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Assessing the Dutch Energy Transition Policy: How Does it Deal with Dilemmas of Managing Transitions?

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ABSTRACT *In the Netherlands, the national government is committed towards altering the systems of energy, transport and agriculture in the name of sustainable development. A process of deliberation and change was started—aimed at achieving 'transitions'—using a model of transition management. This paper examines how the new arrangements of governance for energy transition deal with six problems of steering: ambivalence about goals, uncertainty about cause–effect relations, distributed power of control, political myopia, determination of short-term steps for long-term change and the danger of lock-in to new systems. The Dutch experience shows that transition management is applied in ways different from the original model (established players play a too great role) but it appears a useful model of reflexive governance, combining advantages of incremental politics with those of planning. It helps to orientate innovation policy and sectoral policies to sustainable development goals and to exploit business interests in system innovations in a prudent manner.*

KEY WORDS: Energy transition, sustainable development, governance, transition management

Key Problems in Steering Societal Change Towards Sustainability Goals

Sustainable development is about the *redirection* of development (WCED, 1987). It is not about an identifiable end state (Kemp *et al.*, 2005; Meadowcroft, 1999; Meadowcroft *et al.*, 2005; Voß *et al.*, 2006). Sustainable development is a contested concept. The requirements of sustainable development are multiple and interconnected. As an inherently dynamic, indeterminate and contested concept (Mog, 2004), sustainability cannot be translated into a blueprint from which criteria can be derived and unambiguous decisions can be taken to get there. From a governance perspective such disagreement is an *essential* part of sustainable development, one that makes operationalization difficult (Farrell *et al.*, 2005).

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Sustainable development sparks debate about the capacities of political steering and governance (Voss & Kemp, 2006). Capacities for steering are limited because of several problems: ambivalent goals; uncertainty about cause–effect relations and, distributed power of control (Funtowicz *et al.*, 1998; Roe, 1998; Voss *et al.*, 2006); political myopia; determination of short-term steps; and a danger of lock-in (Kemp & Loorbach, 2005).

The next section discusses these points in more detail and then uses them to evaluate Dutch energy transition policies. These issues are quite clear and well known among policy scientists. Lindblom (1959; 1965; 1979) argued for incremental politics, which is concerned with *ills* rather than visions. He later elaborated his viewpoints in a model of partisan mutual adjustment, a model that is today being called network management. The advantages of a strategy of mutual adaptation are clear: being based on *quid pro quo* it will produce mutual gains for all. It is a useful model for achieving wins through no-regret policies but ill-suited for achieving structural changes or transitions, for example in the energy system. Models of interactive governance based on negotiation will fail to achieve fundamental change *unless* there is a commitment to long-term change that is underpinned by institutions towards this end.

This article outlines a model of managing long-term change in production–consumption systems which appears to be a useful model for working towards system innovation and transitions offering sustainability benefits. The model is called transition management and is currently used by the Dutch government to manage the transition to a low-carbon energy system. Transition management combines the capacity to adapt to change with a capacity to *shape change* (Rammel *et al.*, 2004) and is concerned with positive goals (collectively chosen by society following a process of problem structuring).

Dealing with Dilemmas for Steering

The following section investigates how the mentioned problems for steering may be addressed. The problems are slightly reformulated.

Problem 1. Ambivalence About Goals

Complex societal problems related to sustainability are characterized by dissent on goals, values and means. Different people have different perspectives on what is being discussed as 'the problem', they have different values and favour different solutions. For example, there is no consensus on what sustainable energy or agriculture means in practical terms. For some people, biological agriculture is the only sustainable form of agriculture; for others the larger land requirements of biological farming make it non-sustainable in a global context. Each option has its own setbacks, some of which are only revealed in the course of time.

A proximate solution to the problem of dissent is: continuous and iterative deliberation and assessment. Even in the case of dissent about appropriate solutions, it may be possible to come to define key parameters for a future system, such as a sustainable energy system that is reliable, affordable and low in CO_2. Other parameters could be added, for instance the criterion of no biodiversity loss (relevant for bio-energy). Problem structuring methods (Rosenhead & Mingers, 2001) may be used to get to a shared problem definition about the

non-sustainable aspects of the current system. This does not solve the problem of ambivalence but helps to reduce or clarify it.

Problem 2. Uncertainty About Long-Term Effects

Knowledge of ecological cause-and-effect relations is often limited, most especially in the beginning but also quite frequently at later times (e.g. acid rain processes are still not understood completely thirty years after their discovery). It took a long time to understand the effects of sulphur emissions and a very long time to link lung cancer to asbestos. We also face uncertainty about the effects of intervention and the long-term effects of socio-technical transformations, in part because the effects depend on contingencies. With regard to interventions, there is the dilemma of control (Collingridge, 1980), which holds that the capacity to shape a new development is greatest at the time when we know the least: when the effects become apparent it is difficult to alter the course of development because of sunk investments and interests vested in the continuation of the path of development.

This cautions against rapid new development(s) and calls for the creation of intelligence about long-term effects and the creation of adaptive capacity. Knowledge of the long-term system effects of technology might be understood more fully through risk assessment, technology assessment and monitoring of effects. The capacity to react can be enhanced through flexible designs (Verganti, 1999), adaptive management (Lee, 1993; Walker *et al.*, 2001), the use of portfolios and the use of capital-extensive solutions with relatively short life times (Collingridge, 1980).

Another source of structural uncertainty towards the future lies in the preferences and needs of citizens and society at large, which are subject to change. More often than not, policies are based on the presumption that societal preferences are unchangeable or at least stable. However, especially in the case of problems related to sustainability, preferences and needs will change over time and indeed also need to change. Uncertainty in this respect is thus, simultaneously, a reason for future-orientated policies to become more robust, diversified and adaptive, and a reason for developing anticipatory strategies that help influence and change current preferences and need to support a more sustainable society.

Problem 3. Distributed Control

In pluricentric societies development cannot be steered from the top (Kooiman, 1993; Pierre, 2000). Control power is distributed over various actors with different beliefs, interests and resources. Influence is exercised at different points, also within government, which consists of different layers and silos (compartments), making unitary action difficult or simply impossible. The distributed nature of power and capacities for control, calls for joint decision-making and network management (de Bruijn & Heuvelhof, 1995; Kickert *et al.*, 1997). However, current modes of network management in public governance are not equipped for long-term change. They are too little concerned with long-term ends. A form of interactive governance is needed, concerned with expressing long-term aims and the management of transition processes. The formulation of socio-technical visions for meeting long-term aspirations helps actors to coordinate their action and do useful things for their own personal sake and for society at large

(Grunwald, 2004). Visions help to make explicit what is involved in wide-ranging change, which is useful for thinking, for assessment and, of course, also for action (Smith *et al.*, 2005).

Visions fulfil positive functions for action but there are also negative aspects. First, visions are not expressed by society but by individuals or social groups (Grin, 2000). Visions are related to interests. Secondly, the outcomes of the process of change involved may not constitute true progress. There may be important societal costs that outweigh any benefits. This is why it is important to explore multiple visions and to be reflective about them. Visions for sustainability should be assessed constantly. Participatory integrated assessment is a useful approach for this.

The key question for steering here is how diverse concerns and diverse knowledge can be utilized for long-term societal change offering sustainability benefits at all levels between the local and the global. Here one could rely on possibilities for self-organization available in society. Space for interaction and innovation can be created at the national level. At the local and regional level, this can be done in the two ways: first by allowing local government an amount of discretion regarding what to do and, secondly, by stimulating local actors to reconsider basic assumptions about problems and solutions and their 'normal' way of dealing with issues—to open up the problem space and solutions space. The knowledge and judgement of local decision makers should not be suppressed but be utilized. Beck (1997) argued for the reinvention of politics, "the shaping of society from below", with actors acting on lessons learned at different places. Functional coordination, cross-linking and integration are common strategies for dealing with problems of distributed control but they should be practised reflexively.

Problem 4. Political Myopia

From historical studies (Geels, 2005), it is known that transitions in socio-technical systems take at least one generation (25 years), which means that they span various political cycles. The management of purposive transitions in some way must survive short-term political changes. There is no simple solution for this except that policy makers and politicians have to accept that a transition is needed. For politicians to accept this they have to be convinced that a problem needs fundamental change and that time is needed for such a change to occur. The change process then must be instituted gradually, through transition agendas, programmes, supporting organizations, implementation strategies and reflexive arrangements in ways that help to deal with changing circumstances and political wishes (co-evolution), which means that the institutions should be adaptive.

Problem 5. Determination of Short-Term Steps for Long-Term Change

It is often unclear how long-term change may be achieved through short-term steps. Short-term action for long-term change presents a big problem for decision makers at all levels. There exists little theory on how to do this. A dual strategy of foreseeing and backcasting based on integrated system analysis may be useful here. Such an integrated system analysis may help to analyse the characteristics and origin of a persistent problem, identify key themes of issues for change

and demarcate the subject itself. The reasoning forward would be based on trend analysis and foresight, developing future visions, long-term ambitions and (intermediary) goals (Von Schomberg *et al.*, 2005; Weber, 2006). Participatory backcasting (Quist, 2007; Weaver *et al.*, 2000) and the development of transition agendas, target images and transition paths (Loorbach 2007; Rotmans, 2005) help to identify strategic experiments and help to set goals for new sociotechnical systems.[1] Such a process helps to identify useful steps in the form of short-term actions that generate useful lessons and facilitate further change (Grin & Weterings, 2005; Kemp & Loorbach, 2005). An important role is envisaged for strategic experiments for learning about user satisfaction, sustainability aspects, critical problems and for creating networks for cooperation.

Problem 6. Danger of Lock-in

As with old solutions, there is a danger that one gets locked into particular solutions that can be viewed as 'non-optimal' from a longer-term perspective.[2] A solution for this is the development and use of a portfolio of options (Weber, 2006) in the context of a transition agenda. A transition agenda is a shared strategy for social change that is based on a shared consensus about the need for structural change and about an overall direction. Within this context, so-called thematic target images are brought together with a collection of different transition paths towards these images. This approach allows for diversity and competition while simultaneously maximizing the potential for synergies and co-evolution. At the level of particular solutions (i.e. the level of options within transition paths) there is a lot of uncertainty about which solution (i.e. technology option, investment) is best. Portfolio management is a good strategy here which is widely practiced in finance and large business. Support for options could be based on promises and specific benefits for the nation or region in which it is used. Support should be given to not just one option but to a portfolio. The portfolio of promising solutions would safeguard against the operation of markets favouring short-term solutions. Of course, the portfolio should be regularly reviewed and adapted, i.e. it should be dynamic. Phase out of support should be part of portfolio management. A second strategy is simply to be prudent, and not to go for the best available solution but to take time to wait for better solutions and spend money on their creation.

All this serves to show that at least proximate solutions (ideas for what to do) exist for the six identified problems for steering, which in our view constitute the most important problems for sustainable development policy.

The Model of Transition Management

The model of transition management is a model for governance developed to deal with persistent problems that require systemic change. Persistent problems are complex, uncertain, difficult to manage, hard to grasp and operate at different scale levels (Rotmans, 2005). Examples are the global climate change problem, the agricultural problem and the mobility problem. They are deeply rooted in our societal structures and there are no ready-made solutions for them: sectoral or partial solutions already soon become part of the persistent nature of these problems. The model of transition management has been developed by the authors, in interaction with policy makers, and is described in Rotmans *et al.* (2000; 2001)

and elaborated in Kemp & Rotmans (2004; 2005), Kemp *et al.* (2007) and Loorbach (2007). The basic philosophy is *goal-orientated modulation*: the utilization of ongoing developments for societal goals. The model is based on notions from Integrated Assessment and insights from innovation theory, especially the work on technological transitions (Freeman & Perez, 1988; Geels, 2002; 2005), the work on path-dependence (Arthur, 1989; David, 1985) and on sustainable development and participatory policy approaches (Rotmans, 1998).

Transition management is a new steering concept that relies on 'darwinististic' processes of guided variation and selection instead of planning. Collective choices are made 'along the way' on the basis of (new) learning experiences at different levels. Different trajectories are explored and flexibility is maintained, which is exactly what managers would do when faced with great uncertainty and complexity: instead of defining end states for development, they set out in a certain direction and are careful to avoid premature choices.

Key elements of the transition management cycle are anticipation, learning and adaptation. The starting point is the structuring of problems. This is followed by the development of long-term visions and goals. Visions of sustainable development for energy supply and other domains are being explored through transition experiments as part of programmes for system innovation that are defined in transition arenas, bringing together private and public actors. Transition management as a model of governance relies on a cycle of problem structuring, visioning, experimentation, policy development, implementation and adaptation.

The visions help to define experiments and programmes for system innovation, the lessons of which should lead to a *revision* of the visions and to the identification of new things to do (new experiments and changes in the policy framework).

Transition management has elements of planning through the use of goals and programmes for system innovation but does not aim to control the future. It relies heavily on market forces and decentralized decision making. It does not blankly rely on market forces, but is concerned with the conditions under which market forces operate, by engaging in 'context control' so as to orientate market dynamics towards societal goals. It consists of government acting to secure circumstances that will maximize the possibilities for progressive social movement by promoting innovation and mitigating negative effects (Meadowcroft, 1999). Private initiative is thus not curtailed but rather reorientated towards those activities that serve not only private goals but also serve social goals. This is done through programmes for system innovation and through the use of policy goals providing guidance to societal actors.

Conflict is kept within bounds but is accepted and even viewed necessary (same as in the "compass and gyroscope" model of Lee (1993) for combining science with politics). The structuring form is that of *heterarchy*: modification of structural links and modification of the self-understanding of actors (identities), strategic capacities and interests of individuals and collective actors and hence their preferred strategies and tactics (Jessop, 1997).

Transition Policy for Sustainable Energy in the Netherlands

This section examines the ways in which the problems of steering were confronted with transition management as a guide. A full account of Dutch transition policies

cannot be given; refer to Harmsen (2006), Kemp & Loorbach (2005), Kern & Smith (2007) and Rotmans (2005) for that. The model of transition management informed Dutch transition policies as a general frame (ideograph). It was originally developed for the Dutch government in 2000 who embraced the transition concept in the government white paper *A willing world* [*Een wereld en een wil*]. The government took over a good deal of the concept of transitions and transition management. It took a long-term orientation as a starting point and adopted a strategy of keeping options open for a certain time. It created transition arenas (platforms), developed transition pathways and started up about one hundred experiments. In doing so, it adhered to the principles of transition management. By 2007 the new cabinet has taken the energy transition as one of its pillars to achieve a sustainable energy supply system in the Netherlands. But it started as a niche project within the Ministry of VROM (Environment and Spatial Planning) and was picked up as a serious policy experiment by the Ministry of Economic Affairs. This section assesses in what way the Ministry of Economic Affairs has dealt with the problems of steering towards sustainable development by using transition management.

Problem 1. Dissent and Ambivalence About Goals

There was little dissent about the need for change amongst the actors involved in sustainable energy (ministries, business companies, NGOs and knowledge institutions), but a broad public and political awareness regarding the issue was absent around 2000. Because of global changes, such as the Middle East conflict, rising oil prices, Russia's gas threat, but also local climate pollution, high energy bills and extreme weather, this has changed significantly. It helped to create an image of the current energy system being unsustainable and increased the attention given to nuclear power, CO_2 storage and biomass import as possible solutions. There is by now a wide consensus among the energy experts that the current energy system based on fossil fuels is not sustainable environmentally, socially or economically. The Netherlands was and still is committed to greenhouse gas reductions through the Kyoto process which is viewed as a first step. Fossil fuel-based visions based on carbon capturing and sequestering are accepted so far, in addition to other visions based on renewables and energy efficiency. Nuclear energy was put forward as a transitional (temporary) option by the energy transition task force but did not become an official transition path. Neither the Ministry of Economic Affairs nor the industrial actors active in the platforms of the energy transition favoured it, but there seems to be a strong national and international lobby. Dissent did not obstruct the selection of transition paths and setting of long-term goals, mainly because this approach allows for diversity and different, competing, options based on the idea of variation and selection. This portfolio approach fitted with Dutch culture and growing policy beliefs that it is best to rely on an adaptive portfolio. The exploration and use of various options fits with the model of transition management, which is based on an evolving portfolio.

The vision that ultimately emerged from this process, a sustainable energy system in 2050 is defined as: (i) clean (climate-robust, i.e. a CO_2 reduction of 50 per cent); (ii) affordable (low prices and functional); and (iii) secure (guaranteed and reliable supplies). This is supplemented by more specific goals such as the goal to increase the annual rate of energy saving from 1.5 per cent to 2 per cent

a year and the target of 30 per cent for green energy sources by 2030. The goals were set by the energy transition platforms created by the Ministry of Economic Affairs.

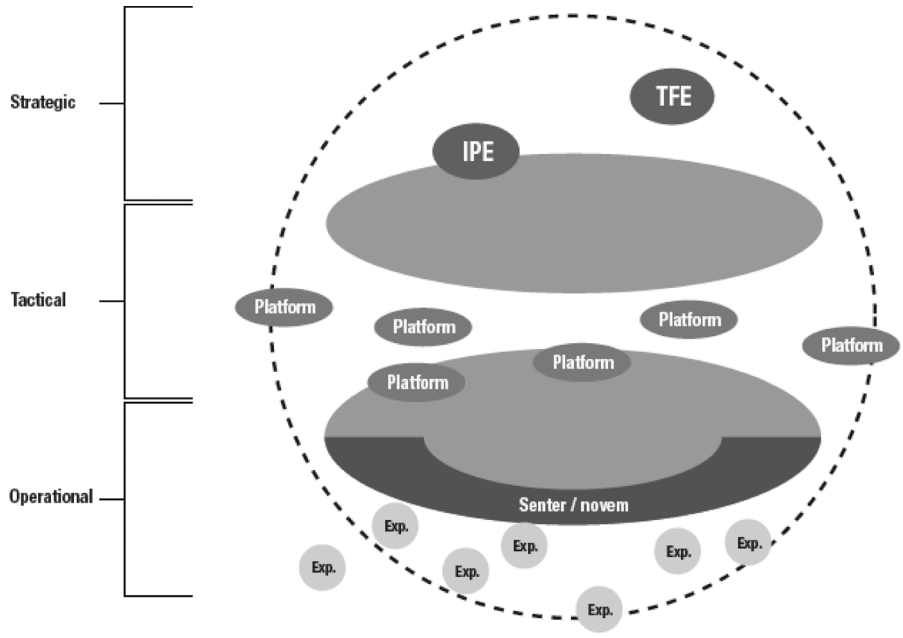
Problem 2. Dealing with Uncertainty

The long-term system effects of various energy systems were not given much attention. They were explored only superficially. A long-term study of ECN about energy and society in 2050 looked at the various long-term options but did not examine in any detail the sustainability aspects.

A scenario analysis was used to identify robust elements of energy futures, leading to the selection of new gas, chain efficiency, biomass resources (for energy but also for other purposes), alternative motor fuels, and sustainable electricity as main routes (*hoofdroutes*) of the energy transition. During the process scenario thinking and other approaches for exploration were not used systematically at the level of the whole energy system in international context, although a number of platforms also used forecasts and predictions specific for their subject. For the main routes special transition paths were selected by specially created transition platforms involving private and public actors. The choice of

Table 1. The energy transition themes, goals and paths chosen by the platforms

Theme	Goal	Transition path
New gas	To become the most sustainable gas country in europe	Decentralized electricity generation Energy efficient greenhouses Green gas hydrogen Clean fossil fuels
Sustainable mobility	Factor 2 reduction of GHG emissions for new vehicles in 2015 and factor 3 reduction for all vehicles in 2030	Hybrid propulsion Biofuels Hydrogen vehicles Intelligent transport systems
Green resources	Substitution of 30% of resources for energy by green resources by 2030	Biomass production in NL Chains for biomass import WISE Biomass co-production Synthetic Natural Gas Sustainable chemistry
Chain efficiency	20–30% extra improvement of product chains by 2030	Optimising the waste chain Precision farming Process intensification Multimodal transport Clearing house for bulk products Symbiosis (closing material loops) Micro cogeneration Energy efficient paper production
Sustainable electricity supply	To make electricity supply more sustainable	Renewable energy sources Decarbonisation and cogeneration Electric infrastructure Electricity use
Built environment	To accelerate energy improvement programmes and stimulate new innovations	Energy improvements in built environment Development and implementation of innovations Removal of institutional barriers



Source: Loorbach (2007)

Note: Exp. stands for transition experiment; SenterNovem is the government agency responsible for implementation of innovation policy

Figure 1. . The strategic, tactical and operational elements of transition management

the transition paths occurred over a period of six years and resulted in the selection of 28 official transition paths. An overview of the paths is provided in Table 1.

The paths are paths for exploration, not implementation. The crux of dealing with uncertainties is that, rather than making definite choices, small-scale experiments are set up and executed from which much can be learned, so that better information is available later on the (un)sustainable aspects of pathways and the related experiments. In this respect better-defended choices can be made by better-informed actors, such as decision makers. Some paths will obtain extra support (from public and private sources) than others.

Problem 3. Distributed Control

The issue of distributed control was dealt with through the creation of a task force (TFE) in 2005 and the creation of a directorate for policy coordination across various ministries (IPE), the creation of networks and platforms of private and public actors to identify attractive transition visions, paths and, finally, the fostering of coalitions for transition experiments. In theoretical terms these are referred to as strategic, tactical and operational types of transition management (Loorbach, 2007). A graphical representation of this can be seen in Figure 1.

The transition platforms form the heart of the transition (Aubert, interviewed in Kern & Smith, 2007) and their activities are described further on. They played a pivotal role in the selection of main routes, the selection of transition paths and identification of transition experiments and the development of the broader transition community. Responsibilities for the selection of transition paths were

devolved to the transition platforms, bringing together business actors, energy experts, people from government and civil society.

At this tactical level various networks, alliances and communities were formed around the diverging transition pathways. New institutional arrangements were developed, amongst others the UKR-arrangement (unique chance arrangement), and a service office for frontrunners.

In May 2006 a transition action plan was presented to the Dutch government. The action plan, written by the task force energy transition, was based on inputs from the platforms. Apart from presenting 26 paths, it argued for the doubling of energy innovation expenditures (from €1 billion to €2 billion a year to be paid out of the general government budget instead of through special taxes) and made a plea for "consistency and continuity of policy based on a long-term vision about sustainable energy".

For discussing transition issues among various departments and to foster collaboration, a directorate was created: the interdepartmental programme directorate energy transition (IPE). The directorate is located at the Ministry of Economic Affairs and encompasses 30 civil servants from six ministries. The impulse for the directorate came from stakeholders involved in the energy transition who developed pressure on the government to re-organize policies and combine them (Kern & Smith, 2007). The creation of such a directorate fits with the transition management philosophy and is an example of endogenous institutionalization (self-organization).

Problem 4. Political Myopia

Structural change in infrastructure-bound systems, such as the energy system, is politically difficult. Any fundamental change in an industry's core technologies creating losers, such as regional unemployment problems, is difficult to bring about politically and is possible only exceptionally (Janicke & Jacob (2005), quoted in Kern & Smith, 2007). Substantial political stability and resilient coalitions are required to keep reform from being derailed (Meadowcroft *et al*., 2005). So far, transition management has survived four government changes (new cabinet Kok and three cabinets Balkenende). The reason for this is that in the first five years it was, politically, not very salient; transition matters were in the safe hands of ministries. The report of the task force in May 2006 changed this by attracting more attention to the energy transition. What began as an experiment in policy innovation became an institutionalized process, which is currently supported by the main actors: Ministries, cabinet and the main advisory councils—SER and VROMRaad. Political parties accept the basic idea of an energy transition. Arguably, the ambiguity of transition ideas aided their popularity (Hendriks, 2006, Smith & Kern, 2007).

The problem of distributed powers of control is thus dealt with by giving an important role to the transition platforms. In later stages the role of the transition platforms will become less important, and politics more important. Firm support has been obtained for the energy transition, with many parties collaborating with each other. The problem of distributed control was thus 'solved' through the strategic use of distributed control. Without the binding notion of transition, not so many parties could have been mobilized.

Problem 5. Determination of Short-Term Steps for Long-Term Change

Perhaps the strongest aspect of transition management is that it offers a practical model for connecting long-term thinking with short-term action without relying on planning. The selection of transition paths and the use of strategic experiments, called transition experiments, help to work towards long-term change in the form of system innovation. The transition experiments (old and new ones) should set into motion learning processes and foster institutional change, such as the creation of networks, standards, new procedures and practices. They constitute a bottom-up mechanism, which should work in tandem with top-down activities consisting of choices about transition paths eligible for support and government policies.

Transition experiments are supported by the "Unieke Kansen Regeling" of €35 million.[3] In order to qualify for support the experiments should: (i) be part of an official transition path; (ii) involve stakeholders in an important way; and (iii) have explicit learning goals for each of the actors of the consortium. Transition experiments for new gas are:

- buses on natural gas in Haarlem/Rijnmond;
- liquefied natural gas as a substitute for diesel;
- CO_2 delivery to greenhouses in the horticulture sector;
- urban transport using compressed natural gas in the north of the Netherlands;
- heating from biogas in the Polder district in Zeewolde;
- pilot project on micro-cogeneration in households.

Problem 6. Danger of Lock-in

The issue of lock-in received a lot of attention in transition thinking, both the current lock-in to fossil fuels and dangers of becoming locked into new solutions. It is one of the reasons why a dynamic portfolio of options is supported. It is worth noting that the director of the energy transition (also the chairman of the IPE), Hugo Brouwer, perceived the energy transition in evolutionary terms. He sees the energy transition as a process of "accelerated evolution" (Shell-venster, May/June 2005), i.e. the outcome of processes of variation, selection and retention. Selection would occur through the market and political process. The current portfolio is very broad. Maybe it is too broad but it will become narrower in the process of market introduction. It is interesting to observe that the task force in the action plan for energy transition argued for a new coal-gasification plant

Table 2. Participation in the private-public platforms of the energy transition

Platform	Government	Business	NGOs	Intermediaries[1]	Science	Total
Green Resources	1	6	1	1	6	15
New Gas	1	6	1	1	3	12
Chain Efficiency	1	6	0	1	3	11
Sustainable Mobility	3	10	3	0	0	16
Sustainable Electricity	1	3	0	0	3	7
Built Environment	0	4	4	2	1	11

[1] The category *Intermediaries* encompasses representatives from municipalities, SenterNovem (excluding the secretaries), the provinces, regional initiatives (such as Rijnmond) or national advisory boards such as SER.

and a new nuclear plant for achieving quick CO_2 reductions, to complement the transition paths approach orientated towards system innovation. These goals, along with the *modus operandi* of the task force, were not received well by the platforms. Whilst the portfolio is broad, the criteria on which it is based are rather narrow. There was a very strong focus on CO_2 reduction.

Differences with the TM Model

In what ways do the transition initiatives differ from the model of transition management? The first and main difference is that outsiders are scarcely involved (Hendriks, 2006; Hofman, 2006; Loorbach, 2007; Loorbach & Kemp 2007; Rotmans, 2005). The process is dominated by regime actors (business and energy specialists), as can be seen in Table 2. Regime actors play an important role, especially in the task force headed by Rein Willems, the director of Shell-Nederland.

Hendriks (2006) spoke of "a democratic disconnect". Whilst she is right on this, several actors invited to the platforms declined to be involved. The *Consumentenbond*, the largest consumer organization, felt it lacked knowledge about energy innovation and transition issues. The projects themselves are innovative and some of the transition paths are very radical also for the companies concerned. None the less it would have been better if more niche parties could have been involved as one can expect them to embrace radical innovation, since they have no interest in the *status quo* (Rotmans, 2005).

Secondly, up until now, demand-side issues and wider issues of societal embedding have been neglected. The transition experiments are very technological by nature; they are hardly aimed at institutional or cultural change. They consist of rather low-risk projects primarily related to CO_2 reduction (and not, for instance, to security). Further, the aspect of scaling up experiments is not addressed at all: how the experiment may foster changes in networks, mental models, structures and regimes and, in so doing, contribute to a regime shift.

Thirdly, little attention was given to strategic issues of integrated system analysis and problem structuring. An old scenario for the energy system was used. Participatory scenario development (advocated for transition management by Sondeijker *et al.*, 2006) was not part of the process (Loorbach & Kemp, 2007). Sustainability assessment did not play an important role. Only for biofuels was a large study commissioned to determine criteria for "sustainable biofuels".

Fourthly, the role of the task force is dubious from a transition perspective. On the one hand it has led to an acceleration of the energy transition process, because they set the energy transition high on the political agenda, influencing high-level politicians and policy makers. However, on the other hand, the current task force is quite autonomous and imposing, putting pressure on the other bodies/constituencies of the transition process. It consists mainly of regime players, trying to defend their own interests, while the very idea behind transition process is to create enough space for frontrunners, pioneers (first movers). The task force might limit the amount of space for frontrunners.

The model of transition management has thus been followed only partially. It is not believed that the above issues will be taken up in some way. The platforms have already been asked to pay more attention to non-technology issues. As a possible sign, all three transition paths of the sixth platform founded in 2007 are non-technological. They are about creating institutions and incentives for energy saving. Also, the role and composition of the task force and platforms

are being debated, probably leading to significant changes in the near future. This is aided by the central position of energy transition in the new cabinet's policies, which has led to debates and political games within the government over responsibilities, money and stakes.

Overall, energy transition in the Netherlands is considered a success in creating a new discourse, framework and orientation which is widely supported. Nevertheless, although many of the recommendations of the original model have been followed, transition management is not the open, reflexive process it was supposed to be. The transition paths have been chosen by people in the platforms (in which the business voice is prominent). There has been little cooperation between the platforms or mutual learning. It has not become politically salient in parliament and society is not really involved in it. The portfolio of alternative energy technologies is very broad but this is not necessarily a bad thing. There is a danger that by formalizing the transition paths as a basis for investment, regulation and policy decisions, they become a goal in themselves instead of a means. On the other hand, the issue of lock-in is being considered. It is one of the reasons why the Ministry of Economic Affairs opts for a portfolio approach and relies on the use of variation and selection processes.

So far the attention to transitions has not resulted in the changes in fiscal policies or in environmental policies that will be needed to change the energy supply system (Berkhout *et al.*, 2004).[4] Instrumental issues about transition management are currently worked out by the task force and people from the ministries. It will be interesting to see what kind of market pull is going to be used and how the government or a new transition council is going to manage the portfolio of technology options. Public procurement will probably be one of the instruments that will be used, together with subsidies and long-term agreements. The government wants to achieve a good balance between deployment and innovation. Cost efficiency is an important consideration for deployment policies. The creation of new business opportunities is a criterion for innovation. For the built environment, regulations will be used. The regulations will not be technology prescriptive. No plans are being made to phase out unsustainable energy technologies, which suggests that a regime change has to occur through markets.

Reflections

Sustainable development is generally viewed as requiring a change in the trajectories of development (WCED, 1987; Weaver *et al.*; 2000) but we lack models to achieve this. Any model of sustainable development must deal with problems of ambiguity and dissent, uncertainty and distributed powers of control. This article described a model of reflexive governance that aims to modulate ongoing developments to sustainability goals through changes in governance (participatory and value-focused) and adaptive policies for system change. This model is called transition management for the reason that it is concerned with transition processes of systems change. The model is currently used in the Netherlands to 'manage' transitions to alternative energy, agriculture and transport systems. It is believed to be an interesting model for sustainable development because it deals with the problems of ambiguity of goals, uncertainty about socio-economic dynamics, distributed control and political myopia through reflexive learning (using integrated assessment, problem-structuring and social experiments).

Transition management is a new steering concept that relies on processes of variation and selection by making use of 'bottom-up' developments but also top-down elements, such as long-term goals (based on a sustainability vision) both at the national and local level. Governing processes are opened up for interaction and feedback relations with an important role for subpolitics (Beck, 1994; 1997) and actors interested in system innovation.[5]

The use of transition management for the transition to a sustainable energy system illustrates how collective long-term ambitions and a shared agenda can go hand-in-hand with short-term diversity, experiments and even dissent. Transition management is, by definition, about using the energy that arises out of the interaction between long-term consent and short-term dissent through learning-by-doing and doing-by-learning. By an integrative and outward-looking analysis of societal dynamics, the capacity to anticipate is being improved and alternatives can be developed in a timely fashion.

Choices about goals, means and instruments are being made as part of iterative processes, although the final decisions and implementation are still predominantly made through formal and regular political and bureaucratic structures. It is not a return to planning but a form of context steering that is concerned explicitly with learning and innovation, including institutional innovation.

The principles of transition management have been followed broadly, but now a critical phase occurs when important instrument choices are to be made. Much of the success of transition management will depend on these. The policy commitment to achieving a transition in the energy system and creation of networks of innovative actors should help to make instrument choices (such as fiscal changes, special funds, the use of regulations and use of innovation waivers) necessary for a transition to occur. Transition management should thus help to do what economists tell governments to do: to internalize external costs—something that is hard to do in a world of special interests. By creating special interests in system innovation it may be easier to take those measures and to go beyond support measures in the form of subsidies.

Whether a radical change in the energy system will be achieved through transition management remains to be seen. However, it has already been shown that problems of ambiguity, uncertainty and distributed control need not necessarily paralyse society and that it is possible to conceptualize and implement an innovative mode of governance in which the best of two worlds—planning and incrementalism—are brought together.

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Notes

1. This is analogous to road mapping, a business tool for exploring paths for development and identifying business steps towards long-term business change (Phaal *et al.*, 2003).
2. It is impossible to establish whether something that 'could have been' is better than what we have. Non-optimality refers to a widely shared view that a practice or system is not the best possible thing.
3. So far 25 million euro has been spent: €10 million in 2005 and €15 million in 2006.
4. Biofuels are exempt from taxes but this was motivated very much by the EU Directive on biofuels.
5. In the Dutch energy transition, the 'subpolitics' consist of the delegation of transition choices to the transition platforms composed of private and public actors.

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