic, economic development, urban and land use planning, housing, tax policy, etcetera. On the local level we see a considerable degree of political support for climate policies, but up to now this has only partially resulted in changes in local sectoral policies and physical changes. Opportunities for local climate policies will be discussed in more detail in Chapter 6.

Contemporary practices

There is some research into the attitudes to and public support for climate policy and contemporary practices of various groups in society. However, the picture is not complete and many different approaches have been adopted. Still, we believe that the overall picture shows a significant difference between declared public support for climate policy and daily practices and routines. We will discuss the available information in the context of public opinion, producers and consumers.

Public opinion

In the late 1990s it was often stated in public debate in The Netherlands that public concern with environmental issues was declining because of the rising prosperity. Empirical evidence doesn't support this statement when it is expressed this simplistically. Annual environmental behaviour monitoring shows that in the second half of the 1990s the Dutch population increasingly saw environmental problems as an important issue. Between 1995 and 1999 the percentage that stated that environment is 'one of the most important issues' rose from 40 per cent to 47 per cent. The number of people saying it is 'the most important issue' ranged between

17 and 20 per cent. Equally remarkable was the (small) growth in the number of people who said that environmental issues would be the greatest threat in the future: 27 per cent in 1995 and 33 per cent in 1999 (Couvert and Reuling, 2000, p24, p31, p41).

What we are actually seeing is a strong shift in the perception of environmental issues. They are decreasingly seen as threat to the health of this and future generations and increasingly people feel that 'the fuss about the environment is exaggerated' (Couvert and Reuling, 2000, p57). So public opinion is tending to shift away from an apocalyptic interpretation. We are also seeing a shift in opinions on responsibility. Dutch environmental policy is built on the principle of shared responsibility of producers, retailers and consumers. Public opinion, however, increasingly holds industry responsible and individuals are less inclined to see themselves as being responsible (Couvert and Reuling, 2000, p50-51).

This perception of personal responsibility may be the most important explanation for the gap between attitude and actual behaviour. Analyses show that this gap is smallest with respect to waste treatment and energy use and water use. The gap is widest in the spheres of food, mobility and purchasing behaviour (Hoefnagel et al., 1996; Becker et al., 1996; Steg, 1999; RIVM, 1998 a and b; Couvert and Reuling, 1999), so actual consumer behaviour is still unaffected.

At this point we should be aware of a fairly strong societal differentiation along the lines of income and even more of education. Research into environmental attitudes and behaviour shows a clear differentiation, especially according to educational levels (Hoefnagel, 1996).

The discussion above is not specific to climate change issues. There is little research specifically on the issue. One example is an analysis of public knowledge about causes, effects and solutions for environmental issues, which showed that in 1998 73 per cent were able to give a cause of climate change correctly, 65 per cent could mention a correct effect, but only 31 per cent could give a correct solution. However, looking at the full chain of causes, effects and solutions, only 25 per cent could give a proper combination, whereas 18 per cent couldn't give a proper presentation of any part of the chain (Couvert and Reuling, 1999, p39-45). This analysis covered a period of four years. It showed no significant increase in the level of knowledge during that period (Couvert and Reuling, 2000, p91). Yet other research shows that the public itself believes that of all environmental issues it is best informed about climate change, with 80 per cent saying they are well-informed or very well-informed (Ester et al., 1999, p42, p69).

With specific reference to energy conservation, research shows that the majority feel this is an important issue (56 per cent), with only 1 per cent saying it is 'not' or 'not at all' important. The number of people who feel it to be important is declining. On this aspect we also see the societal differentiation along the lines of income, and even more the level of education: people with a lower income and level of education explain energy conservation behaviour with economic arguments (squandering of energy costs money), whereas people with a higher income and level of education tend to stress environmental arguments (Couvert and Reuling, 2000, p152-163). Another study analysed priorities given to various environmental issues and showed that climate change is given low priority in public opinion: 8 per cent and 11 per cent giving it first and second place respectively.

Overpopulation (28 and 12 per cent) and air pollution (38 and 27 per cent) were given high priority by a far larger proportion of the Dutch population! Accordingly, climate change is not broadly perceived as being dangerous for human health (Ester et al., 1999, p43-44).

Why is information about public opinion important in this context? Because it is an essential resource for the necessary political process and is crucial for changing consumption patterns. Here we can see two alternative routes. The first is the route of 'conscious consumption', in which citizens may affect producers' willingness to improve the eco-efficiency of their products by purchasing alternative products with substantially lower environmental impacts. Following this route, the need for consumption is not addressed. In the second route the aim is to reduce the volume of material consumption by advocating less materialist forms of consumption or retrenching.

The latter route has been explored by Aarts, who studied rare examples of a culture of retrenching in material consumption and followed other sociological examples of refraining from consumption (like smoking). One might also expect the trickle-down effects identified by Elias to occur in the field of environmentally-relevant behaviour. Material consumption trickles down from groups with a higher social status and better education to the rest of society (Aarts, 1999, p40-41, p59-60). Her argument is that such a trickle-down effect is not likely to occur with respect to a culture of retrenchment because it lacks essential features, like the ability to distinguish yourself from others through this type of behaviour (lack of prestige) and because such an environmental attitude does not represent a cultural capacity contributing to obtaining power (Aarts, 1999; p202).

This discussion raises the issue of affecting lifestyles. Aarts cites Breehaaar et al. (1995), who showed that consumers assess their alternatives in the light of their sets of final values (like freedom, autonomy, health, personal development, social appreciation, etc.). Environmental issues are seldom included in these sets of final values (Breehaaar et al., 1995, pxvii-xix). This line of argument opens the way for research into social mechanisms for constructing sets of final values in combination with social differentiation of lifestyles (see e.g. Schwarz and Thompson, 1990; Motivation, 1999), an approach scarcely followed in social environmental research up to now.

At this point, we conclude that there is public support for addressing climate change, at least at the level of attitudes. However, the public doesn't respond to the greenhouse issue as such but to environmental issues in general. Up to now, the climate issue plays scarcely any role in day-to-day behaviour and there are clear signals that it isn't given a high priority. There is little to be expected from pleas for sober lifestyles.

Producers

In the 1990s impressive improvements occurred in the general environmental performance of producers. In the late 1980s Dutch environmental policy set ambitious targets for the period 1990-2010; in some respects demanding an 80 per cent reduction in an even shorter period than that discussed in this book for CO₂. Producers were addressed with a mixture of three policy strategies: a central

approach using modern forms of coercion and incentives, an interactive approach and internalization, and a self-regulation approach (Vermeulen, 2000a). In 1998 the Dutch government and producers together published a book entitled *The Silent Revolution* singing the praises of their 'co-operative efforts in improving the environment'. In Chapter 1 we said that these targets will be met (Ministerie van VROM/VNO-NCW, 1998b, p160-161; RIVM, 1999). This success is supported by the institutional changes in businesses during the 1990s. We are witnessing a continuing diffusion of institutional change. The number of companies that have integrated environmental management into the business process or are in the process of doing so has grown from 37 per cent in 1997 to 49 per cent in 1999 (KPMG Milieu/NIPO, 1999: 24; see also KPMG Milieu/IVA, 1996). More recently, we have seen rapid growth in the number of firms with ISO 14001-certified environmental management systems (ISO, 2000).

We should be aware that, by implementing environmental management systems, companies in theory put in place the institutional requirements to meet the governmental and societal demands in all areas of environmental improvement, including climate change. However, during the 1990s climate change and energy-efficiency policies have followed different paths, being instigated by different government departments and employing different policy instruments. During the 1990s the Minister of Economic Affairs, who is responsible for energy policy, established a separate forum for consultation with the aim of reaching voluntary agreements on improvements in energy efficiency. As we discussed in the first section of this chapter, this approach has proved effective. Despite low energy prices, companies have met the agreed targets. Research shows that they are more motivated and have improved their organizational capacity to increase their energy efficiency, and energy efficiency has taken a more prominent place in their decision-making procedures (Glasbergen et al., 1997; Glasbergen, 1998).

The first generation of energy-efficiency agreements was mainly concerned with optimization of production processes, application of combined heat and power and energy conservation. They did not cover the use of renewable energy. Natural gas and electricity are simply taken from the national grid. Large industrial firms deserve special attention as large-user tariffs are an interesting issue to address, especially since the European energy market is in the process of liberalization. In 2000 only a handful of businesses used renewable energy, like photovoltaic cells, wind energy or electricity with green certificates (examples are the national rail company NS, Van Melle, a manufacturer of sweets, and Siemens, as producer of wind turbines). In doing so they have faced opposition. For instance, Van Melle could not get local permits to place wind turbines at any of its sites in The Netherlands.

Recent research on 'cleaner production' shows us what types of measure are being applied by businesses. Depending on the type of measure, between 25 per cent and 65 per cent of companies have applied specific measures. Most of these involve a reduction in the use of materials and adaptations in production processes, but there have also been energy-related measures (between 60 and 65 per cent of the companies) (KPMG Milieu/NIPO, 1999).

There is little specific information about businesses' attitudes towards the climate change issue and climate change abatement. A study from 1995 involving

over 500 business decision makers in The Netherlands (Research and Marketing: 1995) shows that about one in four were strongly committed to their environmental performance and one in five showed a strong commitment to climate change issues. However, other (more traditional) environmental issues are regarded as far more important. In general, the level of knowledge and perceptions of climate change issues differ little from those of the general public (see also the previous section on public opinion). Only one in three expected effects on society in the short term. Their main source of information was mass media, but two in five said they generally ignored articles in newspapers or programmes on television about this issue.

Nevertheless, business decision makers generally see industry as one of the main perpetrators (85 per cent) and it is generally accepted that industry has a leading role to play in abating climate change (89 per cent), while also expressing great confidence in the (technological) capacity to resolve the problem. The main barriers to solving the climate change problem are felt to be economic interests, conflicting policy interests and the inadequate pace of technological development. About two-thirds of those surveyed stated that their own company should take initiatives. Regrettably, the study didn't look in more detail into the willingness of companies to act themselves and what they did in practice. A more recent study (Van der Woerd et al., 2000) reported a tendency amongst multinationals in the US and Europe to move towards a more proactive approach towards the climate problem.

Another study focuses more specifically on investment behaviour by firms (Gillissen et al., 1995) and describes barriers to diffusion, the investment criteria that are applied and policy preferences. Their analysis shows that 20-30 per cent of the technological potential for energy conservation is unknown to industry, even in the case of profitable technologies. Perceived impacts on production quality and continuity (possibly due to 'start-up' problems of new technologies) are important barriers and it was found that firms' perceptions of profitability differ significantly from profitability calculated in policy studies (Gillissen et al., 1995, p89-91).

Our observation here can be that there are visible changes in modes of production and in the integration of environmental management approaches. There is some difference between large (internationally-oriented) firms and SMEs. Multinationals like Shell and BP-Amoco are currently shifting their position and are leaving traditional lobbying organizations against climate policies and moving towards a more proactive position. Energy-efficiency is receiving growing attention, but is often not yet integrated in environmental management. Even when it is, it has to compete with other cost-reducing (or liability-reducing) environmental issues. Scarcely any attention is paid to 'renewable energy'. Chapters 4 and 7 will discuss possible routes for the acceleration of dematerialization and technological development.

Consumers

Consumer behaviour is relevant for CO₂ emissions. Energy use in households for heating, electricity and use of appliances has been the subject of energy policy for nearly a quarter of a century now. The growing mobility of consumers adds sub-

stantially to the volume of CO₂ emissions they generate. And, more recently, attention has also shifted to the entire volume of consumed goods. Every product bought may use energy during domestic use, but also includes energy used for its production and disposal. This indirect energy requirement of products and services consumed actually exceeds the energy requirement for domestic use of electricity, heating and use of petrol for cars (Biesiot and Moll, 1995, p43).

Governments have been attempting to influence domestic use of electricity and heating and the use of petrol for cars since the mid 1970s, when The Netherlands was boycotted by Arab oil producers. Many lessons have been learned, but it would take too long to discuss them all here (see Piers Consultancy, 1992). The best way to see whether policies were effective is to look at physical effects and market information. These show that the use of electricity rose during the 1990s at an average of 3.4 per cent per year. The use of natural gas is declining due to the successful promotion of insulation and high-efficiency central-heating appliances (Brezet, 1994).

In the field of mobility we are far from a trend break: the number of kilometres driven has been growing at 2 per cent per year, although the rate of increase seems to be slowing. That is explained by a dramatic growth of congestion on the roads. We see a gradual growth in the use of public transport (3.5 per cent per year), but it still only represents a small proportion of the volume of private transport (about 1:7 to 8) (RIVM, 1998b; CBS Statline).

The other aspect being considered here, the entire volume of consumed goods, is worth looking at in more detail. Biesiot and Moll studied the energy requirements of consumption patterns. This study shows a strong relation between income levels and total energy requirements: households with an income of € 10,000 on average use twice as much energy as households with an income of € 5,000. But even more interestingly, we see large differences within all income categories: those who use a lot of energy use twice as much as the thrifty users within the same income group (Biesiot and Moll, 1995, p48). Although this may be largely explained by physical factors (quality of the houses) and situational factors (distance to work), choices in consumption present quite significant opportunities for greenhouse gas reduction by means of conscious use of products and services with a low energy requirement. Another study shows that motorists themselves believe that 20 per cent of their car use is avoidable (Tertoolen, 1994, p274). A large-scale experiment in The Netherlands showed that with intensive efforts to raise awareness, consumers could combine increased wealth with a reduction of total energy requirements by 30-40 per cent (Schmidt and Postma, 1999).

Results in real-life situations give far less reason for hope. Tertoolen tried to influence car users' behaviour through persuasion with arguments concerning the collective and personal disadvantages on the one hand, and by improving self-monitoring, feedback and commitment on the other. He concluded that car users will not stop voluntarily because car use is predominantly linked with feelings of independence, ease and comfort (Tertoolen, 1994, p278).

When we look at purchasing behaviour, we can use information from a longitudinal study of environment-related behaviour (Couvert and Reuling, 2000, p108-151). It showed that 10 per cent of the population often takes the environment into account in purchasing decisions and 20 per cent do so sometimes. The oth-

ers just choose on functional or economic grounds. In the period 1993-1999, these levels were generally stable for most types of product in the study. There was a minor tendency among high-income groups and environmentally-oriented individuals to improve their 'performance'. In the last year; low-income groups and people who are indifferent towards the environment tend to drop out with respect to purchasing products with less effect on environment and separation of waste.

Here again it is most instructive to look at information available about the effects at the end of the production and consumption chain, or to put it another way the end of the *information* → *decision* → *behaviour* chain. The study discussed above is based on what people say they do. The best proof of behaviour is to look at what is actually being sold. Looking at purchasing behaviour, we see only very small market shares for eco-labelled products. As regards food (representing half of the total indirect energy requirement of households (Biesiot and Moll, 1995, p43), the market share of milk produced under the European EKO label for organic food products grew from 0.6 per cent in 1998 to 1.5 per cent in 1999 after supermarkets changed their policies. Comparable figures for other food products show us three things (Vermeulen, 2000):

1. far more people say in surveys that they buy organic food than actually do;
2. actual market shares for organic food are very small. But there is a small glimmer of hope;
3. changes in policies can have large effects in market niches.

The central question here is whether addressing consumers with both information about the relative environmental impact of alternative products and improving the supply of the environmentally improved goods will bring about trend breaks. The non-governmental organization Global Action Plan employs a method of information transfer, self-monitoring and social stimulation in assisting small groups of citizens with changing their behaviour. These groups are called eco-teams. Drawing on evaluations of eco-team behaviour, they claim to be able to realize a 25 per cent reduction of CO₂ emissions (GAP, 1999). Others like Aarts and Breemhaar, whose arguments we discussed in the section on public opinion, are far less optimistic.

These observations have recently led to what might be called a withdrawal from addressing citizens as conscious consumers. The Dutch National Advisory Council for the Environment recently stated in its advisory opinion on 'sustainable consumption' that it is unwise to expect consumers to buy more expensive product alternatives with better environmental performance. Urging them to do so would imply an overly moralizing role for government. Instead, emphasis should be placed on addressing producers (Raad voor het Milieubeheer, 1996, p79, p84, p85).

Our main conclusions from this section are that we are seeing a shift from an approach where consumers are addressed mainly with respect to energy conservation through their behaviour (heating, lighting, buying low-energy household applications) to one that addresses consumption as a whole. Recent environmental policy has addressed citizens as consumers, but with marginal results. Promoting sober lifestyles tends to be ineffective as it is too contrary to dominant values. Willingness to make voluntary financial sacrifices is small. Rising abatement costs might collide with low acceptance within segments of the population

(related to level of education and lifestyles). At the same time, government's attention for the consumers' role may need to be reinforced.

Reflection: main dilemmas

Surveying the research discussed above, we can see a widespread recognition and acceptance of climate change as a problem that has to be dealt with. This applies to both the level of policy-making and the level of society (stakeholders and public opinion) in The Netherlands. The 1990s also highlighted a willingness to set quantitative policy targets, and at the local level even quite substantial ones. However, they address the short term and involve a step-by-step approach. Because of the difficulties experienced in changing energy-related behaviour, targets have been moderated and even those are hard to achieve.

In addition, looking at the actual behaviour of the relevant societal actors, we see a gap between a willingness to act at the political level and the slow change in actual behaviour of target groups or, in other respects, the absence of the climate change as an issue in their daily lives.

We have consciously focused on the situation in the 1990s to show the contrast between the long-term images shown in the previous chapter and the current situation in Dutch society. Of course this only gives us a picture of attitudes and actual behaviour for a specific and short period, and shows a difficult struggle with very modest policy targets. Over the longer term, perceptions, attitudes and daily routines may prove to be less irreversible than suggested by these observations. However, in our quest for societal barriers in the development towards arriving at the images presented in Chapter 2, we are better off taking into account these constraints and finding ways of dealing with them. Even if we assume that the climate change problem is recognized, resistance among different groups in society based on considerations of cost-effectiveness and competing interests and goals will have to be faced. On the other hand, in our open, non-directive society, long-term and substantial climate change policy will inevitably require co-operation by these different groups in society. Knowing this, we can identify various obstacles to securing public willingness to act:

- a substantial segment of public opinion doesn't support major interventions (relation with income levels, lifestyles and specific political cultures);
- reallocation of administrative competences implies that national governments may have political targets but will increasingly depend on others in attaining these goals;
- in local and regional politics substantive action towards greenhouse gas reduction has to compete with more urgent and inescapable local priorities. This in a context where effects of climate change are barely perceptible and local authorities will rarely be the key actors in combating climate change;
- for many (but not all) of the societal groups involved, other 'basic' values than environmental consciousness construct the initial motives behind choices and orientations of daily behaviour. Conduct relating to greenhouse gases will have to be pushed into these 'basic values-driven' behavioural routines or will have to produce co-benefits;

- there also appear to be some obstacles within industry. There are clear tendencies towards improvement of environmental performance, but for this group of stakeholders greenhouse issues have to compete with other environmental and socio-ethical issues, often involving more direct responsibilities.

The following chapters will explore the most relevant routes for social transformation and identify necessary trend breaks in social institutions, cultures and practices. The authors will adopt different academic perspectives and focus on various sectors of society. The obstacles discussed above confront us with a number of difficult choices one might not want to make between alternative approaches: seven dilemmas in defining strategies for achieving a climate-neutral society. These dilemmas are presented next.

1. *The dilemma of a 'small number of decision makers' trajectory versus a 'decentralized, multiple and diffuse decisions' trajectory*
Do we prefer to realize an 80 per cent reduction by means of a 'central-technological' trajectory, choosing to apply large-scale technological solutions and clean production, or with a trajectory involving as many societal actors as possible, all asked to do their bit to solve the problem in their roles as consumer, motorist, producer, investor, decision maker etc? The second route may be very sensible, opening up as much creativity in society as possible, but it requires sufficient involvement of society. On the other hand, while the 'small number of decision makers' trajectory may very well be feasible (e.g. to build enormous wind parks in the North Sea), it may reinforce the weak public support and may even contribute to the growing distance between politics and people.
2. *The dilemma of 'acting now' versus 'delayed response'*
This dilemma refers to the timing of climate policies. Long-term targets will determine the necessary efforts. According to some, if an 80 per cent emission reduction is to be achieved we have to act immediately. The priority needs to be on reducing emissions and stimulating technological developments in the coming 15-20 years. 'Optimists', on the other hand, believe that a delayed response is appropriate. Future technological progress will enable rapid, cheap and drastic emission reductions in the future, so there is no reason to intensify climate policies right away.
3. *The dilemma of 'focusing on climate change' versus 'pursuing sustainability'*
The public does not perceive climate change as a separate problem. This non-exclusivity of the climate change problem applies equally to many of the technological solutions and policy options. Pushing through a -80 per cent transition may require separate and selective attention in the form of special campaigns and policies on climate change, especially when target groups (still) scarcely acknowledge the problem or the sacrifices needed. Separate public campaigns, separate routes to solutions, clash with existing preferences for attacking climate change in integrated environmental, or preferably sustainable development, approaches.

4. *The dilemma of 'demystification' versus 'need for increased awareness of change impacts'*
 Research into environmental attitudes shows a gradual demystification of apocalyptic messages concerning the environment. In the context of 80 per cent reduction of greenhouse gases, the lack of support for climate change issues at the level of genuine action calls for campaigns designed to increase understanding of climate change and the need to abate it. In that case, apocalyptic messages tend to be counter-productive.

5. *The dilemma of 'central steering via direct regulation and market incentives' versus 'co-production'*
 Regulation and market incentives in theory seem to be effective if enforcement is well organized and incentives are substantial enough. However, due to the administrative burden and reallocative effects, both forms of central steering have serious difficulties in emerging from the political decision-making process unscathed. Participatory approaches in developing climate change policies (co-production) may be the solution, but they require clear politically determined targets and a context of direct regulation and market incentives, discouraging free riders.

6. *The dilemma of 'transition through co-benefits' versus 'inevitability of a special climate change approach'*
 Opting for solutions that are attractive thanks to the co-benefits (simultaneous benefits of solutions, like cost reduction, functional qualities, comfort, safety etc.) makes it possible to ignore lack of societal support for climate change policies alone. However, although this may help in the first stages on the way to an 80 per cent reduction, it will probably not be sufficient in itself. A special climate change approach may be inevitable.

7. *The dilemma of 'decentralization and Europeanization' versus 'the need for national direction of the transition'*
 Achieving an 80 per cent reduction will not only require clear choices in technological fields and modes of enforcing their implementation, but also constant monitoring, activation and revision of policies. We tend to assign this role to national governments, but due to two bi-directional processes, decentralization and Europeanization, European national governments have fewer tools in their own hands and depend more and more on the co-operation of others.

Too many dilemmas may make it hard to see whether we will ever be able to make the transitions described in the previous chapter. However, the practices, policy initiatives, policies under construction, partial support in the various groups in society discussed above could equally be seen as a breeding ground for initiatives that, given fertile growing conditions, will flourish in due course. The following chapters will explore the necessary *societal* trend breaks, consciously bearing in mind the tensions between ambitions and recalcitrant societal practices.

References

- Aarts, W., *De Status van soberheid*, Amsterdam, 1999.
- Aarts, W., J. Goudsblom, K. Schmidt and F. Spier, *Towards a morality of modernity*, Amsterdam School for Social Science Research, Amsterdam, 1995.
- Algemene Energie Raad, *Advies Duurzame Energie*, Den Haag, 1999.
- Becker, J.W. et al., *Publieke opinie en milieu*, SCP, VUGA, 1996.
- Biesiot, W. and H.C. Moll, *Reduction of CO₂ emissions by lifestyle changes*. NRP Global Change, report nr. 410 100 108, Bilthoven, 1995.
- Breemhaar, B., W.A.C. van Gool, P. Ester and C.J.H. Midden, *Leefstijl en huishoudelijke energieconsumptie*, NRP Global Change, report nr. 410 100 109, Bilthoven, 1995.
- Brezet, H., *Van prototype tot standaard; De diffusie van energiebesparende technologie*, Rotterdam, 1994.
- Burger, H., *Evaluatie Klimaatverbond*, ECN Petten, 1999.
- Couvert, E. en A. Reuling, *Milieuedragsmonitor IX*, Amsterdam, NIPO, 1999.
- Couvert, E. en A. Reuling, *Milieuedragsmonitor X*, Amsterdam, NIPO, 2000.
- Ester, P. and H. Vinken, *Sustainability and the cultural factor: Results from the Dutch GOES MASS PUBLIC MODULE*, Globus, Tilburg, Dutch National Research Programme on Global Air Pollution and Climate Change, Report nr. 410 200 048, 2000.
- GAP, *Het Ecoteam Programma, een meetbare aanvulling op het overheidsinstrumentarium voor het kosteneffectief bereiken van de milieudoelstellingen*, Den Haag, 1999.
- Gillissen, M., H. Opschoor, J. Farla, K. Blok, *Energy conservation and investment of firms*, NRP Global Change, report nr. 410 100 102, Bilthoven, 1995.
- Glasbergen, P. et al., *Afspraken werken, evaluatie meerjarenaafspraken over energie-efficiency*, Utrecht, 1997.
- Glasbergen, P., Partnership as a learning process. In: Glasbergen, P. (ed.), *Co-operative environmental management: public-private agreements as a policy strategy*, Kluwer, Dordrecht, 1998.
- Groot, H.L.F. de, E.T. Verhoef en P. Nijkamp, *Energy saving by firms: decision making, barriers and policies*, VU Amsterdam, Amsterdam: Tinbergen Instituut, 1999.
- Hoefnagel, R. et al., *Milieurelevant consumentengedrag*, SCP, Den Haag, 1996.
- ISO, *The ISO Survey of ISO 9000 and ISO 14000 certificates*, ISO, Geneve, 1998.
- KPMG Milieu / IVA, *Evaluatie Bedrijfsmilieuzorgsystemen 1996*, KPMG Milieu, Den Haag/Tilburg, 1996.
- KMPG Milieu / NIPO, *Schoner produceren in Nederland 1999*, Den Haag, Ministerie VROM, 1999.
- Meijders, A., *Climate Change and Changing attitudes, Effect of negative emotion on information processing*, Eindhoven University of Technology, Eindhoven, 1998.
- Midden, C.J.M. en G.C. Bartels, *Consument en milieu*, Houten/Zaventem, Bohn Stafleu van Loghem, 1994.
- Ministerie van VROM/VNO-NCW, *De stille revolutie: industrie en overheid werken samen aan een beter milieu*, Distributiecentrum VROM, 1998.
- Noorman, K.J. en T. Schoot Uiterkamp, *Green Households, Domestic Consumers, Environment And Sustainability*, Earthscan, London, 1998.
- Piers Consultancy, *Energiebesparing op maat*, Den Haag, 1992.
- Raad voor het Milieubeheer, *Duurzame consumptie een reëel perspectief*, Den Haag, 1996.
- Rayner, S. and E.L. Malone, *Human Choice and Climate Change – the societal framework* (Volume 1-4), Batelle Press, Columbus, 1998.
- Rayner, S. and E.L. Malone (1998) *Why study human choice and climate change?* In: Rayner, S. and E.L. Malone, *Human Choice & Climate Change – the societal framework*, Batelle Press, Columbus, Volume 1, pp. 265-344.
- Rijksinstituut voor Volksgezondheid en Milieu (RIVM), *Milieubalans 1998*, Alphen aan den Rijn, 1998a.
- Rijksinstituut voor Volksgezondheid en Milieu (RIVM), *Achtergronden bij Milieubalans 1998*, <http://www.rivm.nl..>, 1998b.
- Rijksinstituut voor Volksgezondheid en Milieu (RIVM), *Milieubalans 1999*, Alphen aan den Rijn, 1999a.
- Rijksinstituut voor Volksgezondheid en Milieu (RIVM), *Achtergronden bij Milieubalans 1999*, <http://www.rivm.nl..>, 1999b.
- Rijksinstituut voor Volksgezondheid en Milieu (RIVM), *Milieuverkenning 5 2000-2030*, Alphen aan den Rijn, 2000.
- R&M Research and Marketing, *Rapport van een kwantitatief onderzoek naar kennis en houding van beslissers in het bedrijfsleven t.a.v. de klimaatproblematiek*, Heerlen, 1995.
- Schmidt, T. en A.D. Postma, *Minder energiegebruik door een andere leefstijl? Project Perspectief*, Eindrapportage, CEA, Den Haag, 1999.
- Schwarz, M. and M. Thompson, *Divided we stand: redefining politics, technology and social choice*. New York: Harvester Wheatsheaf, 1990.
- Slob, A. et al., *Trendanalyse Consumptie en Milieu*, TNO-STB, Apeldoorn, 1996.
- Sluijs, J. van der, *Anchoring amid uncertainty. On the management of uncertainties in risk assessment of anthropogenic climate change*, PhD thesis, Utrecht University, 1997.
- Sociaal Economische raad, *Advies Uitvoeringsnota klimaatbeleid deel I*, SER publicatie 99/14, Den Haag, 1999.
- Steg, E.M., *Verspilde energie?*, SCP Cahier 156, Den Haag, 1999.

- Tertoolen, G. , *Uit eigen beweging ...?!*, Proefschrift Universiteit Utrecht, Utrecht, 1994.
- Thompson, M. and S. Rayner, *Cultural Discourses* In: Rayner, S. and E.L. Malone, *Human Choice & Climate Change – the societal framework*, Batelle Press, Columbus, Volume 1, 1998, pp. 265-344.
- Veen, H.J.C. van der, en J.L. Peschar, *Aanvaardbaarheid en politieke haalbaarheid van energiebesparende maatregelen*, De Lier, 1995.
- Vermeulen, W.J.V., *De weerbarstige consument*, In: P.P.J. Driessen en P. Glasbergen (red.), *Milieu, samenleving en beleid*, Elsevier bedrijfsinformatie bv, Den Haag, 2000, pp. 353 - 373.
- VROM-Raad, *Transitie naar koolsofarme energiehuishouding*. Advies ten behoeve van de uitvoeringsnota klimaatbeleid, Den Haag, 1998.
- Waals, J.F.M. van der, S. Joosen, B.P. van Geleuken, M.C. Groenberg, M. Kneepkens en W.J.V. Vermeulen, *CO₂-Reduction In Building Locations: A Survey And Three Case Studies About The Role Of Options For Co₂ Reduction In Planning Processes*, Utrecht University, Dutch National Research Programme on Global Air Pollution and Climate Change, Report nr. 410 200 036, 1999.
- Waals, J.F.M. van der, S.M.J. Vermeulen, W.J.V., Vermeulen, P.Glasbergen and P. Hooimeijer, *Energiebesparing en stedelijke herstructurering, een beleidswetenschappelijke analyse*, Utrecht, DGVH/Nethur partnership 10, 2000.
- Woerd, K.F. van der et al., *Diverging Business Strategies towards Climate Change. A USA-Europe comparison for four sectors of industry*, IVM, NRP report no. 410 200 052, Bilthoven, 2000.