PBL Netherlands Environmental Assessment Agency

The energetic society

IN SEARCH OF A GOVERNANCE PHILOSOPHY FOR A CLEAN ECONOMY

Maarten Hajer

THE ENERGETIC SOCIETY

In search of a governance philosophy for a clean economy

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The PBL Netherlands Environmental Assessment Agency is the national institute for strategic policy analysis in the field of environment, nature and spatial planning. We contribute to improving the quality of political and administrative decision-making by conducting outlook studies, analyses and evaluations in which an integrated approach is considered paramount. Policy relevance is the prime concern in all our studies. We conduct solicited and unsolicited research that is independent and always scientifically sound.

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Foreword to the English edition

The PBL Netherlands Environmental Assessment Agency studies the relationships between physical and social processes. We do this from 'street corner to stratosphere': from issues concerning new housing developments and segregation to possible food and resource shortages. The PBL also analyses the future of urban areas, opportunities for optimising energy efficiency in buildings, and the demographic downturn expected in large areas of the Netherlands. We are also one of the few institutes in the world able to produce the sophisticated integrated scenarios needed to get a sense of the options available for feeding nine billion people, while controlling biodiversity loss and climate change. The PBL has a wide-ranging portfolio, which allows us a privileged view of the relationships between the various processes. The questions we continuously ask ourselves are: What is society going to be faced with? What is the policy response? And, will such a policy response have the desired outcome?

This privileged view also means we have obligations. If governments fail to meet their targets, if there are unintended outcomes, or if new challenges arise, policy assessment agencies are obliged to share such knowledge. The PBL is not only there for pointing out the challenges, it also sees it as its responsibility to help the Dutch Government develop more effective policies or new strategies.

The PBL has a responsibility to enable the Dutch Government, and therefore society, to make political and administrative decisions concerning environment and

society. This responsibility includes signalling trends ('what can we expect') for consideration by political parties, and governmental and societal actors when making choices for the future.

Contrary to other PBL reports in which we evaluate policy, map changes in indicators, and analyse and assess the outcome of policy options, this trends report focuses on governance philosophy, on the *how* question: How can we respond to what we are facing? Which options are available to governments? More specifically, we address the issue of how the knowledge, know-how and creativity available within society could be utilised more than it currently is for sustainable production and consumption to take root, and what this perspective means for government strategies.

The report was written primarily with a Dutch audience in mind. Yet, obviously issues of sustainability characteristically transgress borders and jurisdictions. What is more, we are very much aware of the fact that the political-sociological analysis of a new, 'energetic' society is one that also applies to other countries. Nevertheless, the particular description we give, with much emphasis on high levels of schooling and of an organised state, reflects the north-western European origin of the study.

Moreover, there are not only manifestations of this energetic society on the national level, we can see manifestations of it in the domain of international environmental politics as well. This report, however, has not been amended to include more examples from the domain of international politics. We leave the task of connecting the theoretical and conceptual statement of the report to particular situations, to the reader.

Sustainability, the question of how our system of prosperity can be maintained, is one of the main issues for the coming decades. This report examines more specifically the ecological dimension, our use of natural resources and the quest for cleaner production and consumption pathways. The underlying assumption is that there is social energy available within society, and we analyse how governments can exploit this 'energetic society'. After all, the sustainability challenge is too large for government alone. If we in the Netherlands want to ensure sufficient (and affordable) raw materials, food and energy for the future, as well as a good quality of life, then we need to mobilise all the creativity available.

This kind of trends report is new for the PBL, and I would like to emphasise the investigative aspect; the report describes a quest which results in several principles that could be used to support a vital environmental policy. Text boxes are included in the report giving additional information about the underlying scientific knowledge and ideas. The aim is that, with this report, we reach a broad group of experts and interested and responsible parties. We hope that this trends report will enable such parties to take further steps on the road to a sustainable society.

Maarten Hajer
Director, PBL Netherlands Environmental Assessment Agency

The road to sustainability

The need for sustainability

The Dutch place a high value on their local environment (SCP, 2007). Local neighbourhoods form recognisable and intensively used daily surroundings (WRR, 2005). They are a refuge as well as a base for all kinds of activities that people undertake in a modern, globalised society.

Anyone who reconstructs our food, transport or home decoration pathways will see immediately how these local communities relate to the global system of services, materials, and money, people and information flows. The container ships steaming into the port of Rotterdam, day in and day out, bring flat-screen televisions, smartphones and the latest fashions to our cities and communities. The production and distribution of our food is based on a sophisticated worldwide logistics chain that flies in fresh produce from all over the world. We fly for work and leisure. We may experience our valued and well-regulated daily life at the local level, but it is global in terms of the logistics of its production and its use of raw materials and emissions. This system places great pressure on the earth's carrying capacity.

Standing at the beginning of the twenty-first century, we are faced with major new challenges. Where the twentieth century was characterised by industrial growth and an unprecedented increase in prosperity, society needs to reinvent itself in the twenty-first century. We expect this process to be accompanied by heavy competition for increasingly scarce (and expensive) resources (e.g. see UNEP, 2011). Such competition will take place between both states and in the production chains of companies.

In the public discourse, in companies and public organisations, as well as in government policy, the term 'sustainable development' covers a wide variety of subjects. However, they all have to do with the issue of maintainability (Den Butter and Dietz, 2004). Can we maintain our pension and healthcare systems in the long term? Are we not using up society's natural resources? This report focuses on 'planet', the earth, on being able to maintain natural resources and the carrying capacity of the ecosystem. Related to the maintenance issue is of course also the issue of distribution: How are the benefits and costs to be shared between generations and between different regions of the world? However, the distribution aspect of sustainability is not addressed in this report.

The facts present a clear picture: societies are faced with the challenge of achieving the full decoupling of economic growth and natural resource use within a few decades (SER, 2010). There is no quick fix for such a decoupling; all of our creativity, efforts and skills will be required to develop a strategy that combines such a decoupling with improvements in social quality. We will increasingly be forced to face the fact that our relationship with the planet is unsustainable. Societies that do not accept this are more likely to be faced with a reduced security of their energy supply, a disordered infrastructure, strongly fluctuating food prices and a geopolitical battle for directly available resources. Sustainable development is not a luxury, but necessary to economic survival. Redefining our strategy also offers new opportunities. Care for 'planet' is therefore directly related to our strategy for 'people' and 'profit'.

The good news is that there is still much we can do to improve the earth's resilience. There are scenarios that show how we can combine growth with less waste, better management and improved quality of life. However, the scenarios are model-based studies. It is especially important to look at how society is responding to the challenge described above.

A changed, energetic society

Societies are anything but passive. Modern society is an energetic society, with articulate, autonomous citizens and innovative companies. There is a large group of citizens, farmers and businesses that wants to act and change. There are also many local authorities and public organisations (housing corporations, hospitals, schools, universities, and so on) ready to take action. These groups, however, find insufficient links with national policy. On the other hand, there are also citizens who are very sceptical of the need for change. This scepticism often focuses not so much on the need for change itself, but stems from a lack of trust in government initiatives that aim for this change, and the idea that such initiatives will constrain their actions.

However, this does not mean that governments have no role in a more sustainable society. To the contrary, wherever collective resources are threatened, market forces do not achieve their efficient allocation. Governments need to eshtablish the conditions under which markets can work. If this is done clearly and predictably, then society will be in a position to make the transition to a clean economy.

Governments need a new governance philosophy

In this trends report, the PBL formulates a challenge for governments by combining two large societal developments:

1. The need to attune our natural resource use to the earth's carrying capacity. This is a major challenge that we are faced with for the coming decades.
2. The emergence of what we call the 'energetic society': A society of articulate citizens, with an unprecedented reaction speed, learning ability and creativity.

In our view, governments could do more to harness the creativity and learning ability of this energetic society, which make different demands on governments. Governments need to rethink their governance philosophy if they want to provide an adequate response to this. According to classical governance philosophy, the current status is usually defined in physical terms ('what is the problem?'), with technical solutions being provided by engineers ('what can we do about it?'), then assessed by economists ('what is achievable?'). In taking this approach, governments view society as an object; society causes problems and therefore requires governance.

It will become important in the coming decades to govern by mobilising social energy. There is a future for an innovative, vital society founded on sustainability. Innovation means scope for action and initiative, accepting the fact that mistakes will be made, and making certain that the best improvements are identified and distributed rapidly. This calls for a different type of government. Such a government sets clear objectives before going on to create room for other parties, implements knowledge, know-how and regulations to help promote promising combinations of initiatives, and creates the institutional frameworks within which citizens, organisations and entrepreneurs can develop and directly benefit from sustainable innovation. The role of government in society is in fact a very topical issue, judging by recent reports published on the subject, for example, by government institutes (the Advisory Council for Transport, Public Works and Water Management (*Raad voor Verkeer en Waterstaat*, 2011) and the Christian Democratic Appeal's council (*Wetenschappelijk instituut van het CDA*, 2011)) the sciences (Aarts and Grin, 2007) and the social crowdsourcing project (Our Common Future 2.0, 2011).

In summary, therefore, the question posed in this report is: How can governments exploit the potential of this energetic society on the road to sustainability? This is PBL's quest in this trends report.

The challenge

Looking back, it is clear that much has improved in our physical surroundings. No one misses the black clouds of exhaust fumes from lorries and buses; even vintage car enthusiasts are happy to do without the leaded fuel and the toxic exhaust fumes from their cars. No one misses the smog, the croup and the asthma of the 1960s and 1970s. The same applies to urban public spaces. Town squares and shopping streets full of cars: old photographs usually produce a bemused smile. How is it possible that for so long we found it more important to be able to park our car than to enjoy a good quality of life in town centres?

These days it is considered quite normal to collect glass for recycling, we drive cars that are much more economical than they used to be, more and more buses are run on natural gas and polluting coal stoves have been almost completely replaced by clean and efficient high efficiency boilers. Town centres have become more pleasant, with outdoor cafés rather than car parks dominating our town squares.

However, look forward in time and it is clear that there is still much to be done in many areas on the road to a more sustainable society and clean economy. A world growing to nine billion people by 2050, while running a healthy economy, automatically generates an increasing demand for food, oil and other strategic resources. This, in turn, will lead to greater land, water and marine exploitation. The consequences – climate change, large-scale losses of nature areas and biodiversity loss – may be destructive (PBL, 2009b; PBL, 2009c). There is also the ongoing issue of human health; in various regions in both the Netherlands and other countries, air quality standards continue to be exceeded, in particular as a result of heavy road traffic (PBL, 2010a).

Policies are therefore needed for a sustainable society. The Dutch Government justifies these policies in particular by indicating the enormous reductions needed in the future: 50%, 70% or 80%. This is a justification that, although factually correct, does not mobilise society. Confronted with such percentages, many feel paralysed and powerless as the implicit idea is that we should just use 'less' of everything. However, it is not so much a case of less, but rather of becoming more efficient. It is not about reducing quality; it is about ensuring that future generations are able to enjoy a good quality of life. Rather than setting limits, the aim should be to

motivate citizens and industry to change their production and consumption patterns.

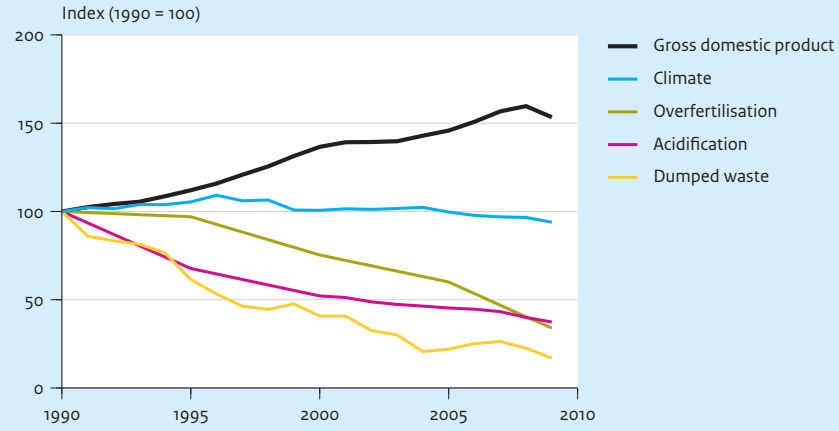
It is quite possible to get citizens and industry interested in sustainability. No one wants electrical appliances that waste energy, everyone would like a smartphone that can go for a week without being charged, and no one is against a low energy bill and greater comfort at home. Many businesses have already made a step in this direction: they earn money by developing much more efficient production methods that result in more sustainable products. It is therefore no longer about an environmental policy of 'less', but about sustainable social innovation – doing more with less, a challenging perspective.

Forty years of environmental policy: 'unimaginable' environmental gains turned out to be possible after all

The last 30 to 40 years have shown that 'unimaginable' emission reductions of tens of per cent are possible after all, even with a steadily growing economy (see Figure 1).

Figure 1

Theme indicators



Source: PBL (2008)

A fairly standard conclusion from PBL's national environmental assessment reports published during the last 15 years is that 'the environmental pressure in the Netherlands has continued to decrease in recent years, despite economic (GDP) growth'. Carbon dioxide emissions are a major exception, although figures from the Dutch Environmental Data Compendium (*Compendium voor de Leefomgeving*) show that CO_2 emissions have also shown a slight decrease since 2004.

The PBL used similar words in its first *Assessment of the Living Environment* (*Balans voor de Leefomgeving*, 2010): 'The quality of the living environment in the Netherlands has shown an overall increase since 1990. Policy has been a significant contributor to this: without policies for the environment, nature and spatial planning the quality of the living environment would have continued to have been affected by the increase in human activities.' In other words, 'The implemented policies concerning the living environment have had some undeniable successes.' An added benefit is that the technological applications used for achieving the considerable emission reductions also have led to a decrease in reduction costs per unit of reduced emissions.

More specifically, as the PBL concluded in 2010 in an analysis of 30 years of acidification policy: 'Sulphur dioxide emissions have decreased by 85% in the Netherlands since 1980, nitrogen oxide emissions by 40% and ammonia emissions by 50%. The deposition of acidifying substances decreased by 50% over the same period, and by 30% for eutrophying substances.'

Nevertheless, it was observed as early as 2001 in the Dutch Fourth National Environmental Policy Plan (NMP4) that, despite such positive developments and policy successes, a number of persistent environmental problems will continue to exist in the long term (VROM, 2001). Persistent environmental problems, 'the most important of which have an international character and a long time horizon (30 to 100 years)'. Examples mentioned in the NMP4 are biodiversity loss, climate change, changes in the nitrogen cycle and the local availability of sufficient and clean water. It goes on to say that, 'Dealing with such persistent environmental problems will require far-reaching social effort. To achieve sufficient support for such efforts, various social, economic and institutional barriers will need to be overcome.'

This NMP4 analysis still stands and the challenge concerning the demolishment of social, economic and institutional barriers still applies. However, the past has also shown us that far-reaching and, for many, seemingly impossible, environmental achievements can be realised. In some cases, more intense policy effort will suffice. However, persistent problems require a fundamental change of policy, as advocated in this trends report.

It is therefore time to reassess environmental policy for the twenty-first century. Such a reassessment must not be afraid to open the way for the dynamics in society. The underlying principle is still the broad recognition that we are all using too many resources and therefore placing too much pressure on the environment, ourselves and our wallets. The principle of sustainable development, however, cannot be denied. It is mainly about steering a middle course between (1) people's needs and desires, (2) the possibilities and limitations of the physical environment, and (3) a notion of common good.

Such a reassessment also calls for a different attitude by government. It requires a step up from the mindset of conventional environmental policy – of there being limits to growth. This 'frame' has been the basis of forty years of successful environmental policy. Here we call this frame 'the state of the environment, the environment of the states'. Three recent meetings are used to illustrate the effects this frame has had.

Example 1: Forty years of the Club of Rome

On 26 October 2009, the Club of Rome celebrated its 40th 'birthday' in the Concert Hall of the 21st Century, on the bank of the river IJ in Amsterdam. At the time, more copies of their influential report about the 'limits to growth' had been sold per person in the Netherlands than anywhere else in the world (Meadows et al., 1972). On the podium, the Club of Rome mantra was often repeated: the earth's resources are being depleted, we are nearing its ecological limits, and it is high time that governments start to take the issue seriously and do something about it. In the auditorium, some members of the public fidgeted restlessly in their seats. These people had assumed that the huge challenge facing us had already been accepted and appeared, when asked, to be mainly interested in creating and making use of economic opportunities and in government policy that would support such an active approach.

To some extent, their restlessness reflected frustration with a frame that did not fit their new ideas. The alarmist call for action from the podium was aimed at governments. However, this was being confronted with an approach that saw the same problem as a crucial and exciting challenge, but then in the first place for citizens and companies. In summary, an approach based on the problem was being confronted with an approach based on the challenge.

Growing within limits: the nature and risk of limits

Various studies refer to fixed ecological limits that define the room for socio-economic development (e.g. see Rockström et al., 2009). In practise, however, it is for various reasons very difficult to define critical ecological values. To begin with, there is the political-ethical discussion about the acceptance of risks and consequences, should certain ecological values be exceeded. This brings up questions such as: What level of species loss do we find acceptable? Which ecosystem services are crucial and whose interests do they threaten? How much inequality can society put up with before it starts to disintegrate? Secondly, many ecological processes are irreversible, especially once certain turning points have been passed (Scheffer, 2009). Examples are the extinction of species, the destruction of landscapes and the melting of the North Pole ice cap given a certain temperature increase. In the third place, it is very difficult in practise to determine such turning points, in which case policy considerations are based mainly on precaution.

Scientists attempt to provide indicators for the risks associated with certain types of environmental pressure. For example, the IPCC (2007a) has indicated what the effects will be of a continued increase in average global temperature. A relatively small temperature increase will mainly affect sensitive ecosystems such as coral reefs. A larger temperature increase may also affect the melting of the North Pole ice cap, rain patterns and, partly due to this, food production. Global climate negotiations have resulted in a certain political consensus to accept a maximum temperature increase of 2 °C; above this the risks are considered undesirable. As far as the protection of global biodiversity is concerned, it is much more

difficult to indicate the risks associated with the loss of different habitats. Furthermore, the corresponding ecosystem services often function at different scales, from that of local fisheries to global biogeochemical cycles. An agreement has been made to stop biodiversity loss in the long term. This means that, by 2020, about 17% of the earth's surface should be designated a protected area.

In setting ecological limits, therefore, a normative choice is always made that depends on scientific knowledge, political consensus and the current worldview. All these elements determine how (often uncertain) costs and benefits are weighed up and the extent to which uncertain effects and precautionary principles play a role (PBL, 2009c). Sustainable development is therefore a time- and place-related quest to determine, given the uncertainty and the costs, how much precaution society will exercise in order to prevent the undesired outcomes taking place.

The broad outlines of the sustainability challenge are sufficiently well known. The problem is not that people do not hear the message; rather it seems to be that there is a lack of a convincing route for action.

Example 2: Barendrecht

On 1 December 2009, the then Dutch Ministers Van der Hoeven (Economic Affairs) and Cramer (Housing, Spatial Planning and the Environment) visited Barendrecht to discuss a proposal to use an empty gas field under Barendrecht for a CO_2 storage demonstration project. A famous photograph shows the two ministers being confronted that evening by a large group of worried and angry local residents.

Carbon capture and storage (CCS) is a technology used to capture and store industrial CO_2 emissions; for example, in empty gas fields (IPCC, 2005). There is such an empty gas field under Barendrecht, just a short distance from the refineries at the Port of Rotterdam. In addition to the geological characteristics of the gas field, the location also meant that the site was thought to be ideal for a demonstration project for this technology. The Dutch Government believes CCS has an important role to play in the transition towards a low CO_2 energy supply. As the technology can be well incorporated into the existing energy system, it may contribute to reaching climate targets. This would simplify the required energy transition challenge. Furthermore, the early development of CCS could also offer opportunities for a successful new Dutch industry sector.

CCS turned out to be unpopular in Barendrecht. The government believed it was acting in the public interest, but in this case quickly found itself in conflict with the interests of local citizens. Residents and government officials talked at cross purposes. In the eyes of the government, the debate was about energy transition,

in which CO_2 storage plays an essential role. In the eyes of the people of Barendrecht, however, it was the quality of their everyday lives that was at stake. They saw this being threatened as the planned CO_2 storage location was directly below their homes (Brunsting et al., 2010). Was such experimental storage safe, what would be the effects on their health, and on house prices, and what about the cost-benefit distribution?

The difficult information evening served to illustrate the strong *horizontalisation* in the relationship between the general public and government. The public did not wait to hear what the ministers had to say; they had already looked up information about the issues relevant to them – safety, costs and side effects. They quickly encountered uncertainty and unanswered questions – yet more reason for a heated debate with the ministers.

Two macro trends provide a backdrop to this example. To begin with, the change in the way information is provided. Most information used to be provided by the government, whereas the internet has changed the relationship between the general public and the government for good. The uncertainty experienced by local residents in Barendrecht was enhanced by the image they had formed online, which was that ccs is a technology still in development, with at most a little experimental experience in urban areas. The second trend is that of increasingly articulate citizens. The combination of these two trends results in a shift in the authority relationship and, in this case, drove the government into a tight corner. This crisis of authority can be seen in many different policy areas, from the environment to healthcare, from criminality to education, and is even being felt in the sciences (Hajer, 2009; Versteeg and Hajer, 2010).

In Barendrecht, local residents felt they were being treated as objects. They were getting no decent answers to their questions, and the fact that the demonstration project was classified under the Crisis and Recovery Act (March 2009) only increased the antagonism (Brunsting et al., 2010). People in Barendrecht thought that the government was using the Act to push through its proposal as quickly as possible. Ultimately, government came to view the residents of Barendrecht as part of the problem, rather than part of the solution.

Example 3: Copenhagen

The climate conference during the 15th Conference of the Parties, in Copenhagen, in December 2009, began with high expectations. After all, a new climate accord was to be signed on the banks of The Sound. However, the leaders of the 192 countries that attended failed to reach an agreement, and Copenhagen became an anti-climax. The lasting image is of politicians powerless to rise above their own, national, interests and take their collective responsibility.

The negotiations in Copenhagen can also be described in terms of the 'the state of the environment, the environment of the states' frame, a framework in which, based on the combined scientific knowledge available, it should have been possible to reach a broadly supported, global political accord. It would seem logical to argue that climate is a global problem requiring a global policy. After all, climate change is global not only in terms of its effects, but also in its causes, as many industrialised countries produce high emissions of greenhouse gases. As far as this is concerned, we are all in the same boat. Most countries in the world are closely linked to one another through complex networks of production chains. Furthermore, countries are involved in an intense competitive struggle, so that 'going it alone' as far as climate policy is concerned can in fact harm a country's economy. However, the vision of first reaching a global accord, *then* discussing actions to be taken, turned out to be unrealistic.

Of course, 'Copenhagen' could have ended differently if US President Obama's room to manoeuvre had not been so severely constrained by US domestic politics. All the same, the question is whether this was an incident, or whether the current political system is vulnerable in a wider sense. After all, there has been a remarkable reversal since 2009 in the trust placed in science, which played such an important role in the existing 'the state of the environment, the environment of the states' frame. Prior to 2009, a direct link was made between climate change and every tornado, storm and drought; whereas now it seems that hardly any scientist dares allude to the existence of such a relationship. Scientific institutes seem to fear the wrath of the media and consequent loss of research funding. US politicians also avoid the words 'climate change'.

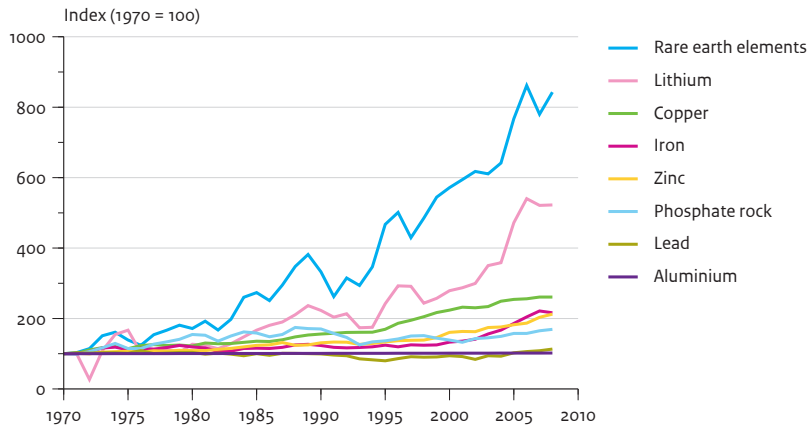
Urgency undisputed

Citizens are aware of sustainability issues (MNP, 2007; SCP, 2010). According to the *Sustainability Compass* (*Duurzaamheidskompas*, 2009), 90% of Dutch citizens would like the Netherlands to become more sustainable. Companies also increasingly take sustainability issues, and possible operational consequences, into account. The challenge is plain to see. Global energy demand will have roughly doubled by 2050. The same applies to the demand for food, and demand for water is expected to increase by 50%.

Policymakers and CEOs are increasingly aware of the geopolitical competition between countries for available resources. After all, a shortage of natural resources is one of the main challenges to sustainable development (PBL, 2009d). This concerns both the physical exhaustion of raw materials as well as the economic and political circumstances that affect their availability. Price increases in raw materials can become a significant source of inflation. Furthermore, high price fluctuations can have disastrous effects on investment decisions. The physical availability of specific minerals (Figure 2) in particular is under pressure due to increasing demand and mineral concentrations in sometimes very specific areas (Figure 3). Such concentrations, for example of phosphorus that is crucial to agriculture, may play a future role in the availability of these raw materials (PBL, 2011). Energy sources and food are also subject to large price fluctuations and the uncertainty associated with speculation and tighter markets. The physical availability of water will decrease in some areas, mainly due to increasing demand, and possibly combined with changes in rainfall pattern as a result of climate change.

Figure 2

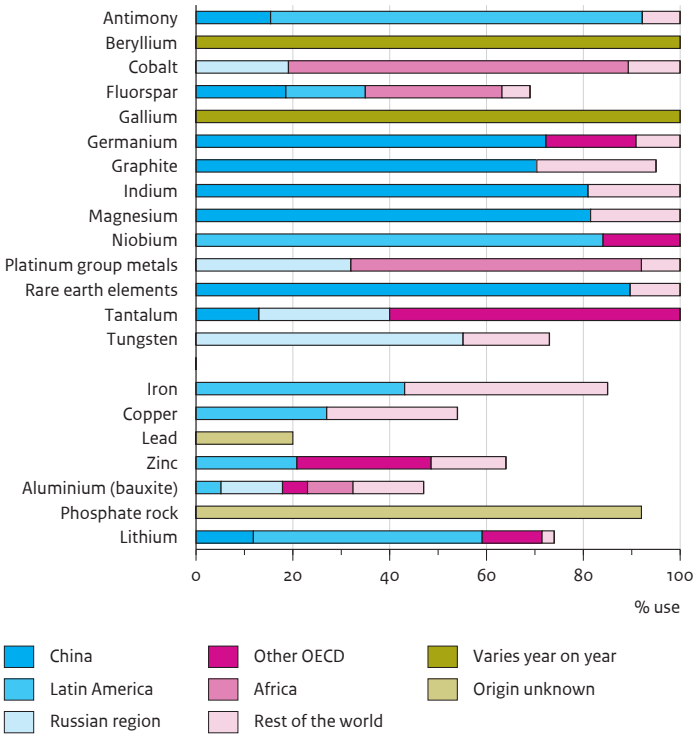
Global mineral production



Source: PBL (2011)

Figure 3

Import origin and import dependence of minerals EU27, 2006



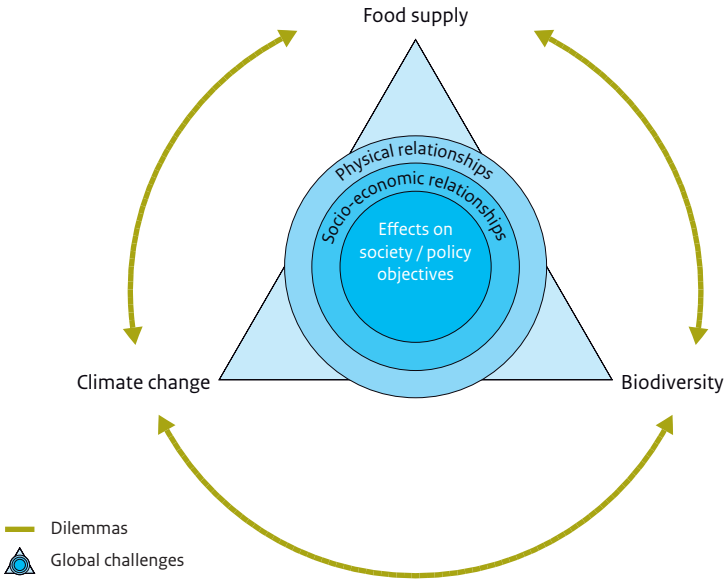
N.B. Lead data from 2004

Source: PBL (2011)

The main sustainability challenges – accelerated climate change, ongoing biodiversity loss and the knowledge that the earth's carrying capacity will be further put to the test by a growing world population – are well known. Climate change, biodiversity loss, the food supply and resource use are major, and related, challenges (Figure 4). Fundamental changes are required if we are to be able to supply nine billion people with sufficient natural resources, food, water and energy in 2050, and secure the availability of these resources (PBL, 2009d). This means that developing countries, as well as upcoming countries and Western economies, will all need to make a contribution.

Figure 4

Relationship between global challenge and dilemmas



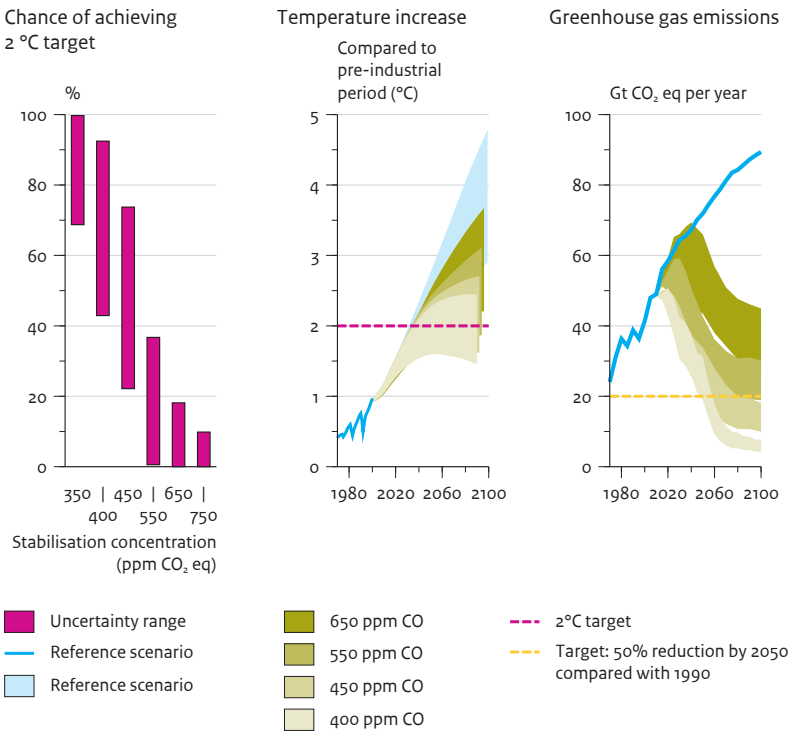
Source: Westhoek et al. (2010)

Climate change, the food supply and biodiversity issues are related to one another in various ways; for example, through competition for land use (for biofuel production, nature or agriculture) and through prices (the price of food increases, for example, if more land is used for biofuels).

It is possible to name the individual challenges fairly precisely. As far as climate change is concerned, there is political consensus that the average global increase in temperature should be limited to two degrees. These two degrees are considered a reasonable balance between 'acceptable' risk and the effort required to achieve the target. For a reasonable chance (50%) of achieving the 2 °C target, global emissions in 2050 must be half those of 1990 (Figure 5). For rich countries such as the Netherlands, which have relatively high greenhouse gas emissions per capita, this means a reduction in emissions of as much as 80% to 95% (IPCC, 2007b). Such a challenge can hardly be exaggerated: inertia in the energy and transport system and fixed behavioural and economic habits mean that action would need to be taken now to achieve the required transition (PBL, 2009b).

Figure 5

Global greenhouse gases and chance of achieving 2 °C target



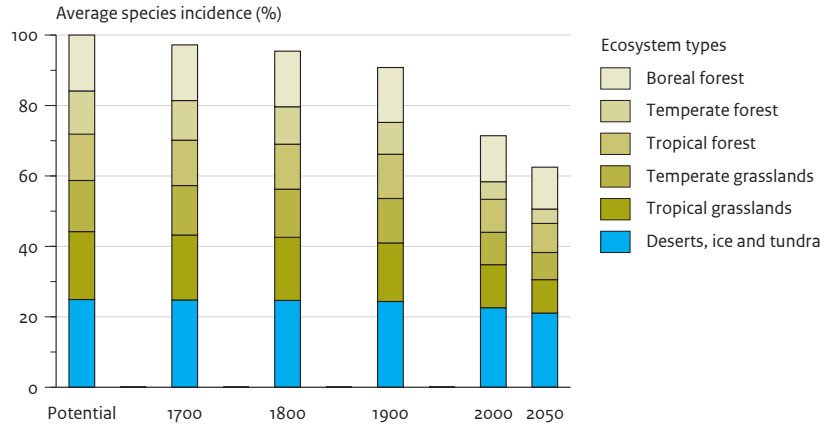
Source: Meinshausen et al. (2006); Den Elzen et al. (2007); Van Vuuren et al. (2008)

The 2 °C target may be accepted, but emission trends still strongly deviate from this target. To have a 50% chance of achieving the 2 °C target, long-term greenhouse gas concentrations of 400 to 450 ppm CO_2 eq are required. The corresponding global emissions scenario would mean a halving in global emissions, with a peak in about 2020.

The high level of land use also presents us with a major challenge. Almost 40% of the world's land area is used for agriculture. This places a high pressure on natural biodiversity and ecosystems. Eighty per cent of this agricultural land is used for livestock farming (this land is largely needed to grow animal feed). A secure food supply and biodiversity preservation are therefore closely related challenges, and they are both being put under increasing pressure due to a growing and increasingly prosperous world population with changing diets that contain more and more animal proteins. Although more and more people in upcoming Asian economies in particular are escaping extreme poverty and hunger, over 700 million people worldwide will still suffer from hunger in 2030 (PBL, 2009a). In addition to this, global biodiversity loss will continue in the coming decades if nothing is done about the food and biodiversity problem (Figure 6). In developing countries in particular, biodiversity loss often has a direct effect on basic necessities such as clean drinking water (Westhoek et al., 2010).

Figure 6

Global biodiversity according to trend scenario



Source: OECD (2008)

The Netherlands may be a small country, but at an international level the Dutch make a significant contribution to the land issue through international trade chains and consumption patterns. The Netherlands is therefore in a position to make a significant contribution to sustainability solutions; not just through government, but also through businesses, individuals and consumers (Van Veen et al., 2010; Westhoek et al., 2010; Westhoek et al., 2011).

Policy challenges

Frames and political dynamics

The natural science analysis shows that government is faced with a major policy challenge. However, the natural science description of the global challenge in terms of nature and environment does not necessarily result in broad societal action. This is partly due to public perception. People base their perceptions and values of what they see and experience on frames of reference, or 'frames'. Insight into such frames significantly increases the understanding of social and political dynamics. A frame has a decisive influence on people's ideas and offers a route for action; it not only determines people's opinions of a problem but also, often subconsciously, of the 'suitable' solution too (see Text Box *Framing*). A frame therefore provides some direction, but on the other hand always limits the field of vision.

Framing: the role of language in policy

Language significantly influences how we talk and think about certain subjects. Often, the meaning of a situation or event is not immediately clear. In this case, frames provide meaning. Some famous experiments have been carried out in recent decades showing that frames can be decisive in assessing the severity of a certain situation, or even in making life or death decisions (Kahneman and Tversky, 1984). An instructive example of how frames work is provided by the situation directly following the death of Princess Diana. Prime Minister Tony Blair gave meaning to the tragic event by describing her as 'the people's princess'. It was a strong frame, and Blair was immediately hailed as leader of the nation. The unintentional effect of this frame however was that the British royal family found itself in the dock: the people's princess set against the royal family. Every action that the royal family then took was interpreted in the light of this very strong frame, putting the Prime Minister in a difficult position.

Framing also plays a crucial role in complex issues such as climate change. This is discussed in an interesting book by Mike Hulme, *Why we disagree about climate change* (Hulme, 2009). Climate change can be approached in various ways. It can be seen as a technological challenge, the result of market failures, a global distribution issue, or as the ecological limit to overconsumption. Time and time again we see how the frame determines not only the proposed solution strategy, but also singles out guilty parties and distributes power. Citing Shanahan (2007), Hulme shows how different frames appeal to different groups of people. The frame of scientific uncertainty, for example, appeals to those who resist change, the frame of the polar bear threatened with extinction appeals to nature lovers, and the frame centred on money appeals mainly to politicians and the private sector.

Steve Rayner (in *Businessworld*) takes a different approach. He points out that climate change itself also acts as a frame. He claims that climate change has become a kind of Christmas tree, on which various groups hang their needs and problems like baubles to hitch a ride on the powerful climate change frame.

Hulme (2009) argues that, for a more productive debate, we need to better define and recognise the different frames, and not conceal the political aspect. Solutions come from recognising that the people involved in a discussion are led by different frames.

Each frame constitutes a point of view. A frame therefore allows you to see some things more clearly, others less so. Frames also often conceal certain ideas about the division of roles between citizens, businesses and the government. Implicit in a frame are the ideas about who is causing the problem, who needs to take action and who needs to be regulated. The examples of Amsterdam, Barendrecht and Copenhagen are described based on the specific policy frame behind them; that of 'the state of the environment, the environment of the states'.

In the 'the state of the environment, the environment of the states' frame, sustainability is primarily a task for government. If the environmental issue goes beyond national government level, then we scale up the level of intervention. Forty years ago, environmental problems were initially problems related to 'environmental hygiene'. Discussions centred on the health effects of various emissions and waste materials. Pollution of the air, ground and water was addressed, first locally, then nationally, then internationally.

With the discussions on climate change, the environment finally became a completely international affair. In addition, as often pointed out by the PBL, we now also need to monitor the relationships between the main issues of our time. Climate, biodiversity, land use, poverty and development are very much related to one another. The only thing is, where do we find the solution to all these problems? What are our policy strategy options? What instruments are available to the government? Is the aim that everything – climate, biodiversity, poverty and development – be combined into an all-inclusive accord about the future of the world? This would not appear to be very productive right now.

Shortcomings in the current management model

The current management model has at least three major policy shortcomings (Hajer and Versteeg, 2006; Hajer, 2009a). These are illustrated based on the three meetings discussed above.

To begin with, the meetings illustrate a *legitimacy deficit*. The government wants to take action based on a global sense of urgency, whereas citizens lack sufficient insight into the problem, the objective and the solution strategy. In a representative democracy, political legitimacy is created through the discussions and decision-making processes that take place in parliament or in local councils. Such committees constantly need to obtain approval from the voter. Citizens are not merely passive voters; they increasingly wish to be actively involved in deliberation and decision-making processes. If government fails to give this sufficient consideration, decisions will lack accountability. This carries the risk of citizens becoming political objects, and of national government finding itself wedged between mistrusting, environmentally sceptical citizens on the one side, and industry, local authorities and citizens wanting to take positive action on the other.

Secondly, an *implementation deficit* has emerged. This is made clear using the Barendrecht example. In a society of articulate citizens, implementation cannot be forced. This is not simply a question of better taking into account the legitimate questions and worries of citizens. Whenever political decisions are implemented, many unexpected questions are raised, plans appear not to fit specific situations, or adjustments – sometimes expensive – are required. If government rules single-handedly, it carries all of the responsibility and, often, will be opposed by its citizens.

In the third place, a *learning deficit* can be observed in the examples. The strong governmental orientation leaves little room for mobilising new creativity. Thinking in terms of policy cycles suggests that policy is first proposed, then defined, and finally implemented. It is a linear policy cycle, that focuses on knowledge management and coordination, but that also assumes a much greater amount of knowledge within government than is actually available. It is also a policy cycle that fails to acknowledge society's learning abilities and, therefore, makes insufficient use of social dynamics for realising public objectives.

Developing dynamism: 'green growth'

A new government philosophy does not need to be developed from scratch. The Organisation for Economic Co-operation and Development (OECD) recently developed an alternative framework in its strategy for green growth (OECD, 2011), and the United Nations Environment Programme (UNEP) made proposals for such a framework in its initiative for a green economy (UNEP, 2011). Both approaches are based on the concept of the greening of the economy: combining economic growth with the reduced use of natural resources. There are also important differences. For example, the OECD focuses on the relationship between the environment and the economy, while UNEP also addresses social aspects, such as the contribution to be made to poverty reduction. UNEP's *Green Economy* is intended to be taken as a global agenda for both industrialised and developing countries, while the OECD hopes that *Green Growth* will mobilise the transition to green growth in the 34 rich OECD countries. Also, the OECD emphasises the green contribution to growth, whereas UNEP concludes that the transition to a low-carbon and resource-efficient society can be achieved by investing two per cent of global gross economic product in ten sectors.

According to the framework for green growth, we stand at the start of a 'green race': who, in the face of rising energy prices, will end up possessing the technology to generate renewable energy most efficiently? Who will develop substitutes for depleted resources? Who will supply the fast trains and provide rail connections between urban agglomerations in a future of high fuel prices? These ideas are not unrealistic. Moreover, such a framework opens up creative possibilities. For the Netherlands, the question is whether Dutch companies will make use of the opportunities on offer and take part in this global growth market. Innovative companies will have an important part to play in the quest for the more efficient use of energy and resources. They will be at a competitive advantage if they are prepared well and in time for this changing world – a world of nine billion people all wanting to make use of increasingly scarce resources. This is also why companies and economic organisations such as the OECD are taking such a leading role in the green growth debate.

The greening of the economy gives new meaning to innovation objectives. The frame shows that there is a need for economic change; change based on the new ecological issues. This is an established insight; the economy knows physical and economical boundaries in the form of resources, energy and resilience. A strategy for green growth and a clean economy, therefore, first and foremost assumes the pricing of natural resources. This is explicitly acknowledged and named in the OECD's strategy for green growth. Such pricing may provide a significant impulse to the creativity of individuals and industry. Efficiency, thus, would become even more important and waste more costly.

If, in the 'the state of the environment, the environment of the states' mindset, we had a sense of all being in the same boat, the motto for the green growth frame is 'don't miss the boat'. Countries that require more strategic resources in the future are economically vulnerable, whereas those that are able to reduce their resource dependence will make a return on their investments. The same applies to individuals and businesses.

Decoupling, the rebound effect, the Jevons paradox and the green paradox

The more efficient use of energy and resources does not always reduce the ecological risk. In the case of *decoupling*, a distinction is made between 'absolute' and 'relative' decoupling. Faced with a growing economy, the environmental pressure will only be reduced in the first case.

In the case of relative decoupling, efficiency improvements do of course take place, but the environmental pressure still increases due to the increase in volume, though at a lower rate than economic growth. For example, although we have made huge improvements in energy efficiency and agricultural production in recent decades, global energy use and land use continue to rise. This is partly due to the *rebound effect*, which states that, as we change our behaviour following the introduction of new technology, we swallow up part of the efficiency gain. For example, LED lighting is ten times more efficient, but so cheap to use that all kinds of new applications have been developed (spotlights on buildings, garden lighting), partly cancelling out the savings made. Another example: if car motors become more efficient, we drive faster and further.

The extent of the rebound effect may still be under discussion; but it most certainly exists. In those cases where the increase in use is greater than the efficiency gains made, the *Jevons paradox* applies. This is named after the nineteenth-century economist William Jevons, who discovered that the invention of the steam engine led to the increased consumption of coal, despite huge efficiency improvements.

As well as the Jevons paradox, there is also a *green paradox*. The green paradox states that a possible future tightening of policy regarding, for example, greenhouse gas emissions, can lead countries to accelerate their depletion of fossil fuel reserves. The green paradox is not necessarily accompanied by efficiency improvements. The main challenge regarding the greening of the economy, therefore, is not only to improve efficiency, but also to ensure that we remain within the limits of the ecological carying capacity, however difficult they may be to define.

No road map to a sustainable society

There is much research showing that the costs of ignoring sustainability issues are greater than the investment costs leading to their solution (see Hansen (2005) for climate policy examples; Stern, 2006; Rockström et al., 2009; Nordhaus, 2010). The discussion therefore is not whether transition is required, but rather what the ambition level of the chosen objectives should be. However, there is no recipe or road map to a sustainable society, as society is far too complex and governmental power too limited. Therefore, to obtain results, it is crucial to gain additional insight into the *dynamics* within society and the *conditions* for behaviour that leads to a more sustainable society.

A new environmental policy framework

The policy challenges lie not only in understanding the nature and extent of global environmental problems, but also in finding a better response. The discourse on 'limits' which underpins the frame of 'the state of the environment, the environment of the states', is of little help: constantly highlighting the complexity and scope of an almost impossible task has a paralysing, rather than motivating, effect. This is therefore a governance view of the world that is inadequate when it comes to mobilising society. A fundamental reassessment of environmental policy therefore requires the radical reframing of the issue. 'Martin Luther King did not say, "I have a nightmare". He said, "I have a dream", and he created a movement.' These rhetorical words from environment critics Michael Shellenberger and Ted Nordhaus (2004) certainly provide food for thought.

Such a reassessment could involve combining green growth with the frame of the energetic society. Get citizens, farmers and businesses onboard, and develop a new, beckoning mindset that presents new opportunities, offers new openings, releases more energy and encourages the creativity that already exists in society to flourish.

A possible start could be to take a completely different approach to the broad issue of sustainability. Although international agreements are important in providing a broad context for change, true change hinges on the motivation intrinsic to society.

The response to global issues therefore requires greater recognition of regional differences in the world. For example, in north-western Europe, a relevant characteristic is the current reassessment of the government-society relationship. On the one hand, there are governments with fewer public resources to administer. This means that they need to look for other instruments of intervention. At the same time, and more so than in other regions of the world, there is a group of articulate citizens able to oppose government plans with relative ease. In doing so, an impressive amount of energy is mobilised. The interesting question is whether that energy, or rather the energetic society, can also be mobilised for sustainable development.

The government-society relationship as starting point

The relationship between government and society is very important in mobilising the energetic society for sustainable development. After all, the strength of the energetic society is partly the result of decades of government policy. The problem, however, is that this strength is not necessarily used to support government. If governments fail to get the energetic society on their side, they are likely to find themselves being opposed by it. On the other hand, cooperation between governments and the energetic society would also provide the strength and energy required to improve the quality of our surroundings. What is required to achieve this?

To begin with, recognition that the energetic society frame combines the challenges presented with the available societal dynamics. In this frame, both the issues and the solutions are based on society – both individuals and innovative companies. It is an approach that shows that sustainability pays; an approach that motivates, that stimulates change in which quality comes first, and that fits in with the visible macro trends. The 'energetic society' represents a society of articulate individuals and companies with fast learning curves, who *themselves* form a source of energy. It is up to the government to create the right conditions to make this possible.

Secondly, it is important that the government responds better to what motivates its citizens. Environmental policy has become very abstract, partly due to its own success: the quality of the local environment in the Netherlands has radically improved in recent decades, so that environmental problems have become less obvious. Citizens are still very involved in their local environment, but these immediate surroundings are also directly linked to the big sustainability challenge, as will be shown here. It is precisely at this level that the relationship between citizens and environmental problems needs to be presented.

To find resonance with citizens, it would seem to make sense to develop 'living environment' policy by integrating spatial planning policy, mobility policy and environmental policy. When environmental policy affects the physical environment, then issues become more concrete. In addition, spatial development policy also provides different perspectives of the relationships between government, citizens and companies.

In third place, the government's role and philosophy also requires examination. The energetic society wants to use and accelerate societal dynamics to achieve the public objective of sustainability. Societal dynamics have until now been mainly seen as causing the problems, but could such dynamics also be the driver of workable solutions? How can government stimulate this, and which roles and attitudes are required? At which level of government can the best response be made?

From the point of view of the energetic society, some things are still much better controlled at the European or global level. However, the approach is different: look for ways in which governments can make use of the dynamism available in the energetic society.

Social engagement and urban dynamics

The city as starting point

To tap into the energy in society, governments need to restore the relationship between abstract environmental issues and people's everyday experiences. The city and neighbourhood levels are crucial in this respect. Cities are crystallisation points within society – important entities within which people live, work and travel. Various recent studies (e.g. UNEP, 2011) show that cities fulfil a crucial role in our 'social metabolism': the main resource flows run through the cities, and the cities are responsible for a large proportion of the emissions produced by society. Heating our homes, businesses, hospitals and schools, for example, is responsible for over 10% of greenhouse gas emissions; transport flows for almost 20%. These flows interact with our immediate environment at the neighbourhood and street levels. The metabolism of society pumps and breathes to the full at the city level, where societal dynamics are at their highest.

Is it possible that, as well as producing emissions, homes, public organisations and businesses could also produce solutions to the emission problem? Such a reversal in thought can result in new creativity. Citizens and companies do not just

use resources, but also play a significant role in the quest for a clean economy. Furthermore, this can result in more pleasant surroundings and cost reductions in the city.

The new city is a regional city

The city of the twenty-first century is no longer a clearly defined city surrounded by rural areas; it is first and foremost a regional city. The urban planner Dirk Frieling once described the Netherlands as a 'thinly populated metropolis' rather than a densely populated country. Successive, meticulously planned, developments mean that city suburbs now adjoin, or even merge into, one another. In large parts of the Netherlands, villages have grown into towns, into cities, and into urban agglomerations (RPB, 2007). Between Breda, Teteringen, Oosterhout, Dongen and Tilburg, for example, only a few undeveloped plots remain. The urban agglomeration runs, at varying concentrations, through Waalwijk to Den Bosch, then through Boxtel to Eindhoven. 'Brabantstad' has now become a meaningful concept. Such urban agglomerations are not unique in the Netherlands – they can also be seen between Wassenaar and Dordrecht, between Haarlem and Almere, and around Heerlen.

The phenomenon of urban agglomerations requires a different concept of the city. Anyone who thinks of a city in terms of 'centre' and 'suburbs' is likely to overlook the energy so unique to these regions (PBL, 2010b). The regional city is an interconnected collection of spaces, from historical city centres to the areas surrounding stations, shopping centres, residential areas and sports fields. People live in a regional city but their home is in one area, they sport in another and work a few kilometres away. People and businesses also usually move house or premises at the regional scale. In fact, businesses, local residents and visitors construct their own city from the various different surroundings available.

The regional level is also relevant in terms of sustainability. Continuous built-up areas mean that problems can no longer be shifted outside town. This has contributed, for example, to the water problem, as large urban areas receive water and, at the same time, want to make use of the discharge capacity.

New urban agenda

Regional cities are also economically interesting. City policies in recent decades have focused on deprivation, whereas many cities are now the drivers of economic success. Cities create cohesion and synergy between individuals and businesses. It is in cities that inspiration is found for innovation, renewal and new levels of comfort. Economic activities are also becoming increasingly concentrated as proximity to suppliers and buyers, a qualified workforce and potential 'knowledge

spillovers' are invaluable agglomeration advantages (Scott and Storper, 2003; Audretsch et al., 2006). Cities also provide a platform for easy and frequent face-to-face meetings that facilitate the exchange of knowledge and information and support trusting relationships between economic actors (Storper and Venables, 2004). The region has become the city's suburbs.

Such developments mean that the modern urban agenda is very different from that of recent decades. It is an agenda for the energetic society: citizens and businesses coming together and interacting to create a chain of 'creative competition' that turns out to be of great economic value. The future of our economy lies in regional cities, as they harbour a great amount of innovation potential and provide the starting point for the clean economy.

The question relevant within the scope of this report is: Which strategy should the government follow to enable this energetic society to reach maturity? After all, individuals and businesses are taking many initiatives, but they will not be able to succeed in their ambitions if conditions do not change. More specifically, what does the government need to do to channel this societal energy so that it can contribute to the objective of a more sustainable society? Starting points for a new governance strategy may be found by contemplating city planning traditions.

Building on existing cities

Contra Masdar

Much thought has already been put into the sustainable city, and environmental optimists often point to the city of Masdar. 'The sustainable city? We can do this already! Go to Masdar – it's already being built!' Masdar is an ambitious plan for a sustainable city for 40,000 people in the Arabian desert near Abu Dhabi.

But do we really need to go to Abu Dhabi to gain a better understanding of the challenges facing the sustainable city of the future? After all, 70% of the European cities of 2050 already exist; these cities will only be expanded in the coming decades. There is no reset button for a city, as Richard Florida (2010) would seem to hope. The challenges for future cities lie mainly in improving and restructuring existing cities. Present cities will therefore determine those of the future. The well-documented 'battle' over New York City planning between Robert Moses and Jane Jacobs over half a century ago may teach us something about the tools required for twenty-first century planning (Caro, 1974; Berman, 1983; Flint, 2009).

Moses versus Jacobs

Robert Moses was – in the middle of the last century – the powerful planner, the big man of modern urban development in New York, a master when it came to thinking in terms of infrastructure. He created a bureaucratic system with the aim to 'clean up' the 'chaotic' and unhealthy 'slums' of New York, as he described them. Jacobs defined the quality of these areas completely differently. In what Moses described as chaos, she in fact recognised urban quality (Jacobs, 1961). She spoke of the special way in which residents of existing neighbourhoods such as Greenwich Village were able to informally carry out all kinds of services for each other, and how the 'grain size' ensured a much greater level and sense of security. Moses was the big planner; Jacobs grassroots activism. Moses referred to structure and statistics; Jacobs to ethnography.

Moses' reputation is linked to his last, rather megalomaniac project, in which he lost sight of the human aspect – the huge 'super blocks' that he had built on the site of run-down neighbourhoods, and the freeways that he planned to build across Manhattan. But in the decades before this he had given the New York area wonderful parks (large and small), swimming pools and play areas, beaches and lanes ('parkways'). The bridges and tunnels that surround the island of Manhattan today are the work of Moses. He was also responsible for making Central Park what it now is. He transformed the nineteenth-century landscaped park, which was only used by the middle classes, into a park with facilities for all. It was no easy task as he had to force through construction of the zoo and the baseball fields in the face of resistance from the chic residents living near the park.

However, it was his later work that moved Jane Jacobs to take action. Her battle – initially about the future of Washington Square Park and the SoHo district, though later much broader – symbolises the changes to the functional thinking associated with the modern approach personified by Moses. It was a battle of paradigms. Jacobs argued that residential areas need activity, that the value of living in the city lies in the informal way in which many and very different groups of people share spaces with one another. Her approach was also modern, with its demand for citizen participation – not just in terms of approval, but in having real input.

Fifty years later, this planning debate is no less topical. Following the large-scale new expansions of the post-Vinex residential developments, urban development in the Netherlands is now focusing on the transformation of existing cities. The ideas of Jane Jacobs are therefore still highly relevant, certainly where renewal is combined with a social agenda (Franke and Hospers, 2009). But what can we learn now from this battle of paradigms to help us define a planning strategy for the twenty-first century?

Based on the present city

Where Moses in his urban planning devoted special attention to *structure*, Jacobs pointed especially to the importance of engagement and of using people's *creativity*. A combination of both these considerations would create a balance; one that would do justice to the strength of a well-organised urban structure on the one hand, and that would have an eye for the valuable dynamic of the existing and ever changing society, on the other. In this way, the social capital, stored within the structures of existing cities, could be utilised to the fullest. It will take great skill to subsequently mobilise the creativity and innovative capacity of citizens and companies within these existing structures.

The fact that the future city is based on that of the present means that we are faced with significant inertia. Inertia in society comes from being rooted in particular institutional, technical or social structures. However, recent experiences with changes enacted literally from one day to the next show that it does not have to be like this. For this we need to go back to New York, to the work of the current Commissioner of the New York City Department of Transportation, Janette Sadik-Kahn. When Janette Sadik-Kahn took office in 2007, she was confronted with a city that was short of money, but that urgently needed to improve the quality of its surroundings and come up with a new transport strategy. In addition, she was

faced with a city that was, and still is, famous for the long drawn-out legal proceedings used by residents to effectively oppose all kinds of changes.

Janette Sadik-Kahn took a new approach: (1) let the city experience what is possible in terms of quality improvements; (2) implement plans quickly, if necessary on a temporary basis; and (3) measure change, analyse data and communicate the results.

To improve the quality of the local environment small, temporary swimming pools were placed in various areas of the city in the summer months, when the city swelters. The most high-profile decision, however, was to transform Broadway, one of the main roads in Manhattan, into a series of squares between Times Square and Union Square. The transformation took place literally overnight, by placing planter boxes in the middle of Broadway and painting green traffic-free areas on the road. This initially controversial 'reclaim the street' project is now incredibly popular. Sales on Times Square increased by 71%, there were 63% fewer injuries to car drivers and passengers, 35% fewer injuries to pedestrians, 80% fewer pedestrians walking in the road, taxi journeys to the north of the district went 17% faster, and so on (New York City DOT, 2010a; New York City DOT, 2010b).

Are these, therefore, the vague outlines of a different kind of urban planning? In any case, the focus is less on the construction of large infrastructural projects and more on making better use of what is already available. It is also about experimentation and taking quick action. There is also a much greater awareness of what the government can do to convince society of radical changes, based on 'the proof of the pudding is in the eating'. It is therefore important to ensure that citizens are able to experience the new reality, and quickly. The results are consistently measured and statistics are used to learn, communicate and convince society.

A new type of planning

Urban development has been characterised by a battle between two paradigms during the last fifty years: the visions of planners on the one hand, and those of citizens and users on the other. Planners, over the past fifty years, have managed to get government on their side. Simultaneously, citizens have been seeking ways of exerting influence and trying to frustrate planning strategies. Subsequently, we have developed an ever more complicated game of negotiations, in which representatives from large interest groups (local authorities, project developers, corporations and housing associations) speak on behalf of citizens. The recent financial crisis has jeopardised this process of collective bargaining. The government task for the twenty-first century will be to find a way out of this impasse. Is a new approach feasible: an approach that combines the strengths of Moses' infrastructure, Jacobs' awareness of the value of 'place' and the modern pragmatism of Sadik-Kahn?

Is in fact a new kind of urban planning already developing? Now that large-scale regional development has run aground – due to lack of funding, incorrect demand assessment, or governments that are no longer in a position to take the lead – we are being forced to discover a lighter form of development. A form that offers greater scope for citizen initiatives and a different type of project development, a form that will work. The public risk is lower; the scope for the individual greater. The government sets the broad outlines (building limits, zoning plans, urban development outlines and environmental quality requirements) and draws up a development plan for the middle- to long-term (concerning accessibility, mobility, and how to deal with declining or accelerated growth). Innovative citizens and businesses give form to their own ideas within these outlines – citizens by building their own homes, businesses by providing better support for such ideas or even by providing new suitable types of housing. Furthermore, this new way of working enables governments and society to learn much more quickly from the multitude of experience that is available (e.g. see Urhahn Design, 2010).

This new way of planning requires a different interaction between policies with respect to cities, citizen participation, spatial planning, mobility and the environment. A broader concept of policies relating to the local environment may inspire interest in the large issues for which government carries a special responsibility, such as climate change and the development of a system that would structurally reduce demands on resources. Right now, we have little idea of what the new city will become. The modern, twentieth-century spatial typology of industrial estates, residential areas and city centres will make way for something new. It would seem that, rather than the number of buildings, the emphasis will be on the quality of the new spaces that combine to form a pleasant city. These spaces may include new combinations of home, work and leisure, with new mobility services and activities. The process that produces the city of the twenty-first century needs to provide more scope for new providers and new ideas. A key question in this new way of planning will be how to work with this vital, new creativity.

Without strategic objectives, a government exerting less central control can quickly result in a decline in the quality of the local environment. A government wants to achieve something with a regional city: it needs to be capable of generating high levels of economic dynamism, it must attract individuals and businesses, and it needs to challenge residents as well as giving them a feeling of security. Cities should also use as little energy as possible, and any unused energy (residual heat, waste, secondary raw materials in buildings and infrastructure) should be collected for re-use. These are issues to be addressed at government level, after which it is up to society itself.

There is no blueprint for the sustainable city. The sustainable city is rather a collective quest that begins with a willingness to address the problem. The main question that requires answering is: What can the government do to focus societal energy on sustainability?

Environmental policy for an energetic society

The frame of the energetic society encourages governments to take a different approach, and requires the various tools already available to governments to be used in new ways. We therefore first take a look at the governance philosophy currently applied, and then address the possible tools available to governments for local environmental policy.

Shortcomings in the current governance philosophy

Beyond optimum levels

As discussed earlier in this report, the intervention level has grown with the level of the problem: from local odour and noise problems to national air, water and soil quality standards, to international agreements for the management of the Rhine and the North Sea, to global climate and biodiversity summits. In all cases, however, the government controls and regulates the system. At the same time, the political, technical and social complexities of environmental policy have also increased. At least as important as the scale of the problem is the tendency of government to follow a central approach in its study and management of solutions. Such an approach makes it vulnerable. Of course, every strategy has both its strong and weak points. For example, better pricing of the use of the environment

is theoretically effective in encouraging people to be more careful about how they use their local environment, but it is difficult to obtain political consensus for such a measure. Global agreements on national CO_2 emission reductions are of course required, but should these global agreements be the starting point for policy?

What is often missing is a philosophy of the dynamics of change, the relationship between cause and effect: what policy response can produce a decoupling between economic growth and resource use? Most solving strategies optimise only one specific dimension, while an integrated view on the environment encompasses at least three dimensions: the biophysical, socio-economic and socio-political dimensions.

Up to now, the socio-political dimension of the environment has often remained underexposed. However, this dimension will become increasingly important to policy success. Take renewable energy as an example, an area in which the Netherlands compares poorly with its neighbouring countries. Renewable energy use has even *decreased* in the Netherlands, from 4.2% in 2009 to 3.8% in 2010 (Dutch Environmental Data Compendium – *Compendium voor de Leefomgeving*, 2010). Reference has often been made to the institutional reasons for such a poor performance (Agterbosch et al., 2009). The United Kingdom has a Climate Change Act, in Germany there is a favourable export tariff for home-generated electricity, and in Denmark there are all kinds of options for the cooperative generation of electricity. But here too, everything has its strong and weak points. For example, Spain had to restrict its system for buying electricity back from consumers when the costs became too high.

In the Netherlands, the national government usually decides on both the optimum location and moment for an investment. Society then often contests such decisions because the top-down solution does not fit in with local ideas and visions. There is however an alternative. Numerous 'bottom-up' initiatives have been taken that address the sense of urgency, but are based on the local situation. On the Dutch island of Texel, this sense of urgency has given rise to a new action agenda based on a future vision for Texel 2040. The *Texel gives energy* (*Texel geeft Energie*) plan, that combines leisure, sustainable innovation and sustainable energy, takes a fundamentally different approach from current policy (Henneman, 2011). There is synergy with the local energy cooperative *TexelEnergie*, with an emphasis on sustainability, engagement and local production. Another example comes from Belgium. In Flanders, wind turbines installed on land and along the coast resulted in local protest. It appeared that the main complaints of local residents were the noise generated by the blades and the shadow caused on sunny days. A compromise was made: the turbines were switched off on sunny days. In Denmark, as well as in the Flevopolder in the Netherlands, wind turbines are owned by the same people who experience the disadvantages of living near them, as it is a well-known fact that people are less worried by nuisance that they cause themselves (see Bröer, 2006).

Studying all three dimensions of the environment, therefore, makes it possible to come up with new solutions to problems, particularly when society itself has an active role in such solutions.

Beyond the silver bullet

Seeking optimal solutions to complex issues of sustainability is like searching for the Holy Grail. There is no technological solution waiting in the wings to be implemented. Hydrogen powered vehicles, nuclear fusion, a 'smart city in a box', and possibly ccs as a solution for CO_2 emissions from fossil fuel combustion: waiting for such magical solutions would be a mistake. Moreover, an emphasis on optimal solutions hinders the development of social dynamics. After all, the idea of an optimum presumes more knowledge within society and a greater control of the dynamics than could realistically be expected (see Text Box *Transition management*).

An alternative to studying the optimal solution is to experiment, learn and scale up. Experiments, innovations and learning processes flourish especially where there is room for renewal, creativity and intractability. The government is primarily responsible for setting public objectives, but society is the carrier of required change.

Transition management: from technological to social imperative

Transition policy in the Netherlands is a continuation of the technocratic (and highly effective) approach taken to environmental pollution during the last quarter of the twentieth century. Initially, it was possible to apply scientific reasoning to reduce environmental problems to straightforward dose-response curves, providing well-reasoned policy intervention strategies. However, current, complex environmental problems require a system perspective, with a focus on the restructuring of the full social-technical system (Rotmans et al., 2000).

Such a perspective was given form in the Dutch *Fourth National Environmental Policy Plan* (NMP4) from 2001, under the name 'transition policy' (VROM, 2001). The transition policy aims to implement fundamental system changes within 30 years (by 2030 since NMP4) in a number of complex environmental areas, such as energy, mobility, agriculture and natural resources. Transition policy has crystallised as transition management, focusing on managed system change (Rotmans et al., 2000; Elzen et al., 2004; Kemp et al., 2007; Loorbach, 2007; Grin et

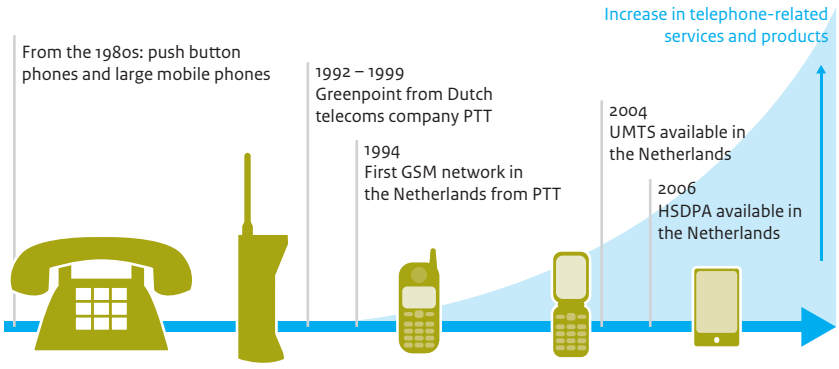
al., 2010). Energy transition policy has become particularly institutionalised over the last ten years (Smith and Kern, 2009), with many, often established, interests involved in the form of regional bodies, platforms and working groups.

However, current transition policy does not run smoothly in practice. There is too much emphasis on the manageability of technical system change, with too little attention paid to social integration and complexity. Transition policy seems to have entered a phase in which mostly professionals are involved, just as it demands broad social engagement.

The energetic society, not the government, is the main source of innovative power. Innovation takes place in leaps and bounds; Bakelite telephones were not replaced in one go with the UMTS network and mobile telephones. Various products came in between, such as the 'brick' with an antenna (Figure 7). Twenty years on, telephone communication has completely changed, into a complex system of inexpensive ICT services.

Figure 7

The telephone: from Bakelite to smartphone



These dynamics in communication technology provide a good frame of reference for achieving the decoupling between economic growth and resource use and a clean economy by 2050. They also show that governments need to consider how to mobilise the creativity of the energetic society. After all, the decoupling of environmental use and economic activity is not designed in an ivory tower, but also requires the know-how of citizens and businesses. This requires a different mindset, 'We may not be able to predict or direct economic evolution, but we can

design our institutions and societies to be better or worse evolvers' (Beinhocker, 2006, p. 324). We are looking for a governance style that is dynamic, that evolves, and allows scope for learning and a productive form of competition.

Radical incrementalism

In the energetic society, an incremental approach works better than the more conventional governance model of 'analysis and instruction'. In contrast to the conventional model, the government in the incremental approach does keep the large objectives in mind; however, it does not rely on absolute control, but rather places more emphasis on releasing energy, on learning ability, and on the use of dynamic systems of regulation, at all levels, from local to global. It is therefore about creating more alternative operational options, using more intelligent and adjustable infrastructures, amounting to a greater acknowledgement of uncertainties about future developments in terms of growth and needs, and therefore with less emphasis on single-purpose infrastructure. Under a radical version of incrementalism, governments can run processes much more pointedly, so that many relatively small steps may lead to a sizeable result. Furthermore, such radical incrementalism always reasons from the standpoint of the local environment of citizens and businesses.

This means that old hierarchical administrations make way for a horizontal and open form of governance, in a world of collaboration and competition, mutual learning and rivalry between designs and models. It is a governance philosophy according to which society is constantly in search of effectiveness, following a process of trial and error. Great things can also be achieved step by step. As Wei Wei Zhang (Zhang, 2011) recently said, 'you feel for stones to cross a river'. The best path is sometimes that along which simple changes precede the more complicated ones. However, do we dare go down a path with no road map, only a destination, and will we first address the simple changes before going on tackle the more complex ones?

Dutch Government not pioneering

At present, the Dutch Government is certainly not taking the lead when it comes to clean production and consumption trends. The business community, however, does recognise the necessity and desirability of a more sustainable economy. Some companies themselves anticipate resource scarcities and therefore come to the conclusion that they need to be more efficient in their use of raw materials in order to remain competitive.

Practical examples

- Companies are already making money from sustainability, for the simple reason that sustainable practises are more efficient and therefore cheaper. However, they often discover than government regulations make things more difficult than they need to be. The waste processing company Van Gansewinkel has the motto 'waste no longer exists', and attempts to maximise both the amount of waste recycled and the economy of scale by recycling at an international level. However, the international transport of waste is either restricted or subject to strict regulations. From a legal point of view, therefore, waste does still exist.
- The PBL is also aware of such societal dynamics. Companies and other public organisations have discovered that we are working on an energy map of the Netherlands that shows locations that offer the best opportunities for various forms of sustainable energy (geothermal, residual heat, wind, solar, biogas, and so on). Although the government seems unsure what to do with the information, other public organisations cannot get hold of it quick enough.
- In The Hague, local residents and energy company ENECO have together bought a decommissioned wind turbine to generate energy for the local area. The turbine is run not on a subsidy, but on a feeling of doing good, and symbolises the broader objective of making sustainability real.
- On the island of Texel, the cooperative TexelEnergie initially began by buying and selling electricity to and from its members. The electricity is generated locally and sustainably, for now using proven technologies based on wind, sun and biogas, but the cooperative also plans to experiment with more complex technologies such as geothermal energy and gasification techniques. TexelEnergie makes pragmatic agreements with many different parties regarding investments in and the generation of sustainable energy, and in doing so is creating an experimental garden with no government involvement. Its small size means that TexelEnergie is able to purchase electricity from its members on a small scale. This entails too much administration for a large company, but small companies are able to take an individual approach.
- Existing businesses are successfully transforming themselves into green industry leaders. Unique Lights is a company that installs LED lighting on an increasingly large scale, thanks to an innovative procedure based on lease and rental contracts. The company Connex has developed the *Solar Vlinder* (Solar Butterfly), an aesthetically pleasing charge point for electric bicycles and scooters in towns. Van Houtum BV is a paper factory that has implemented the cradle-to-cradle philosophy in every stage of its production process, resulting in a significant and permanent reduction in the amount of chemicals required. Local authorities also demonstrate this combination of daring and open-mindedness. In the Van Houtum BV example, operational changes were made possible thanks to the flexibility of local licensing authorities, so that there was room to experiment and achieve benefits for all.
- In Rotterdam, a large-scale urban project involving renovation of the Stadshavens area promises to transform the urban economic structure of and life in the city. This ambitious programme comprises no less than 1,600 hectares of urban development. The major

stakeholders – the city of Rotterdam and the Port of Rotterdam Authority – worked together to create an integrated plan to be implemented by a separate organisation, with the relevant responsibilities and powers. In other words, the main parties worked together to transfer some of their influence to Stadshavens Rotterdam, which then had the authority to work together with other stakeholders to achieve the coordinated development of the area.

There are already many initiatives in which societal creativity has resulted in product innovation, cost reductions and sometimes even new social cohesion between citizens, businesses and institutions (see Text Box *Practical examples*). There is certainly no lack of creative leadership. However, innovation often strands in the generalisation, dissemination and marketing. This phase in the innovation process is known as the 'valley of death': the difficult to bridge gap between the invention and marketing of new products. It is often difficult to find sufficient funding in this phase, and is the highest risk phase for privately financed inventors, with actual interest rates of up to 20% being applied (Krozer, 2011).

What is missing, therefore, is collaboration between government and society that provides more dynamism in the renewal of our production and consumption patterns. Government support has up to now mainly focused on the general stimulation of technology, rather than the stimulation of new markets. Nevertheless, the government can do much to help the valley of death problem, by stimulating demand, for example through its own purchasing policies, feed-in schemes such as the export tariff for sustainable energy, or setting standards. The government can also develop market opportunities to reduce the financing risk, and therefore create more chances for innovative leaders to realise their products.

A new governance philosophy

Over the course of fifty years, Dutch society has evolved from a hierarchical, compartmentalised society – with its stable labour relations, clearly defined sectoral business organisations, and politics that organised social consensus in an orderly and coordinated fashion – towards a networking society. Government organisation is only gradually adjusting to this. Governance in a networking society requires a focus on the flows (of money, people and images) and nodes of activity and creativity. Nodes could be partnerships between organisations, or a physical city, a Silicon Valley or a high tech campus. These nodes develop where conditions encourage partnership. This attracts business, capital begins to flow, and real estate value develops. However, flows can shift very quickly should conditions change. A new governance philosophy therefore needs to be more consistent in placing the focus on societal dynamics. A good understanding of

such dynamics is required, for their effective governance and to ensure that what has been achieved is not lost again.

It is clear that the political centre and vested interests still hold a lot of power. However, existing governance structures seem increasingly to stand in the way of new opportunities. Is there still too much of a focus on hierarchical structure, despite all the changes taking place in society, with the government in control of a society of obedient citizens and organisations? This raises the question: What do we need government for?

The government for collective decision-making and public interest

Sustainability will not be a controversial objective in a society that aims to maintain, or even improve, quality of life. One of the problems with sustainability, however, is that it does not happen by itself. Sustainability is an example of a collective service that cannot be provided unsupported. The reasons for this are known: (1) you cannot prevent people from making use of a collective service, and (2) the use of a service does not affect its use by anyone else. Consumers are not prepared to pay for a service that they can also get for free; therefore private investors cannot recoup their investment with the sale of such services. This is therefore a task for central government, as *how many* and *which* collective services society wants will of course always be a political decision. How clean does the air really need to be? By how much do we want to reduce our CO_2 emissions and how many natural areas (and what kind) do we really want? Collective services therefore require considered political decisions to be made, that carefully weigh up the interests of all those involved.

The financial crisis has made it acutely clear that the government plays a crucial role as keeper of society's interests. As the government is being forced to make severe cuts, a reassessment of all its tasks is being made. The desire to step up the pace of the sustainability strategy has therefore come into conflict with the political reality of reduced financial resources and a faltering economic recovery. However, looking at the governance philosophy puts this conflict in a different light. The green economy framework, as proposed by the OECD, could then provide an alternative frame, in response to a period of relative economic stagnation.

Objectives and solutions

In solving complex problems, centralised decision-making is a vulnerable approach: in practise it often results in tunnel vision, and in the problem being shifted elsewhere due to the lack of an integral approach, and ultimately to delay in the process (Lindblom, 1959; 1979). The problem has therefore often changed by the time a balanced solution has been agreed on. If a government also only consults a limited (trusted) stakeholder group, then it risks failing to make use of the innovation potential of society. It is also possible that the rest of society will be

unhappy with the chosen solution. After all, society often turns against solutions which in the trusted consultation groups seemed so promising. The result is that society is disappointed in the government, and the government finds society unpredictable, whilst its own governance and process structures are in fact part of the problem.

These developments require a reassessment of the governance philosophy. We need a new governance philosophy that manages to tap into the energy of society in order to realise liveability and environmental objectives. Van Gunsteren (1994) made a distinction between the governance models of 'analysis and instruction' and 'variety and selection'. Analysis and instruction is the world of Robert Moses, of survey-analysis-plan, of the central rule approach. According to this model, all learning abilities are centralised at the beginning of the process, approaching the world as if it were an object. The alternative model, variety and selection, starts with an initial analysis of the problem then attempts to inspire, convince and, most importantly, involve the relevant actors in solutions as quickly as possible. Analysis remains necessary, but is gradually integrated within the process.

According to the model of 'variety and selection', new governance philosophy focuses on public objectives. For any elaboration of such objectives, however, the local situation is taken as a starting point, incorporating the wishes, ideas and capabilities of local communities, using persuasive power instead of obligations, and focusing on learning processes within the policy process (Ostrom, 1990; Liu et al., 2007; Ostrom, 2009; Brunner, 2010). Nobel Prize winner Eleanor Ostrom has shown that organisation forms can be much better tailored to the local situation and to enhancing learning (Ostrom, 1990). Polycentric strategies – providing as much scope as possible for local requirements and nodes – can therefore be more effective (see Text Box *The exchange decision*). This also applies to the protection of collective resources such as the rainforest or fish stocks. The challenge facing further sustainability gains is on the one hand offering scope for dynamism, innovation and experimentation and creative ideas, and on the other providing regulation and support for promising ideas (Boutellier, 2011). Linking major problems to an incremental approach would represent an incredible conceptual breakthrough and justify the term 'radical incrementalism': radical in terms of result, incremental in terms of process structure.

The 'Room for the River' (*Ruimte voor de Rivier*) exchange decision

There are of course some good examples of centrally defined (and ambitious) objectives being implemented through decentralised activities. The Room for the River programme 'exchange decision' is a good example. The Dutch Government formulated a clear public objective: the rivers needed to be capable of discharging 16,000 m^3 of water per second. Spatial quality considerations were a secondary objective. The government said how much it was prepared to spend on the project, and the programme was organised in modules. Regions were invited to present alternative, creative plans that were considered locally more acceptable but that fitted in with the national objective. The national plan would then be 'exchanged' with the multifunctional regional plans. An interdisciplinary team assessed the quality of the alternative plans and passed on its advice to the Room for the River project leaders. The exchange decision resulted in many private-public initiatives, reduced resistance to the new plans and meant that the programme was completed on time.

The importance of information

The digitisation process can support a radical incrementalism strategy. There are now an uncountable number of ways in which clear information can be made available quickly. Digitisation therefore feeds the solution capabilities of the energetic society. Take the phenomenon of crowdsourcing, for example: a development that allows organisations (government, businesses and public organisations) or individuals to make use of the knowledge and experiences of a large group of people (professionals, volunteers and other interested parties); for example, for policy development and research. The idea is that society would operate much more efficiently if it were able to mobilise its own intelligence and creativity. We see it every day: it is now possible to find the answers to many questions by placing them in a 'cloud' – an internet forum. Innovation strategies flourish thanks to open source systems: open up access and allow people to join in the thought and development processes. 'Our Common Future 2.0' is a good example of crowdsourcing for sustainability: hundreds of volunteers have contributed through social networking sites, such as Hyves (a Dutch variation on Facebook) and LinkedIn, to the development of a vision for a sustainable Netherlands for the coming 25 years (Our Common Future 2.0, 2011).

There are some important conditions for public knowledge to be used successfully: diversity of cognition, independence in decision-making, the inclusion of decentralised (local) knowledge, and a mechanism for processing the many opinions (Surowiecki, 2004). This processing mechanism is crucial: providing it can be an important task for governments that want to support the bottom-up approach to initiatives and ideas. This is already being done in other countries such as the United Kingdom.

Govern through information: the government stimulates private initiatives

Allowing access to government information contributes to societal creativity. We see this taking place in an increasing number of open data initiatives being implemented worldwide, such as data.gov in the United States and data.gov.uk in the United Kingdom. In the Netherlands, such initiatives take place mainly at the local level, for example, Open Data Rotterdam (or Amsterdam). The objective of open data initiatives is to give businesses, non-profit organisations and individuals the opportunity to interpret and use raw government data. The idea is that this kills two birds with one stone: the innovative re-use of government data promotes economic growth and government efficiency and effectiveness, and it also increases government transparency, which has a positive effect on the legitimacy of and trust in government (TNO, 2011).

The idea is that data for which the government has already paid can be released as long as there is no violation of privacy, national security or economic interests. In the United States and the United Kingdom, as much data as possible is proactively published. After all, if the data can be released under the Openness of Government Act, they might as well be published straight away. The Dutch Government takes a more cautious approach and currently only publishes data already in the public domain (http://www.overheid.nl/opendata).

Four conditions must be met to be able to stimulate businesses, non-profit organisations and individuals to develop new social and commercial initiatives based on government information (Vein 2010): (1) the data must be available, (2) it must be possible to enhance the value of the data, (3) there must be a community that knows how to use the data, and (4) competitions ('hack days' or 'app contests') must be held to reward the best ideas. Such competitions bring developers and data crunchers together in a breeding ground for ideas, cooperation and new companies. These kinds of competitions are also organised in the Netherlands (www.appsforamsterdam.nl) and within the EU (Digital Agenda for Europe).

The government therefore acts primarily as a platform to stimulate action and to provide a basis for further development by entrepreneurs. This ultimately benefits society and the economy. The Dutch research institute TNO (2011) researched open government policy in six countries, including the United States and the United Kingdom, and found demonstrable economic effects. The effects on public services are however anecdotal, not surprising as large-scale open data initiatives only started two years ago. Social and democratic effects are visible, though not yet measurable. The app contests however do show that open data can result in new, innovative services (TNO, 2011); the open participation and participant diversity (the crowdsourcing of ideas) create services that would not otherwise be provided by government. A classic example is the navigation systems that were developed after the US Government released GPS data (Lathrop and Ruma, 2010, p.14). A more recent example is the way in which the city of New York uses open data for 'city sourcing' to improve services in the face of shrinking budgets (Deputy Mayor Stephen Goldsmith in O'Reilly Radar, 2011). In New York, the government sees a future for its role as a platform for a community of developers and individuals that re-use data on life in the city to promote transparency and economic growth (Ingram, 2011).

Digital data are therefore crucial in mobilising the energetic society. Information is becoming a new kind of infrastructure that enables a much more dynamic process of innovation and target realisation. However, the government can no longer think of citizens in terms of objects. The government needs to take on a new role, based on cooperation, comparison and creative competition.

Responding to the energetic society

Society will not respond of its own accord to scientists' call for change. Doom scenarios are considered suspect, as are overconfident claims relating to technological risks, or lack thereof (e.g. regarding carbon capture and storage (CCS), high-voltage power lines, or nuclear energy). A greater awareness is required of the large differences in opinions in society. Differences, for example, that result in a hardening of attitude to the climate issue (see Hulme, 2009), and that have resurfaced in the discussion about nuclear energy following the disaster in Fukoshima (2011). However, where society is committed to sustainability, government can increase its effectiveness by better responding to the social mechanisms that appear to be moving society in the right direction.

The energetic society is carried along by its own capacities and achievements. It rests on individuals who wish to make a mark and businesses that want to innovate with their products. Such creative competition can be turned to the collective advantage. A few examples: Marqt, a supermarket for regional products, has taken off in the Amsterdam region. The Dutch supermarket chain Albert Heijn defines its strategy based on the principles of 'scientifically sound and socially supported'. In implementing this strategy, the supermarket chain is rapidly expanding its assortment of 'green' meat and fish. And for how much longer will it still be 'cool' not to be able to talk about your own energy use? How long before solar panels are installed stylishly but visibly on houses? Recent research shows that homes in California with solar panels sell for a better price than those without (Hoen et al., 2011). Is it reasonable to make a link between the many school buildings in the Netherlands and decentralised energy generation? What will be the conditions for schools to generate their own income and at the same time contribute to renewable energy? What will be the results of social initiatives that aim to generate or purchase 'smart' energy?

Interestingly enough, these are examples in which it is in everyone's interest to increase the number of participants. Once a public-private investor has developed a business case, it is financially interesting to be able to share it with others. An example: if a middle-class residential district has developed a local strategy for the purchase of sustainable energy, this can be passed on to other districts, and other cities. In fact, it would even benefit the initial area as the economy of scale increases. In this way, the learning process is given societal dynamism, and the government needs to decide whether it chooses to support such a learning dynamic.

This governance philosophy of radical incrementalism has already proved itself. In each case, the focus is on the mobilisation and empowerment of individuals and businesses. Archon Fung, one of the intellectuals working in this area, speaks of 'empowered participatory governance': governance that decentralises its powers (Fung, 2004). In the city of Chicago, school achievements improved and criminality fell when local residents were given the opportunity to discuss their priorities and to work with the professionals (the police and teachers). The city of Chicago supported the process. It conducted thorough comparative policy analyses to map the performance of the various districts, and succeeded in discovering the reasons for the success of particular districts. This information was made freely available. The improvements in education and criminality were the result of friendly competition between districts and the creation of new forms of collaboration and accountability.

Governance tools

Perspectives such as green growth, predicted (global) competition for resources, and the opportunities available to an energetic society for finding new technologies and solutions – these all result in a vision on how governance could be applied. A vision of a government that sets clear objectives then mainly facilitates, promotes learning and supports innovators. Which governance tools can be used?

This vision on government steering includes at least five elements: (1) positioning, (2) infrastructure, (3) regulation, (4) financial instruments, and (5) monitoring and feedback. These elements are never employed in isolation. A governance philosophy uses them to create a coherent mix of governance tools. A focal point, therefore, could be the aim to mobilise the energetic society in order to achieve the objectives of sustainability.

1 *Clear positioning by government*

Government could exert much influence by clearly positioning itself. The challenges of sustainability demand it. Citizens have no problems with a government that names the issues. They do have a problem with a government that appears not to care about the difficulties that citizens come across in their daily lives. The business community is also aware of the challenges of sustainability. In facing these challenges, it needs clarity about the government's objectives and about what is expected of it. A clear government will also free up new financing. Banks and private funds do not lack money but make risk assessments, and in doing so require a future that is as predictable as possible. Governments can create a context in which investment in sustainable innovation becomes more attractive.

The problem for businesses lies not so much in an over-ambitious government, but in the perception of an unpredictable government. As far as sustainability is concerned, predictability has not been a strong point in government in recent years. Whether or not a government chooses to address a sustainability issue is of course a political decision, but the decision must be made based on an estimate of

the severity of the problem and on consideration of the strategy to be followed and the opportunities and threats, and costs and benefits involved.

The government can mobilise much energy if it takes a clear position and focuses on relating the main challenges to people's immediate surroundings. There are many measures that both improve the quality of local surroundings and are good for the environment. For example, people have double glazing fitted because it increases the comfort level in their own homes, or choose a more economical car because fuel is so expensive. These are very local concerns, but it takes little effort to link the most local concerns to global issues such as food security, biodiversity and energy.

The 'green growth' frame has the potential to guide, bind, and inspire other governments or levels of government, for example, by combining new energy generation opportunities with the issue of how energy can contribute to regional identity and urban development objectives at regional levels.

2 *Infrastructure determines routines*

Infrastructure puts things in order. Infrastructure also services broader social objectives, including general economic development and sustainability (WRR 2008). Above all, infrastructure is something for which society mostly looks to government; it is expensive, inert and of strategic importance. It stays in one place and is a cumulation of networks. Given the current budgetary restrictions, the government will need to make strategic decisions about its infrastructure. The expectation therefore is that infrastructure policy in the twenty-first century will mainly be about making efficient use of existing infrastructure. This can lead to behavioural change if clear priorities are set based on the government's strategic objectives.

A perspective of 'improved utilisation' also provides citizens and industry with many new options. For example, this may entail changes to the rules of the game for the management and introduction of new mobility services. Could a concession system for a new form of public transport between Almere and Amsterdam reduce travel times by making the network more finely meshed and faster (with of course the requirement that the concession's chosen transport system has a very good CO_2 profile)? All around the world we see the fusion of twentieth-century products such as trams, buses and metros taking place. The basic outlines of the infrastructure network are in place, there is obvious demand, and the product is of interest to the market – now we need to make better use of this basic infrastructure network.

There is also a more conventional infrastructural task; one on which there is broad consensus. For the twenty-first century, everything points to a second wave of electrification of society. The transition from fossil to renewable fuels requires more flexibility in energy transport, for which electricity offers certain options. This is a major task in terms of network construction and their interconnection. In the field of energy, this would entail 'intelligent networks' and 'smart meters'.

Not only can the government make better use of existing infrastructure, it can also use it to steer society to achieve new potential. The smart meter is a good example. Smart meters provide citizens and businesses with more opportunities to act as producer and earn money through decentralised energy generation (see Text Box *Smart grids and smart meters*). Intelligent networks can contribute to the development of new conditions for decentralised, sustainable electricity generation. This does however require that public organisations such as housing corporations, local authorities, homes and schools can work together.

In both cases, infrastructure is of course more than just the network 'hardware'. Just as important as the hardware is the social technology of rules and institutional renewal. Where sustainability infrastructure is concerned, fundamental choices also need to be made about the rules concerning the sharing of responsibilities, export tariffs for self-generated electricity, network distribution, and so on. The focus of such technical discussions will be different if they are based on the needs of citizens and businesses rather than network distributors and large power companies.

Smart grids and smart meters

The development of decentralised, sustainable electricity generation is a major challenge for the Dutch electricity network. This is because electricity generated from wind or sun is variable and unpredictable, making it more difficult to match supply and demand. Locally generated electricity is also transmitted at low or medium voltages, so that the network can no longer be controlled top-down. It would also be fair to assume that the demand for electricity will show a sharp increase, particularly if the sale of electric cars takes off. These developments require an intelligent network to facilitate such new developments.

'Smart grids' are created by coupling electricity flows to information flows, which can help overcome the challenges named above (Faber and Ros, 2009; IEA, 2011; Netbeheer Nederland, 2011; Taskforce Intelligente Netten, 2011). The development of smart grids makes it possible to maintain balance in the network; for example, by managing demand through the use of temporary storage, or by linking up with other networks (such as heat or CO_2). Smart grids improve coordination at the network level, for example, enabling a better response to collective systems, better use of flexible central production and the organisation of a 'back-up' at a higher network level. It is even imaginable that sustainable energy generation in a particular area could be controlled as a 'virtual power plant'.

Homes will also have a role to play in the production of sustainable electricity; for example, because they have solar panels on their roofs. Households are therefore no longer passive consumers, but producers too (Faber and Ros, 2009). 'Smart meters' couple consumers to producers to make them an integral part of the network, rather than a passive endpoint. This makes it easier for network distributors to balance the network, while homes are able to respond to real-time price fluctuations, for example. Various experiments are taking place that study the technical, institutional and behavioural challenges of smart grids in practice.

Investment in the electricity infrastructure involves risk due to the high costs and still relatively significant uncertainties. It would however be a mistake to delay, as the existing network infrastructure is ageing and because all the current additions and replacements being made to the network have a very long lifespan (Netbeheer Nederland 2011). This is not just a question of market forces, but of cooperation between the parties involved. The government should allow scope for experimentation, as in the recently announced Dutch experimental garden projects. Legislation changes will also be required, for example, with regard to the collective aspect of local generation and the exchange of self-generated electricity, storage by network distributors and the issue of VAT on self-generated electricity.

The implementation of new technologies often requires changes in legislation. Pilot projects and experiments can help determine and mitigate the technical and institutional bottlenecks. A British example: the Carbon Trust – a government-financed non-profit organisation that aims to accelerate the transition to a low-carbon economy – provides support for businesses and government organisations wanting to achieve reduced carbon emissions, make energy savings or commercialise sustainable technology. Carbon Trust accreditation and certification provides businesses and consumers with a reliable standard for sustainable business practises and products.

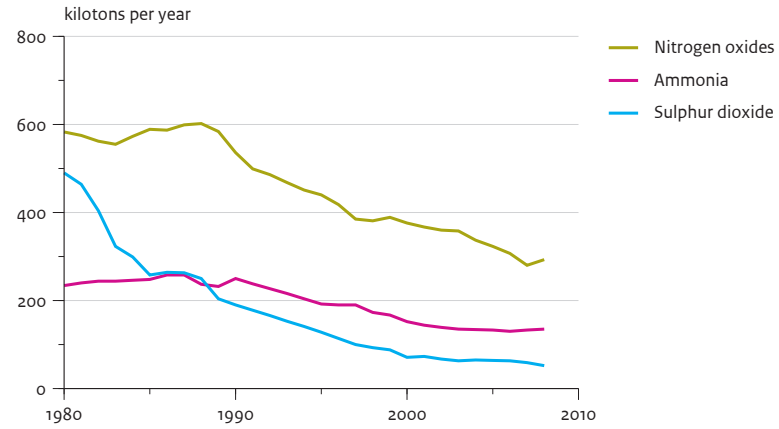
The government role is therefore broader than just the physical infrastructure. It can also act as 'choice architect' for the institutional structure (Thaler and Sunstein, 2008; WRR, 2009). This means modifying citizen choices, by changing the default (e.g. making vegetarian the standard menu, see Hajer, 2009b), by strengthening feedback mechanisms (e.g. information on energy use) and by paying better attention to people's routines. Legislation changes, information or standards can make an important contribution.

3 *Dynamic regulation for an energetic society*

Regulation is a conventional instrument of proven effectiveness. Regulation has played an important role in the first phase of environmental policy; for example, in the reduction of acidifying substances in the Netherlands. Examples of such regulation included emissions standards for power plants, refineries and other industries. The three-way catalytic converter was made compulsory in cars, and businesses were required to apply the best available techniques in new equipment. Such regulations have resulted in a significant decrease in emissions (Figure 8); sulphur dioxide emissions decreased the most in the 1980–2010 period, by 85% (PBL, 2010c).

Figure 8

Emissions of acidifying substances



Source: PBL (2010c)

Regulation will remain a crucial instrument in the twenty-first century, with three concrete dimensions requiring attention. Firstly, the government has up to now mainly made use of fixed standardisation. However, with a more dynamic system of standardisation, government could make better use of the energetic society. The core of such a system is that government rewards those that embrace innovation and penalises laggards, or at the very least treats them with less preference. Japan has a Top Runner Programme, in which the government regularly decides on the leading technology for products and equipment. As the best performing businesses are taken as a 'benchmark' for the requirements made by the Japanese Government of other companies, this stimulates innovation. The current EU Integrated Pollution Prevention and Control (IPPC) Guideline, requiring businesses to apply the best available techniques, would seem to be a good starting point for a similar approach within the European Union. Wisconsin is another example. Here a Green Tier scheme has been implemented, under which businesses that are innovative in terms of sustainability are exempt from particular licensing systems.

Such innovation-oriented, dynamic regulation could also provide a solution to the 'valley of death' problem, in which the distribution of innovative solutions often strands. To stimulate the distribution of innovation techniques, government can create conditions for the successful completion of a business case for new technology, for example, by raising standards.

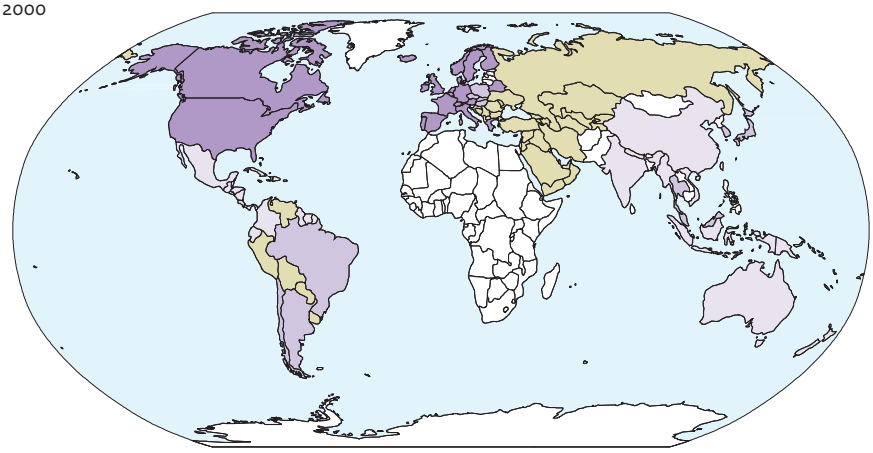
Secondly, the appropriate level of governance is key. European regulations are, compared to national ones, less intrusive in terms of competitive position and have shown great results in the past. A commitment to the sustainability issue would logically speaking translate to a forward and innovation-oriented attitude of governments in a European context. For example, the European Union has much influence on air pollution standards for cars, one of the reasons being that it is a major import market. In many areas of the world, standards are tightened once traffic volumes increase and new emission reduction technologies are made available (Figure 9).

Thirdly, the government could remove self-raised barriers. Addressing or adjusting regulations that needlessly hamper sustainable innovation is in fact a matter of cherry picking. Certain regulations, such as technical specifications, hinder sustainability unintentionally. However, there are also rules that are meant to protect certain interests. These rules, especially, frustrate sustainable entrepreneurship as they offer non-innovative competition the advantage. The government can act as 'market superintendent', by identifying and addressing such regulations. The Green Deal approach in the Netherlands, in which businesses, citizens and organisations are encouraged to report bottlenecks in legislation and licensing, is a potentially important step in this direction; and is an extension of the more general *Meldpunt Regelgeving*.

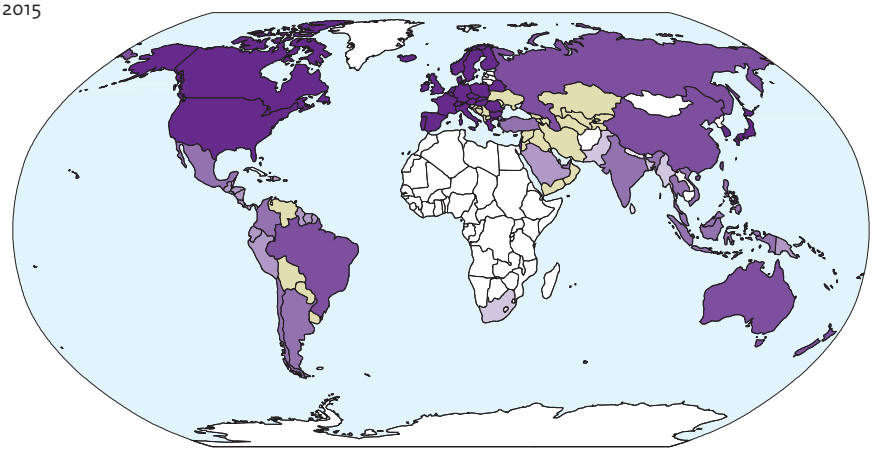
Figure 9

Air pollution emission standards for petrol vehicles

2000



2015



Emission standards equivalent to European emission standards (except for CO_2)

Euro 6
Euro 5
Euro 4
Euro 3
Euro 2
Euro 1
Changes to engines
No policy

Source: GEO (2006), ADB (2011), Dieselnet (2011)

Our society has an unprecedented learning ability. However, many regulations do not stimulate such learning. For example, take current licensing legislation. Once a company has obtained an environmental license it needs to do little more. The VROM Council (*VROM-raad*), the Netherlands' Council of housing, spatial planning and environment, has already proposed addressing the system and replacing it with a dynamic licensing system (VROM-raad, 2009). This would make it possible to tighten standards once technology puts us in a position to do so.

To make use of the dynamics in society, innovation must be rewarded more consistently, under the motto, 'what can be done, should be done'.

4 Financial instruments for behavioural change

By pricing detrimental environmental effects, polluting products and activities become more expensive. This encourages citizens and companies to choose environmentally friendly alternatives. Such pricing, in addition, stimulates innovation; it makes it more attractive for industry to develop environmentally friendly and thus cheaper alternatives.

By governing change through pricing, governments allow citizens and businesses to choose *how* they reduce their impact on the environment. This is efficient because in theory people are the best judge of how they can reduce their impact on the environment and therefore their costs. The *extent* to which citizens and businesses will in fact do this is however difficult to predict. This makes it difficult to determine which taxes will have the required effect on environmental impact. However, in general there are more opportunities in the long term for behavioural change than in the short term.

Financial incentives already exist in the Netherlands to stimulate environmentally friendly behaviour, such as the regulatory energy tax and fuel taxes. Such green taxes are currently responsible for about 14% of all tax proceeds.

However, there is resistance to the further greening of taxation. Increasing energy taxes may reduce the repayment period for energy-saving measures, but it also reduces household purchasing power and affects the competitive position of businesses. It is also unclear whether taxes really result in the desired effects on the environment. Pricing is therefore a politically sensitive subject. The precise formulation of green taxes also entails difficult choices. For the sake of simplicity, energy taxes make no distinction between the environmental effects of different types of energy. Households therefore pay just as much energy tax for wind energy as for energy from coal. Differentiating energy taxes according to impact on the environment would make them more complex to implement, therefore require more manpower and increase the cost. The further greening of taxation would, according to the OECD however, be an important building block for further greening of the economy. However, further greening is no panacea and in this case too asks for clear government positioning.

The current tax system also includes incentives that produce the wrong effects and encourage unsustainable behaviour. Examples are reduced energy taxes for horticultural companies, fuel tax exemptions for aviation and the low VAT rate on meat. Abolishing such incentives would be good for the environment, although they would meet resistance due to the vested interests involved. Such measures, therefore, require the clear and compelling position that is the first dimension of the new, facilitating government style. International agreement on further greening of the taxation system would also help limit competitive disadvantages.

5 *Monitoring and feedback*

The government could exert much influence through the organisation of monitoring and feedback. This is one of the areas that, recently, have experienced most in the way of renewal. Monitoring and learning are fields that are closely connected (Sabel, 1994). Moreover, monitoring especially is an instrument through which the government could demonstrate its support of transparent collaborations between citizens and businesses.

There are three reasons why the government is involved in making information transparently available. To begin with, only the government can compel private and public organisations to release information. Secondly, only the government can ensure continued transparency through legislation, and thirdly, only the government can create transparency that is legitimised through democratic processes (Fung et al., 2007).

Free access to information can open up the door to new forms of collaboration between the private and public sectors (Fung et al., 2007). Open government policy has been actively experimented with since 2009 in the United Kingdom, the United States and Australia. At the societal level, there are significant benefits to such an open policy approach, partly because new innovative services can be developed that the government is unable to deliver itself (TNO, 2011). This requires the development of markets and communities prepared to act as 'social entrepreneurs'. On the other hand, focused transparency through, for example, 'naming and shaming' can also increase the social pressure on laggards. For example, the number of cases of food poisoning fell dramatically in Los Angeles and the hygiene in restaurants increased when food inspectors started sticking a simple report mark on the restaurant door. Customers can now decide for themselves whether they choose to eat in an unhygienic restaurant. Apps that link up enterprising citizens do the rest: before walking in you can quickly check what other people think of the quality of the restaurant, for example. We now choose hotels and stimulate quality assurance in a similar way. This can also work in the environment (see Text Box *The Aarhus Convention*). For example, some factories in the United States have to publish their emissions of chemical substances under the Toxic Release Inventory. The availability of such information has led to

significant emission reductions, partly due to a greater level of knowledge about reduction options, partly due to the increase in social pressure (Fung et al., 2007). The previously mentioned Top Runner Programme in Japan also works mainly because companies are worried of the damaging effect of being placed on the list of the 10% least innovative companies (UNEP, 2011).

The above-named mechanisms reinforce each another. Information availability, for example, is closely related to transparency as a governing mechanism, in addition to regulation and the use of market tools. The effective implementation of transparency as a governing mechanism is no panacea, but depends on the nature of the policy issue. A bridgeable gap in the information supply, a certain amount of consensus about what improvement, or an indicator of improvement, is, working communication channels, a relationship between information and possibilities for improvements in choice or risk reduction, and acceptance of variable results – these are all important conditions.

The Aarhus Convention

As far as the environment is concerned, the importance of transparency is underwritten by the Aarhus Convention, a UN treaty that gives the public the right to access to information, participation in decision-making and access to justice in environmental matters. The Aarhus Convention has a wider remit that an environmental treaty; it explicitly links sustainable development to social engagement and government responsibility for environmental protection. The Convention is implemented in European guideline 2003/4/EC, which regulates public access to environmental information and with which all EU governments must comply since 14 February 2005. The European Pollutant Release and Transfer Register (E-PRTR) protocol is a supplement to the Aarhus Convention. This is a binding instrument that provides the general public with direct access through websites to information about waste and environmentally harmful emissions. It also makes it possible to compare the environmental performance of companies in the Netherlands and the European Union (MoI, 2008).

Vision of a sustainable society

Sustainability, in the sense of the responsible use of resources, nature and the environment, is quite possibly the biggest challenge for the twenty-first century. The challenge is, and will remain, enormous. Society needs to reduce its resource use and impact on the environment by a factor of 5, which means operating 80 to 90 per cent more efficiently. There are of course model-based studies that achieve the required decoupling between economic growth and resource use.

In this report, we identify 'green growth' and the 'energetic society' as two frames that provide opportunities for addressing the sustainability issue. Both frames focus on finding synergy with citizens and making use of the entrepreneurial spirit and learning capacity of society. Within these frames, the government presents a target scenario that offers a positive, reliable and motivating perspective for citizens, public organisations and companies. This target scenario should have three components: a clean economy, dynamic innovation and pleasant surroundings, with the added benefit of low vulnerability to future energy and food price spikes.

Focus on society

Starting points for the greater engagement of citizens and businesses with their local environment can be found mainly in the introduction of new 'clean' and 'smart' products. Opportunities also exist in bringing improvements in the quality of the local environment closer to citizens, though this is open to interpretation. On the one hand, much can be done by showing what citizens can do themselves to contribute to such change (through certification, green consumption and the impact measurement of behaviour). On the other hand, this can also be achieved by proving citizens with greater scope for make the transition to a clean economy themselves. Examples are identifying and removing barriers that currently hinder the use of residual heat, geothermal energy, biogas, solar energy or wind energy, or prevent the more sustainable use of food. Not just policy results create legitimacy for sustainability – offering perspectives and opportunities are just as important.

It sounds paradoxical: to initiate a new type of cooperation between the government and society the government needs a broader vision – a vision based on an integrated approach to the environment. After all, the sustainability issue involves various policy fields, such as housing, participation, spatial planning, the environment and taxation.

An integrated approach to the environment is particularly useful because citizens are worried about changes to their local, often highly valued, surroundings. If society wants to make the transition to a clean economy, this will unavoidably involve the construction of new infrastructure, also in people's immediate surroundings. For example, electricity is becoming increasingly important as a form of clean energy. This requires new high voltage networks and smart meters in homes. Technologies such as supergrids, that enable electricity to be sent long distances without excessive loss, and smart grids, that connect many different products and consumers to each other, simplify the sustainable society challenge. However, if the government tries to implement these changes top-down it runs the risk of alienating society. Policy legitimacy is then at stake.

By approaching the issue from the perspective of the energetic society, the government can gain effectiveness and legitimacy. It needs to view citizens as producers and allow scope for cooperation between public organisations, businesses and individuals. This is where the energy will be found that will generate a broader dynamism. Ensure that society is not the last consideration in policy development, but work from the perspective of society. A clean economy and pleasant surroundings are aims that motivate individuals and businesses, as well as an understanding that these gains are not made at the expense of other people, either elsewhere or later. Good starting points for such a mindset are available to government in urban areas. The Netherlands has become a country of regional cities, within which much will need to change in the coming decades if we are to meet the sustainability challenge.

The financial crisis has made it necessary to find new policy strategies, and it is therefore in the cities in particular that new creativity is to be found. It is important that this creativity is immediately focused on the sustainability challenge facing society. The development of an environmental perspective, therefore, will combine new opportunities for individuals with a reduced ecological footprint and improvements in the quality of our local surroundings.

The role of national government

When the national government places greater responsibility with decentralised public organisations, citizens and companies, it is important that it also considers its own responsibilities. In the governance philosophy of the national government, the focus should then be on making use of the dynamism in society. Ambitious, enduring targets, incentives and a desire for lifelong learning could be part of such a philosophy. The Netherlands could benefit from a *radical incrementalism* philosophy, in which national government commits to realising a clean economy and focuses on the course to be taken, on learning from mistakes and accelerating the dynamism of change. The government does not have a monopoly on wisdom, but it is capable of focusing society's learning capacity on what it sees as the important public issues. It therefore needs to focus on policy evaluation and continuous selection. Take the purchasing power of government as an example. This is a valuable strategy for increasing the market share of sustainable products. However, it requires that the government learns from the first phase of such a purchasing system. It needs to evaluate the system, scrap excess bureaucracy and so increase the effectiveness of and support for the valuable tool that is sustainable purchasing. The same applies to product certification: the first phase concerned the development and proliferation of products; the second phase must be about selection. The government can increase the effectiveness of instruments, possibly in cooperation with public organisations (e.g. trade organisations and NGOs), by ensuring that the range of tools implemented remains as stable as possible. Should circumstances change, the choice of tools should be adapted to reflect such change.

The national government is also responsible for ensuring public access to information. Readily accessible open networks and openness over the sustainability of public organisations and companies helps the energetic society flourish. If the national government, following the US, British or Japanese model, asks public organisations and companies to publish their data (on emissions, for example), and guarantees the transparency of the whole process, this would have a disciplinary effect. Fast and continued feedback on own behaviour and its consequences are also important for behavioural changes within society.

National government also has the task to provide the necessary infrastructure. This will concern more than quantity (capacity) in the future, when quality and flexibility will become increasingly important. Infrastructure strategies allow the government to highlight its long-term objectives. If, for example, the long-term

objective is an energy supply that makes the maximum use of renewable sources, then the Trias Energetica would be a logical starting point. Energy savings would then have the highest priority, followed by the use of renewable sources. If, finally, fossil fuels are used, this must be done as economically and efficiently as possible and at a minimum cost to the environment.

Sustainable innovation ultimately creates wealth but is not without pain

The transition to a clean economy will provide individuals and businesses with new opportunities and can improve quality of life, as shown by the OECD. However, a clean economy assumes a willingness to resist vested interests, based on unsustainable production or consumption patterns, and to open up existing routines for discussion.

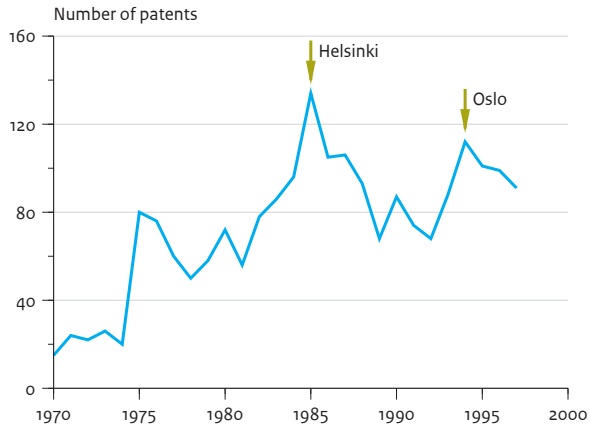
This requires a fundamental system change. However, this is not possible without what the economist Schumpeter calls 'creative destruction'. Economic development is a bumpy ride, in which old technologies, production processes, institutions and structures that no longer conform to modern standards, fall along the wayside. If the government continues to support such products or processes it slows down the required transition and reduces scope for new opportunities.

Effective governance at multiple levels

In this report, we have discussed a number of tasks that are best left to national government. However, naturally, today's administrations are many times more versatile than those of the past. Effective governance requires multiple levels, each of which with its own orientation and strength. As the local environment benefits greatly from a decentralised administration (province and council), in a similar manner small and medium-sized enterprises greatly benefit from national government. Here we cannot expect to see the effects of long-term objectives, but of product and process requirements that need to be implemented within a few years. Effective energy and climate policy on the other hand was, and remains, predominantly a European affair. Here we have a great responsibility in the coming years, for example, to strengthen the emissions trading system. Let us also not forget that legislation creates market opportunities. Markets and legislation, therefore, are not incompatible. Clear, collective emissions standards agreements have contributed to peaks in innovation, as shown below in a graph showing patent development and international protocol negotiations for sulphur dioxide emissions reductions (Figure 10). The number of patents also increased after the Kyoto protocol was finalised (EPO, 2010). The European Union is important as a level at which legislation can be set without resulting in a competitive disadvantage for businesses in the separate Member States.

Figure 10

Protocol for sulphur dioxide reductions



Source: Dekker et al. (2009)

The task for the future is to create greater synergy between the actions taken at these administrative levels. The development of networks therefore does not represent the end of government authority, but requires a redefinition of the governance philosophy (see Rhodes in Hajer and Wagenaar, 2003).

In conclusion

PBL model calculations show that a clean economy is theoretically achievable by 2050. However, the magnitude of the sustainability issue is such that policy only has a chance of success if it results in an active quest for new operational options at *all levels* and amongst *governments, individuals and businesses*.

The government does not have a monopoly on wisdom, neither in defining social objectives nor in deciding on the best way to achieve such objectives. Objectives will change, as will the best path to be taken (Westley et al., 2006). This means that policy must be adaptive to some extent, so that government can respond flexibly to changing circumstances or new insights.

The path to a clean economy clearly requires intensive guidance. It also requires a coordinated transition from the industrial phase and its heavy use of resources, to a more sustainable phase with an awareness of ecological limits (Homer-Dixon, 2006). There are many social mechanisms that hinder the required change. Policy

analysis will continue to be needed to help anticipate such problems, but also to help quickly identify new reference points, understand transition catalysts and consider cutting-edge policy instruments. The government will also need to work in closer cooperation with society. The possibilities offered by ICT and the presence of articulate, creative citizens provide opportunities for using the energetic society to realise major objectives, objectives that citizens also consider to be a challenge.

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Government has much to gain from a better utilisation of its citizens' creativity and innovation potential. With a different philosophy of governance as well as a new mindset, government may effectively improve development towards a cleaner economy.
Ecological boundaries are well-known. Many entrepreneurs and institutions already consider ecologically responsible behaviour as a precondition for success within a changing world; a world in which nine billion people are all entitled to their share of scare resources. By combining the mindset of 'green growth' with 'the energetic society', a new perspective is created on the role of government: one that considers the long term and that creates opportunities for society. In this report, PBL describes ways in which such a new philosophy of governance could be formed.

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