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# The transitions discourse in the ecological modernisation of the Netherlands

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## Abstract

The rise of a transitions discourse in Dutch environmental policy is analysed. This new approach to environmental policy seeks radically more sustainable socio-technical systems. As such, its agenda constitutes the latest twist in attempts at ecological modernisation, aiming to decouple economic growth from harmful environmental degradation. The coalescence and influence of a transitions discourse coalition, which has helped shape national environmental policy planning in recent years, is contextualised and analysed. Its limited success in institutionalising procedures for structural change in the energy domain suggests ecological modernisation remains elusive.

## Keywords

Discourse analysis; socio-technical transitions; ecological modernisation

## 1. Introduction: ecological modernisation

Dutch environmental policy has adopted a distinct new discourse. A 'transitions approach' is being institutionalised through the Fourth National Environmental Policy Plan (NMP4). This papers asks why the Dutch have adopted this new policy language, and with what practical effect upon environmental policy? Specifically, why did the Dutch approach to environmental policy, considered innovative in the late 1990s, need replacing with a new transition approach at the start of the twenty-first century?

This shift provides an important opportunity to analyse the roles discourse plays in policy development. Uncertainties and ambiguities pervade many environmental policy problems. Issues are characterised by incomplete (and disputed) 'knowledges' about complex causal processes, and contests over what the environmental problems mean for society, in terms of both consequences and trade offs (Hajer and Versteeg, 2005; Dryzek, 1997). Discourse theory provides a frame for analysing how policy actors construct meanings around problems and act upon them. Discourses are drawn upon both in negotiating these meanings and in framing ways to proceed in problem solving. New policy discourses subsequently do not neutrally reflect environmental problems, but have a structural role in (re)constructing what they mean (Philips and Jørgensen, 2002). Discourse analysts argue that shifts in discourse, like that surrounding the new transitions approach, invariably attend radical policy development.

Environmental problems come to be understood in diverse ways across cultures, social groups and over time. Consequently they are tackled in certain ways and not in others, in a process that is guided by subjective, evolving value systems. Moreover

commitment to certain solutions often drives policy change and associated shifts in discursive construction of the problems to be addressed. In recent decades, for example, an 'ecological modernisation' discourse around the ecological crisis has emerged that competes with an older zero-sum 'economy versus environment' discourse. Ecological modernists reinterpret high-tech capitalism from environmental culprit into saviour. This discourse offers arguments and instances that suggest capitalism's innovative zeal can profitably decouple economic growth from environmental degradation (koko – Mol, Spaargaren). A large scientific literature supports and debates these controversial 'win-win' ideas. They are then fed into policy thinking, as rhetorical resources for developing policy. Policy outcomes then return as evidence for further scientific investigation and critical debate. This is significant: science and policy continually and mutually construct this new discourse, but they also challenge it. (Jasanoff, 1990)

Ecological modernist discourse manifests in policy institutions promoting environmental innovation (e.g. market-based instruments, win-win regulations, public-private-civic environmental partnerships) (Berkhout and Gouldson, 2003; Hajer, 1995). And yet, the effectiveness and possibility of ecological modernisation is disputed. People drawing upon competing discourses interpret its limited achievements more critically, and argue that capitalism's need for growth remains culpable in environmental degradation (York and Rosa, 2003). Despite critical distinctions between ecological modernisation and sustainable development discourses (Langhelle, 2000), policy-making is more strongly embedded in the former, and policy makers routinely draw upon ecological modernist claims in their justifications. This paper does not enter this debate. Rather, we analyse the latest (transitions) approach by Dutch policy-makers to institutionalise ecological modernisation, whatever its attractions or short-comings.

Dutch environmental policy is identified as pioneering ecological modernisation (Gouldson and Murphy, 1998; Weale, 1992; Hajer, 1995). The Netherlands was among the first countries to develop comprehensive environmental policy planning in partnership with business (NMP1 in 1989). This served as a model for other countries (Jänicke, Kunig et al. 2000: 115; Jänicke and Jörgens 1999: 179; Jörgens 2003: 15-16). Then, in its fourth national plan in 2001 (NMP4), the Dutch government overhauled environmental planning with the new 'transitions approach'. Progress under earlier plans, whilst positive, was considered insufficient for decoupling the economy from environmental degradation. As such, the transitions approach can be considered an attempt to reinvigorate the ecological modernisation discourse and move it from a weak to stronger version (Breukers and Wolsink, 2007).

NMP4 commits the government to restructuring production and consumption systems over a generation (2030). New systems are envisaged which satisfy the needs of Dutch society using one-twentieth of the resources, and reducing emissions by a similar factor. This contrasts with incremental emission reductions and efficiency gains negotiated with industrial sectors in earlier plans. The new transitions discourse broadens the focus beyond firm-level processes of cleaner technology development. It refocuses on wider, linked processes that shape the social and technological systems satisfying our needs for energy, food, mobility, water, housing, and so on. Dutch researchers and policy-makers have been in the vanguard here. They advocate policy attention turning to processes for restructuring entire '*socio-technical systems*' into

more sustainable forms (koko - Kemp and Rotmans; Geels, Elzen et al. 2004; koko - Hoogma et al). As we shall see, this research developed in close interaction with policy-makers, who currently fund a major transitions research programme. The 'transitions approach' attracts considerable interest as a practice-oriented expression of these ideas (Kemp 1994; Berkhout 2002; Defra 2004; Jänicke 2004; Weber 2005).

At the same time, policy-makers internationally are articulating a more systematic view of environmental challenges. The 2002 World Summit on Sustainable Development committed to a ten-year framework on sustainable *production and consumption systems*. An increasing number of governments, businesses and civil society groups are considering how reformed policy approaches might bring such systems into being, such as the ten-year 'Marrakech process' to implement World Summit on Sustainable Development commitments in this area.[1] The shift in Dutch discourse can, once again, be considered to be at the forefront of this discursive milieu or frontier. Their experience has wide relevance for policy initiatives and directions that may be pursued by other nations and international organisations. In particular, the case illustrates the difficulty of breaking away from incumbent, technology R&D focused strategies despite a discursive recognition of the need for structural change.

The following section introduces the 'discourse coalition framework' (Hajer, 1995) used in the analysis. Section Three elaborates on the transitions discourse and its implications for policy. Section Four identifies how the opportunity for the shift in discourse opened, resulting from dissatisfaction with earlier national policy plans. That dissatisfaction was informed by research. It was at the research-policy interface (analysed in Section Five), that the transitions discourse coalition coalesced. Section Six considers why the government decided to adopt the discourse in NMP4. The implementation of the transitions approach is considered in Section Seven for the energy sector, which was the earliest and most enthusiastic adopter, and provides an early indication of ways in which it might shape institutions through discourse structuration. Section Eight draws conclusions about the degree to which the transitions approach has reinvigorated ecological modernisation, and uses this case to reflect upon the discourse coalition framework as a theoretical approach for analysing policy change. The material draws upon evidence from primary and secondary documentation, plus transcripts of 27 semi-structured interviews conducted between January and March 2006 with observers and participants in the relevant debates, negotiations and transitions.

## 2. Analysing discourse coalitions

Discursive approaches to analysing environmental policy have mushroomed (e.g. *Journal of Environmental Policy & Planning* 7, 3, 2005). Our discourse analysis relies upon a framework developed by Marten Hajer (1995). Other analytical frameworks could be used for studying the rise of transition ideas into policy, such as 'advocacy coalitions' (Sabatier, 1998), 'epistemic communities' (Haas, 1992), or 'agenda-setting streams' (Kingdon, 1984). We chose to follow Hajer's theoretical framework for three reasons.

[1] http://www.un.org/esa/sustdev/sdissues/consumption/Marrakech/conprod10Y.htm (accessed 19 April 2007).

Firstly, Hajer's own framework was originally developed through an analysis of ecological modernisation in the Netherlands, and its institutionalisation in their national environmental policy plan in 1989 (NMP1). Applying Hajer's framework to the latest twist in Dutch environmental policy provides an opportunity for further interrogation of the theory. It is particularly compelling that the transitions approach *appears* to be motivated by a desire to reinvigorate ecological modernisation, and even to take on a form similar to that advocated by Hajer at the end of his analysis (1995: 279).

'*The challenge seems to be to think of an organization of ecological modernization as a process that allows for social change to take place democratically and in a way that stimulates the creation of an – at least partially – shared vision of the future … in finding new institutional arrangements in which different discourses (and concerns) can be meaningfully and productively related to one another, in finding ways to correct the prevailing bias towards economization and scientification, and in active intersubjective development of trust, acceptability, and credibility*' (Hajer, 1995: 280)

In other words, where Hajer felt policy-makers had gone wrong, by being overly technocratic about ecological modernisation, they now appear to be making corrections: specifically through the creation of stakeholder arenas for envisioning and debating structural changes towards sustainable socio-technical systems. Analysing NMP4 allows further reflection upon the possibilities and conditions for a more 'reflexive' ecological modernisation.

Second, Hajer's framework links policy ideas with practices in a useful way for our research questions set out in the opening paragraph of Section One. He defines discourse 'as a specific ensemble of ideas, concepts, and categorizations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to social and physical realities' (1995: 44). New ideas, concepts and categories can be used to undermine and disrupt existing policy practices, and to generate and legitimise new approaches. Alternatively, working in the other direction, the way new ideas are adapted (or even corrupted) by prior, structurally embedded practices can substantially alter their meaning.

On this latter point, Hajer considers ecological modernisation a 'paradox' (1995: 267): governments argue that thoroughgoing structural change is necessary in economy-environment relations, but in practice they promote only selected, remedial measures. Ecological modernisation discourse is weakened through such practice and becomes susceptible to criticism. As with any discourse, the transitions approach will be 'molded by institutional settings and through the application on particular cases' (Hajer and Versteeg, 2005: 177).

Prior institutions and interests are important. They are the product of past discursive interplay (Hajer calls this discourse structuration), and they provide the context in which new discourses emerge and are shaped (Rydin, 2003). There may be incidents or crises that undermine institutional legitimacy and force a rethink, opening up space for hitherto marginalised discourse. Historically informed analysis considers the contexts that bestow credibility upon certain discourses at some points, whilst rendering them fanciful at others, and their rise into dominance, or fall from favour.

Third, Hajer's framework puts competing discourse coalitions centre stage in policy development. He avoids what critics see as a totalising impasse in more hegemonic understandings of discursive orders (Dryzek, 1997). Hajer considers Foucault to place too much 'emphasis on the constraining workings of discourse' and 'is rather weak on the enabling aspect' (Hajer, 1995: 49). The enabling aspect of this duality operates through competitions between coalitions of actors grouped together around distinct storylines. This suggests a plurality of discourses 'that partly cover the same terrain, a terrain which each discourse competes to fill with meaning in its own way' (Philips and Jorgensen, 2002: 141). Policy-makers draw upon and adapt discourses as a resource in their policy activities, but in so doing experience the structuring effects arising from the parameters within those discourses.

Storylines bind discourse coalitions together. Storylines are powerful devices through which actors make sense of complex issues without recourse to comprehensive and cumbersome explanations. The coalition can be a fluid set of actors (individual and organisational) that share the usage of these storylines over a period. Whilst actors may come and go, it is the storyline that endures, and which is the focal unit of analysis. Actors need not hold identical meanings around the same storyline – indeed interpretive flexibility is essential for political coalition formation. Additionally, successful storylines hold discursive affinities with others, and thereby expand the population of actor interests committing to a discourse coalition. An example is the appeal ecological modernisation holds for business storylines around innovation and efficiency. Through time practice brings a dominant interpretation to bear on issues through efforts to institutionalise the discourse in question.

'*[Ecological modernisation] has not happened because of sheer idealism on the part of the initiating actors, nor because of the strict rules set by the respective public authorities. It is the consequence, I would argue, of the socio-cognitive dynamics of the discourse-coalition that shaped up around eco-modernist storylines. The discursive power of ecological modernization manifests itself in the degree to which its implicit future scenarios permeate through society and actors reconceptualise their interests and recognize new opportunities and trouble spots*' (Hajer, 1995: 261)

Actors may join coalitions with certain strategic or tactical goals in mind; nevertheless, by committing to a discourse actors sometimes reconsider those strategic interests. As with relations between institutions and discourse, there is a recursive relation between interests and discourse here, with Hajer preferring to take discourse as his point of departure, and seeing actors realising[2] their interests through discourse. Similarly, actors seek strategically to co-opt and neuter a threatening discourse in the ascendant through tactics such as rhetoric, ridiculing aspects of an argument, undermining other actors' positions by exposing them as ideologically driven or self-serving, inserting elements of other story lines. All these are used to shape the debate and try and influence policy. This is where Hajer goes against Foucault – people are not trapped in the discourses, but cleverly draw upon and manipulate them as a resource for attaining policy supremacy (Ockwell and Rydin, 2006).

[2] The term 'realise' is intended in both senses here: to come to understand ones interests; and to try and fulfil those interests (after Byrne, 1998).

Emblematic issues play a key role in typifying storylines, and provide a focus around which coalitions compete most vigorously. Ecological modernisation is rarely considered in its full complexity. Emblems such as 'acid rain', 'climate change', 'clean production' or 'resource efficiency' become more amenable proxies for understanding. The transitions discourse appears novel because its emblematic issue is not so much an environmental problem so much as a *process* for solving multiple problems. The goal of transforming socio-technical systems into more sustainable forms is approximated through evocation of an 'S'-shaped curve. Goal-oriented 'sustainability visions' form the destination for the top of the transformation curve. Transitions discourse actors repeatedly state the need to promote learning and innovation as part of these processes. It is this procedural emblem that provides a storyline about how transitions progress.

Historical research into the transformation of systems in energy, transport, sanitation and food, suggests that radical, systems-level change begins with the emergence of alternative practices in niche settings (Rip and Kemp, 1998; Geels, 2002). Over time some of these develop, grow, and attract wider support; practitioners and their ideas become more influential upon their socio-economic contexts. Opportunities for growth are greatest when Kuhnian contradictions in the incumbent system are placing it under considerable stress. The old system shows weaknesses and repeatedly fails to offer satisfying answers to the questions people want to ask, a competing niche emerges offering a fresh understanding, new ways of framing questions and a set of alternative practices pressing for change.

By creating policies that support niche experiments in sustainability, whilst other policies place incumbent systems under concerted pressure to become sustainable, the transitions approach seeks to facilitate the transformation of systems (Smith *et al*, 2005). The 'S'-curve moves from the niche 'pre-development' phase, through 'take off', along an 'acceleration' phase, and culminates in 'stabilisation' around the new structure of sustainable socio-technical practices (Rotmans et al, 2001). Elaborations upon this storyline have intrigued and attracted many to the transitions discourse. It appears radical, whilst echoing conventional marketing understandings around the adoption of new products (and social scientific ideas about scientific change). The discourse coalition framework would suggest that actors coalescing around this transitions storyline led to the shift in Dutch environmental policy. However, it is interpretation and institutionalisation of transition discourse, practice and outcomes that is the final arbiter of its meaning.

## 3. The Dutch transitions discourse

The transitions discourse was articulated through close interaction between researchers and policy-makers. As we shall see, the institutionalisation of this discourse into policy has heightened rather than closed debate. This reveals the flexibility of the original storyline, and how this permits influence whilst simultaneously making it susceptible to capture. Critics argue the radical edge of the discourse has been blunted: structural goals, they argue, have been eclipsed (once again) by technocratic reforms (see below).

The transitions storyline has three basic elements. First, it invokes the generational goal of steering Dutch society towards socially envisioned sustainable systems, whose resource use and emissions are radically lower than systems today. Second, transitions

towards these visions can be the subjects of social experiments, and promoted practically through sustainability niches, whose successful development into systems follows the 'S'-curve trajectory. Finally, transitions require learning processes and policy pressure upon incumbents in order to transmit improved niche practices into the mainstream (socio-technical change). Innovation is essential to the transitions discourse. The storyline adopts an evolutionary stance towards structural change, seeking social processes for consciously guiding the trajectory of development in more sustainable directions.

Other policy discourses share aspects of the transitions discourse, indeed many have informed it. The transitions discourse appeals because it combines aspects like 'long-term visions', 'policy learning', and 'adaptive governance' into a strategic framework based around the 'S'-curve storyline. As such, it offers the prospect of reinvigorating ecological modernisation without challenging cherished components. Thus, market-based instruments and win-win regulations, both advocated within ecological modernist discourse, remain key policy tools amongst a portfolio that can help guide transitions. The power of innovation to decouple environmental degradation from economic growth remains as a foundation. The dominant ecological modernisation discourse is repackaged in the transitions approach.

Whilst the discourse suggests a *process* for realising sustainable systems, it does not impose a particular view. Similarly, Hajer does not suggest what a more radical, *reflexive* ecological modernisation would mean in terms of specific goals. Rather it is the process for debating this meaning that he holds to be important. A *reflexive* ecological modernisation institutionalises processes for deliberate social choice between alternative scenarios of development. Scenarios are considered a point at which contrasting perspectives can meet and seek productive integration. What is intriguing about the transitions approach is that it proposes policy institutions along these lines: multi-stakeholder civic arenas for debating and progressing transitions to sustainable socio-technical systems; practical niche experiments for exploring potentials; institutions that promote social learning, supportive policy development and innovation.

However, Meadowcroft strikes a cautionary note:

'*To commentators outside the Netherlands the approach can appear hopelessly unrealistic. Even in a country known for its consensus-oriented political system and strong traditions of planning and environmental policy innovation, one can wonder whether actors with divergent economic interests (for example, firms representing rival technological approaches) can be expected to agree on pathways of socio-technical change, and whether the political system can be expected to provide a sufficiently stable context to orient transitions that may last decades*' (Meadowcroft 2005: 487; also Berkhout et al, 2005).

Does the transitions discourse in NMP4 really herald a reinvigorated ecological modernisation?

## 4. Difficulties in Dutch National Environmental Policy Planning

The discourse coalition framework (Section Two) considers interactions between discourse formation, its institutional context, and coalition building. Discourses can prompt reappraisals of what contexts mean, whilst contexts influence the credibility of discourses and coalition formation. The transition discourse developed at a time of growing dissatisfaction with earlier national environmental policy plans. But it did not simply respond to that unease. The transitions discourse also contributed to it, through policy-oriented research that reconsidered sustainable innovation in more systematic terms, and that begged questions of the existing policy approach. This section documents the dissatisfaction in Dutch environmental planning, and the following section discusses the research-policy interface.

Published in 2001, NMP4 presented 'a new policy cycle' (VROM, 2001: 78) to complement earlier series of national environmental plans, beginning with NMP1 in 1989. Strategic planning has deep roots in the Netherlands, as does a consensual approach to stakeholder involvement (Weale 1992; Hajer, 1995). The 'capacity of government to develop and apply strategic plans at the national level has evolved over a considerable period of time' (Gouldson and Murphy 1998: 105).

National environmental plans are led by the Ministry of Housing, Spatial Planning and the Environment (VROM). The first national environmental plan (NMP1) was innovative for a number of reasons (Weale, 1992). First, thanks to the 'intellectual stimulus and diplomatic leadership' of environment minister Pieter Winsemius (Weale 1992: 139), NMP1 enjoyed cross-ministerial endorsement. Second, it took a long-term and comprehensive perspective (with targets to 2010). Third, it considered environmental functions essential to Dutch society. Fourth, it sought four- to ten-fold improvements in environmental performance, and established quantitative targets for key industrial sectors. Fifth, these long-term targets were negotiated in partnership with industry (Keijzers 2000; Krarup and Ramesohl 2000; Oudshoff and Klinckenberg 2003). Sixth, partnerships were also sought with civil society. Subsequent national plans, issued in 1993 and 1998, reinforced this framework, and focused upon implementation (NMP 2 and 3).

Many commentators applauded this co-operative, long-term approach. The plans were considered to institutionalise ecological modernisation discourse through commitments to integrate economic and environmental activity (Weale, 1992; Gouldson and Murphy, 1998; Keijzers, 2000). Others were disappointed. The plans interpreted ecological modernisation technocratically. They did not debate publicly the sustainable renewal of industrial society (Hajer, 1995). The plans were weakened by compromises within government and with business that translated into relatively undemanding targets. Partnerships with civil society were, in practice, absent. VROM later acknowledged, 'in retrospect, the impression is that the stakes could have been set higher' (VROM 2001: 9).

According to Hajer, a fatal discursive disjuncture lay at the heart of NMP1. The plan acknowledged the severity of environmental pressures, and admitted deep structural causes lying in industrial society. But the targets, whilst demanding from a business perspective, fell short of addressing structural change. Government acknowledged this discrepancy, but argued pragmatically that NMP1 was the only way to ensure everyone (including business) took responsibility for the environment (Hajer, 1995:

250). The more structural components of the ecological modernisation storyline were not the basis for coalition growth. More dominant storylines around economic performance and international competitiveness, embodied within the more powerful policy-making institutions of government, trimmed ecological modernisation to a series of incremental reforms.

Subsequent policy evaluations confirmed the disjuncture (VROM 1998: 18-22). Even where industry had successfully met targets, these relative improvements could not compensate for environmental pressures associated with absolute growth in the Dutch economy. Significant advances (e.g. in terms of cleaner production) were not breaking the stubborn link between economic growth and environmental degradation (VROM 1998: 18-22). The Dutch economy was experiencing strong growth in the late 1990s.[3]

Evaluations strengthened the position of those arguing for new approaches with deeper solutions. Gerard Keijzers, former head of the Directorate of Strategy and Plan Development at VROM (1990 to 1999), argued a new way forward was needed 'if real reductions in per capita levels of demand for energy and in claims on resource stocks and biodiversity are to be achieved' (2000: 191). Environmental policy was insufficient to really change the social and economic drivers of the problem, and 'handling these dominant challenges will demand both changes in social behaviour (consumption patterns) and technological regime shifts' (ibid). In the late 1990s, VROM was being led at the time by Minister Pronk who, like Winsemius before, and once persuaded by the transitions coalition, was considered to provide the visionary leadership to nurture this space within government (interviews 15 and 18).

Discussions around science & technology in NMP3 reveal how policy-makers were already signalling an appetite for new ideas.NMP3 argued 'more radical innovation is possible by developing new systems which fulfil the functions of existing systems more efficiently' (VROM 1998: 246). NMP3 called for policy that 'must not be confined to the development of new technology and technological products, [but] must also be directed towards the interrelationship between demand pull and technology push' (VROM 1998: 246-247). The language moves away from an incremental approach, and begins to contemplate its more systemic and structural dimensions.

However, NMP3 continued to frame innovation within a neo-classical economic framework - 'a well functioning market in technological research will automatically lead to innovation' (VROM 1998: 247) - whereas the transition approach, based in evolutionary economics, considers innovation to involve more institutionally complex, distributed processes of variation, selection and adaptation that is far from 'automatic' (Bergh et al. 2006). Even so, NMP3 opened discursive space for a more radical ecological modernisation.

In NMP4 the Dutch government formally endorsed the transitions discourse. It continued to identify 'system faults in the current social order' (VROM 2001: 11), but sought transitions that 'take on the form of a long drawn-out transformation process comprising technological, economic, socio-cultural and institutional changes'

[3] GDP growth averaged four per cent (before slowing down considerably in 2001-05, picking up to nearly three per cent today).

(VROM 2001: 30). The language and institutions across Dutch government must, according to NMP4, be reconfigured to permit transitions policy. NMP4 was signed by nine ministries. However, whilst endorsing a transitions approach, NMP4 remained thin on detail, and included more conventional policies alongside its commitment to the new framework. As we shall see, one of the discursive strengths of the transitions approach is that it accommodates prior policy positions, like market-based instruments, technology subsidies, and regulations, within its broad framework. In practice, NMP4 was a point of endorsement for a discourse coalition already developing a transition policy model.

## 5. Coalition formation: the transitions research-policy interface

Since the 1970s the Netherlands has invested considerable research capacity in studying relations between technology, society and innovation. Many Dutch universities have technology studies departments that enjoy good research links with government in a densely connected polity. This research community has attended repeatedly to environmental issues, and helped develop a sophisticated repertoire of policy tools. Several environment-technology research programmes in the 1990s[4] provided a context for further dialogue between research and policy communities (Vergargt, 2005). It was through these dialogues that a series of ideas about technology and sustainability were developed and carried by a small network of actors, and that would eventually crystallise around a transitions storyline. This dialogue and networking provided NMP4 with the new direction being sought by environmental policy-makers at that time.

Most research under these programmes worked within conventional, reform-minded frameworks of eco-efficiency. Nevertheless, a small network of individuals was reaching conclusions that suggested a broader, systems perspective was needed. The network shared a number of ideas. It considered prospects for sustainable technological practices into the long-term (over a generation - 20 years). The potential for radical (e.g. twenty-fold) improvements in resource efficiency and emissions reduction were being explored. There was an awareness of the important social processes shaping technology development and use. A 'socio-technical' perspective emerged, attending to the way institutions, markets, culture, social values, material interests, as well as the technological artefacts themselves, were critical in the mutual co-development of sustainable practices. Experiments with scenario building and 'back-casting techniques' (Quist, 2007) convinced this network that articulating long-term sustainability visions provided an important compass for instituting systematic changes, plotting potential pathways, and encouraging social learning.

These were themes 'in the air' at the time, and were drawn together in the transitions approach (Vergragt, 2005). The developing transitions storyline was supported by emerging historical research into past technological transitions that had widespread social underpinnings and ramifications (e.g. sail power to steam ships) (Geels, 2002). These historical case studies conceptualised three interconnected processes by which the socio-technical system undergoes change (innovative niches, internal contradictions in the incumbent system, and socio-economic 'landscape' pressures

[4] These were the *Duurzame Technologische Ontwikkeling* (DTO, 1993 to 1997), the TNO *'81 options* project (1997), the *Nationaal Initiatief Duurzame Ontwikkeling* (NIDO, 1996-2002), and the *Economie, Ecologie, Technologie* (EET, 1996-2002).

deriving outside the system but bearing upon it) (Rip and Kemp, 1998). Other applications of the model included transitions in domains like agriculture, energy, transport, manufacturing, entertainment, and sanitation. Here was a storyline that could generate compelling policy stories about all sorts of change.

The loose network of twenty or so people interested in these emerging transition ideas included policy-makers from the environment ministry, the economic ministry, and researchers from universities and government research institutes. Researchers and policy-makers in particular projects may have been working in different domains of practice, such as energy, agriculture, housing, or transport, but programme-level activities facilitated dialogue across domains.

Follow-up initiatives[5] specifically attempted to deepen participation from the business community. Intriguingly, successful engagement was felt to demand a shorter-term orientation relating to modifications in business practice (e.g. environmental management) rather than systems innovation. Participatory envisioning processes and back-casting techniques were not considered sufficiently meaningful or enticing. According to one participant, they were 'uninteresting for businesses … they wouldn't invest in that kind of processes' (interview 9). This narrowing of focus anticipates the institutionalisation of transitions discourse, and appears to repeat the pattern identified in the institutionalisation of ecological modernisation in NMP1.

Nevertheless, the network of researchers and policy-makers seeking systems changes persisted in their advocacy. A researcher participant recalled:

'*There was a policy network of individuals and civil servants in favour of those ideas, bridging the science and policy sphere because they were involved in both and could translate ideas and had some credibility and also some business relationships. This network emerged out of those programmes*' (interview 2).

The big opportunity for the transitions coalition was provided by an interdepartmental working group, charged by the environment and economy ministers to prepare NMP4. The role of innovation in sustainable development formed an obvious bridge between economic and environmental ministerial agendas. Some working group members had either been involved, or were familiar with, the research programmes in which transitions ideas had been aired.

Ideas for radical, system level change were slowly percolating into policy narratives. A senior civil servant at the economic ministry argued, 'the learning processes with [the research programmes] were necessary preliminary steps for a transitions approach' (interview 15). There was dissatisfaction with the existing approach (NMP1-3), and 'people from within the government were looking to the outside for new concepts' (interview 7). Two studies were commissioned by the NMP4 working group that crystallised the emerging transitions discourse. The first study made the case for a transitions approach, whilst the second study put this on a firmer conceptual and practical footing.

[5] In the NIDO programme.

The second, influential study was done by a team from the University of Maastricht (ICIS-MERIT[6] led by Jan Rotmans, expert in systems modelling climate-society interactions, and René Kemp, expert in innovation and environmental policy). Their report describes transitions as long-term fundamental structural change processes in societal subsystems, and proposed a model of how such processes could be directed by policy (Rotmans et al, 2001). Their inchoate model took energy as an emblematic case (the economic ministry is responsible for energy policy). In retrospect, this report had a crucial importance for getting preliminary ideas around transition management into NMP4: parts of the plan reproduced verbatim sections from the ICIS-MERIT report (Kemp and Loorbach 2005: 129).

Interviewees repeatedly recall the outcome of the process as far from predetermined. The transition approach was a discourse that gradually emerged within research-policy networks (Kemp and Loorbach 2005: 129). One author described a series of meetings with 'a lot of confusion, a lot of ideas, a lot of discussion, a highly iterative and interactive process during which the concepts co-evolved. This was not a goal oriented or planned process' (interview 17). And yet there was a goal – promoting an 'S'-curve of sustainable structural changes to socio-technical systems. The report and associated discussions drew on various ideas from earlier research-policy programmes that were already in the air, being discussed, counter-posed, integrated, mutually adapted, and so on. A storyline was being fleshed out that suited the purposes of the working group and had a credibility brought from the research community.

A senior civil servant said, 'Rotmans deserves credit for inventing transition management and bringing it to policy makers but the learning processes with [earlier programmes] were necessary preliminary steps for a transitions approach' (interview 15). The team were 'people who had the right words, pointing towards new directions … who also had the authority and the communicative skills to affect others' (interview 7). However, the ICIS-MERIT team considered themselves to have been responding to a 'transitions' agenda initiated by government, and their report refers to ideas and reports emerging from other programmes. In effect, the ICIS-MERIT report 'merely' succeeded in pulling together various research and policy threads already current in research-policy dialogues, and adapted them into a more coherent and persuasive storyline. Affinities between actor stories were being actively sought and constructed. However, whilst the various groups, reports and projects were weaving a transitions storyline, it remained a discourse coalition that still had to impact upon policy. Ideas exploring a reinvigorated Dutch environmental policy had to lead to policy commitment. These came with publication of NMP4 itself.

## 6. The policy shift: adopting the transitions discourse

Unsurprisingly, not everyone in the ministries was convinced by the transitions discourse. Those pushing the transitions storyline were careful to present it as extending rather than undermining existing policy commitments. Reputations were riding on both, and those developing the transitions ideas knew it. The discourse coalition had to be accommodating. As one of the ICIS-MERIT team explained:

[6] MERIT – Maastricht Economic Research Institute on Innovation and Technology; ICIS – International Centre for Integrated Assessment and Sustainable Development.

'*[we] helped to overcome one of the big threats of the project: that TM [transition management – the transitions approach] could be perceived as a complete policy change. We were very careful in saying that this is a framework for policy thinking for things beyond the usual policies, not as a replacement, which took away some of the concerns*' (interview 20).

This helped further recruitment to the discourse coalition. Within VROM, the transitions approach presented a way of reinvigorating environmental policy without having to dismantle or radically reconfigure existing legislation. Existing policy instruments were an assuring part of moving along the 'S'-curve: though the evidence undermining earlier NMP approaches suggests they were failing to do so. Something extra was needed, which was the promise of the transitions approach.

Transitions provided existing instruments a more integrated, longer-term framework for future development. This was persuasive for those charged with presenting the new policy ideas for ministerial approval. The recollection of one senior policy-maker at VROM is:

'*Rotmans came in with a presentation on transition management and that fitted in very well with our needs…It was a lucky coincidence that the need for a new concept came together with the supply of one*' (interview 24)

The connection, however, was a 'coincidence' carefully developed through the discourse coalition. The transitions storyline had been crafted through extensive dialogue, drawing upon long-standing research-policy engagement, and an entrepreneurial understanding nurtured by policy workshops that tested and adapted the key ideas.

Amongst the needs addressed by the transition coalition was an approach which would work with other ministries. In practice, non-environmental ministries were not all living up to their end of the NMP bargain, and continued to defend the sectional interests that constituted their policy networks. The big break-through with the transitions storyline was that working groups championing it included those with an inside track in the influential economics ministry (EZ).

Sections within EZ found the transitions storyline appealing for several reasons. First, it spoke to EZ responsibilities for both innovation policy and energy policy. In energy policy, traditional corporatist modes of governing energy were being disrupted massively by European liberalisation of energy markets, beginning in 1998. EZ was coming to terms with the deep ramifications of low carbon policy commitments precisely at the moment when influence over the energy system was giving way to the market.

The transitions approach suggested new governance mechanisms that might better fit the new liberalised energy system. An EZ civil servant involved in the transitions discours coalition acknowledged, 'in EZ [the ministry] the big thing in energy is market liberalisation so we have to connect with that. If we don't do that we will always remain a sideshow (interview 12). And yet liberalisation has shortened perspectives in the sector, in terms of R&D, investments, reserve capacity, and

management of resources, precisely at the time when the transition approach is trying to institute a longer-term, sustainability perspective (see Section Seven).

Second, transitions appeared accordant with EZ innovation policy. Some in the ministry were persuaded (rhetorically, at least) that a more sophisticated approach to sustainable innovation might attract international R&D capital to the Netherlands. This chimed with a self-image of the Netherlands as a knowledge intensive economy and important nodal site for global innovation networks. EZ accepted environmental problems were persistent and that issues like climate change needed system innovations. The transitions approach connoted a 'sense of opportunity' for Dutch business (interview 1, Bruggink 2005: 10-11, EZ 2004a: 9).

In other words, the transitions storyline reinforced the economic promise of ecological modernisation. EZ was persuaded the transitions discourse could help it convince business too. Transition ideas resonated with more dominant policy commitments towards the knowledge economy and international competitiveness under the EU Lisbon agenda: sustainable niches turning into mass markets; structural changes through evolution rather than revolution; the emphasis on innovation and attracting international R&D; and a reduced, enabling government seeking ways to work more productively with business. Here was an environmental policy approach that EZ could internalize. Elements in EZ championed the transitions discourse and were soon driving its dissemination internally and amongst other ministries. They were assisted by civil servants from other ministries already involved in the discourse coalition, and whose voice was facilitated by failures in conventional policy in their own ministries, notably agriculture and transport.

NMP4 needed approval amongst ministers from nine ministries. The transitions storyline provided a framework within which each could work, or, at least not feel threatened. A large part of its appeal has been the way it provides a procedural framework for systems change, but without specifying the policy goal. The 'S'-curve model can be applied at multiple scales and fleshed out in a variety of domains. As such, the discourse allowed ministries to continue pursuing their own agendas within the overall approach. Politically as well, it appealed across the spectrum, since it appeared market-friendly whilst seeking progressive aims. This was particularly important for the Kok coalition government at the time, consisting of the social democratic party (PvdA), the liberal party (VVD) and the social liberal democrats (D66). Initial lack of enthusiasm amongst ministers leading VROM (Jan Pronk, PvdA) and EZ (Annemarie Jorritsma, VVD) was turned to willing approval when they realised the personal political capital attainable through championing a measure that could succeed across government. The government agreed NMP4 in 2001 and adopted the transitions approach.

In sum, the transitions storyline provided a suite of elements that policy-makers could latch on to. A successful coalition built because the transitions approach contained considerable interpretative flexibility. But it also appeared modular. It was not a single instrument or tight package. Different constituencies could major on elements that suited their policy agendas and networks. Transitions could mean, by turns, long-term envisioning amongst stakeholders, supporting niche innovations, creating new partnerships with business, reducing state involvement, or simply providing a new

language for defending existing policy instruments. In terms of coalition formation, the storyline's strength was its susceptibility to deconstruction and co-option.

Of course, this is not what those developing the storyline originally intended. To them, the strength of the storyline was its overall coherence and strategic aim. The result was that a reinvigorated, potentially radical ecological modernisation hung in the balance, and depended upon the way the transitions discourse became institutionalised in policy practices.

## 7. Discourse structuration? The Dutch *energietransitie*

The energy policy domain has been the first and most vigorous to institutionalise the transitions approach. EZ considered itself to be the 'initiator, trailblazer and leader of the energy transition in the Netherlands' (EZ 2004b: 1). They seek 40 to 60 per cent cuts in carbon dioxide emissions by 2030 compared to 1990 (VROM, 2001: 33). Institutionalisation of the transitions discourse in the energy domain is generating considerable debate about what the approach really means in practice. The focus to date has been on trying to establish sustainability experiments (niches). Critics consider this to be fairly conventional innovation policy, rather than part of a concerted attempt to seed structural change in energy systems. Even so, it is innovation re-interpreted through transitions discourse, whose institutionalisation encourages continuing debate and policy learning.

At the heart of energy transition (ET) institutionalisation are six *transition platforms*. Stakeholders have come together under these platforms and developed *transition themes* and ambitious goals for 2020; they are developing *pathways* towards those goals; and they suggest *transition experiments* that could help move sections of the Dutch energy system along those pathways, as well as considering suggestions from others (Oudshoff and Klinckenberg 2003; VROM 2003; EZ 2004a). The first experiments began in 2005. Table 1 provides an overview of the platforms, pathways and experiments. Platform activity is analogous to the creation of niches in transitions theory.

[Table 1]

In convening the platforms, EZ turned to its established energy policy networks. They appointed business representatives as chairs for all platforms, who then identified other interested stakeholders. The composition of the platforms (Table 2) reveals business to be the dominant actor group. The only environmental NGO actively involved is Stichting Natuur en Milieu (SNM, Society for Nature and Environment). Other NGOs maintain a critical distance.

[Table 2]

Subsequently, the government has created an ET taskforce to oversee and coordinate the work of the platforms. It consists of 17 individuals, mainly from industry and the public sector, and is chaired by Rein Willems (CEO Shell Netherlands). Representatives from large energy companies feature prominently in the taskforce - Shell, Essent, Electrabel and Gasunie. The taskforce is 'intended to strengthen the role of the platforms and to determine which technological spearheads offer the best

prospects for the Netherlands' (EZ 2005: 30). Their action plan, published in May 2006, attracted considerable publicity (TaskforceEnergytransition, 2006).

Those in EZ responsible for ET have sought to complement this external political reinforcement with a reorganization of policy internally. An interdepartmental directorate for the energy transition (IPE) has been created, whose 30 civil servants are drawn from six ministries. Their task is to improve the 'fit between ongoing policy dossiers and policy conditions for system innovations over the longer term' (EZ 2005: 52). An EZ civil servant suggests this initiative came from ET stakeholders who 'developed pressure on government to re-organise policies and combine them' (interview 24).

Progressively larger sums of public money for energy R&D are being distributed through the ET platforms, boosted by private investment from business participants in the transition experiments. Whilst the ET taskforce calls for annual spending of €2 billion, levels at the moment run into the low hundreds of millions. Nevertheless, in terms of energy R&D policy, it is clear that the transitions approach is steering the commitments being made. EZ takes the final decision on experiments proposed by the business-led platforms. Decisions are taken on conventional, 'near market' criteria for technology development projects. These include the costs and benefits of the 'experiment', likelihood of business investment, strength of demand, and a good chance of the experiment meeting with success.

Both the business consortia proposing transition experiments, and subsequent EZ decisions, are following a pattern heavily influenced by existing institutions for technology R&D. The transitions discourse is being practised through technocratic means and, as such, any connotations of broad-based civic dialogue around re-ordered socio-economic priorities are being lost to more narrow pursuits of technology-fixes. There is little evidence yet that the ET is exerting a strong influence over energy policy beyond R&D. Neither market-based instruments nor regulations are being instituted with the express purpose of pressing for a transition. Discursive components that argue incumbent systems must be placed under concerted pressure to restructure (thereby complementing niche building efforts) are not reconfiguring energy institutions. This would involve the IPE in confrontations with some powerfully entrenched interests in government and business (e.g. the Netherlands is a major gas and petrochemical economy). The transitions storyline is not gaining ground on more entrenched discourses around energy liberalization and the international competitiveness of key economic sectors. The imperatives of political economy are proving, once again, to be strongly filtering the heavier demands of ecological modernisation.

However, from the perspective of transitions champions within EZ, it is essential that the energy sector and wider ministry accept the new policy approach. As with NMP1, policy-makers have had to be pragmatic in the demands they made. The challenge ahead is for this shallow institutionalisation to deepen, extend and really overturn entrenched cognitive routines, and redirect private sector investment and business models. Participants are under pressure to deliver successful projects in the short-term in order to justify the transitions approach. This reinforces narrow and technocratic institutionalisation. There is an emphasis on supply-side technology products rather than overall social practices around sustainable energy.

Researchers instrumental in establishing a transitions discourse coalition, as well as some of the leading policy-makers, have become critical of its institutionalisation. They see the approach simplified and turned into crude instruments by consultants and civil servants. One of the ICIS-MERIT team argues the ET taskforce consists of 'people from the [energy] regime who try to control the process. They are interfering [with the process], kill the space and obstruct radical change more or less consciously' (interview 17). Social dialogue is thin, dominated by incumbent business interests, and too technocratic in its framing. The imminent creation of a carbon capture and storage working group with little public debate is, according to one NGO representative, 'just an illustration of the total corruption of the transition by the vested interests' (interview 13).

The interpretive flexibilities valuable for recruitment to the discourse coalition simultaneously undermine its influence by permitting very elastic uses of the language. Institutionalisation has to solidify the meaning, and, in the absence of a power base for structural change, it has to do so pragmatically; but in so doing it fragments the original discourse coalition. Fortunately, amongst the institutions created are opportunities for dialogue, such as a transitions competence centre, that will permit continued learning and debate between the research and policy community. And the openness of transitions processes suggests a susceptibility to critical engagement from civil society, if this becomes sufficiently strong and concerted. So whilst this attempt to reinvigorate ecological modernisation is faltering, it is remains open to renewed attempts in the future.

## 8. Conclusions

In analysing the transitions approach, we wished to see to what extent its institutionalisation is reinvigorating the ecological modernisation of the Netherlands. The case also provides an opportunity to reflect upon Hajer's discourse coalition framework for analysing policy change.

The analysis finds a transitions discourse coalition that did not simply fill an opportunity for policy renewal with a ready-made alternative. The coalition emerged from a research-policy interface, whose research into environmental innovation, and whose evaluations of earlier policies, were feeding a dissatisfaction and appetite for policy change. Ideas moving around this coalition were leading to a suite of new policy suggestions. Jan Rotmans and colleagues were clever at negotiating these into a coherent transitions storyline at just the right moment: during the deliberations of the interdepartmental working group for preparing NMP4. This instance adds credence to Hajer's enabling interpretation of Foucault mentioned in section 2. Transitions advocates achieved policy influence through discursive strategies that sought affinities between storylines and built a broad-based coalition of support.

The transitions approach was found to offer an open framework for sustainability activities. Breadth has furnished flexibility: transitions have been interpreted quite broadly. Rather than the 'S'-curve symbolising the restructuring of entire socio-technical systems, for example, it has been interpreted by some to mean the diffusion of specific low carbon technologies. The institutionalisation of the discourse restates the need for structural change, but fails to induce institutional change with sufficient reach and depth for the task. Rather, we have technology R&D policy repositioned

within a longer-term sustainability framework. The new arrangements do not provide the kind of reflexive fora and processes for discussing socio-cultural change and debate about industrial restructuring – though there is potential. Instead, we have technocratic attempts at sustainable technology development.

The practice-oriented aspect of the discourse coalition framework is very careful to interpret institutions and interests through discourse, both of which have a powerful influence in this case study. Our analysis finds, however, that existing institutions and interests are narrowing and bending transitions discourse strongly in the short-term. They do this more than transitions discourse reconfigures institutions and shifts interests. So whilst discourse analysis has helped us understand why policy is being framed differently, it is existing interests and institutions (older discourses solidified) that form a powerfully restricting and attenuating point of passage for that new discourse. The discourse is downgraded and ecological modernisation still needs reinvigorating.

The paradox that Hajer identified in ecological modernisation persists. The transitions discourse is failing to reinvigorate and radicalise ecological modernisation. As before, structural components diminish in the storyline. Overriding imperatives around economic performance and international competitiveness, embodied within the more powerful policy-making institutions of government, continue to trim ecological modernisation into a series of incremental reforms. Nevertheless, like earlier plans, but with a qualitative difference, the transitions approach creates space for continued debate over the possibilities of decoupling harmful ties between economies and environments and the adequacies of existing approaches. Included in this is a transitions research programme, whose critical reflection on transitions in practice, and whose engagement with policy-makers, could potentially feed further discursive developments.[7]

The transitions approach diverges from reflexive ecological modernisation by perpetuating technocratic, 'how to' exercises. Reflexivity demands the debate moves back to prior questions about social realities, social preferences and the framing of the environmental problem at hand. Expert opinion becomes contextualised and the contingencies of truth claims revealed through a less authoritative engagement with broader public argument. Dutch transitions policy is not there yet. Much has been achieved from the perspective of the processes EZ has set up for energy transitions: ambitious long-term visions; continuous learning and policy-research interaction; open engagement; and deliberation with stakeholders over further institutionalization of the transitions approach. One should not diminish the effort and innovation this has required on the part of policy-makers. From the perspective of a transition to sustainability, however, and decoupling economic growth from environmental degradation, then much work remains. At least there is an argumentative opportunity and entry point for more reflexive institutionalisation in the future, should such a movement emerge.

In our view, deeper, more profound envisioning exercises and transitions debates will happen in civil society arenas, removed from the messy compromises of government

[7] See, for example, the Competence Centre for Transitions: http://www.senternovem.nl/Competentiecentrum_transities/English.asp (accessed 19 April 2007)

and the economic imperatives of business. What the transitions discourse and ecological modernisation lack is an account of how such initiatives become a power base for change. Neither identifies the social agents that can ensure the radical components of a discourse are carried through to institutionalisation.

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**Table 1: Overview of transition platforms, pathways and experiments**

| Platforms and their visions | Pathways | Experiments |
|---|---|---|
| **Chain Efficiency**<br>Environmental benefits can be achieved when producing goods, which demands the use of many different raw materials, uses a lot of energy and leads to emissions...Changing the energy structure can reduce CO2 emissions, conserve energy and materials use and reduce the environmental impact. Critically assessing production chains, from raw materials to end products, brings the largest savings. | KE 1: Renewal of production systems<br>KE 2: sustainable paper chains<br>KE 3: sustainable agricultural chains | save 50% energy use along the production chain of paper by 2020 |
| **Green Resources**<br>The Netherlands should use raw materials more carefully. The total demand for energy, chemicals and materials in 2030 must be back to the 2000-level, by saving energy and recycling more materials and products. By 2030, the Platform foresees to replace 30% of fossil fuels…with bio-based raw materials (biomass). And in 2030, bio-based raw materials must supply the following: 60% of transport fuels; 25% of chemicals and materials; 17% of heating requirements; 25% of the electricity demand. The Platform realizes that the Netherlands has a limited agricultural area and that 60% - 80% of these needed bio-based raw materials will have to be imported to achieve the above goals. | GG 1: biomass production<br>GG 2: biomass import chain<br>GG 3: Biosyngas<br>GG 4: Bioplastics | Conversion of the MTBE (methanol tertiary butyl ether) production process to ETBE (ethanol tertiary butyl ether) based on bio-ethanol |
| | | Bio-plastics: Breakthrough to self-sustaining growth |
| | | Breakthrough for bio-plastics to high-value applications |
| | | A factory for the production of bio-diesel from palm oil |
| **New Gas**<br>The energy transition in the natural gas sector means that the entire natural gas chain will become more sustainable. In recent years, in cooperation with interested parties, a portfolio of potentially promising routes has been identified that can provide direction and can be developed in parallel. They can be classified into two types: efficient use of gas, green and clean use of gas. The ET aims to sketch a long-term vision regarding the role of clean fossils in the Netherlands. This includes the significance and opportunities regarding CO2 storage (both on-shore and off-shore), due to the specific geological conditions of its substructure (oil and gas fields, aquifers, coal layers). | EGG 1: Energy saving in the built environment<br>EGG 2: Micro and mini CHP<br>EGG 3: clean natural gas<br>EGG 4: Green gas<br>EGG 5: energy saving greenhouse | Buses on natural gas in Haarlem/Rijnmond |
| | | Liquefied natural gas as a substitute for diesel |
| | | $CO_2$ delivery to greenhouses in horticulture sector (OCAP) |
| | | Introduction of compressed natural gas as a mature car fuel in the North of the Netherlands |
| | | Polder district in Zeewolde gets heating on biogas |
| | | Pilot project of micro generation in households |
| **Sustainable Mobility**<br>The platform aims to speed up market introduction of sustainable fuels and vehicle technologies, with a focus on commercially viable options in the Netherlands in the next two to four years. | AM 1: Natural gas<br>AM 2: Biofuels | Realisation of the hydrogen cart (Formula 0) |
| | | A sustainable petrol station in the North of the Netherlands |
| | | A large-scale production facility for bio-diesel in Terneuzen |
| **Sustainable Electricity**<br>The transition has an ambitious but feasible and robust aim: a sustainable electricity provision that can be made virtually CO2 -free. The transition is so robust because the centralized production can deal flexibly with changing insights and market conditions. | DE 1: Biomass<br>DE 2: Wind | |
| **Built Environment**<br>The total energy demand and CO2-emission from the use of a building is more important than the heat demands that are determined by the building design. Total energy demand is expected to rise approx 0.5% p.a., with a decline in natural gas use and a much stronger increase in electricity demand. Neighbourhood development is more important than single buildings. Key is the upgrading of the building stock and organisational and financing innovations to enable building owners to invest in their property. | No pathways developed yet | Use of mine water for heating and cooling in Heerlerheide centre |
| | | A good perspective can give an impetus for energy saving in council housing sector |
| | | Heating in houses based on waste wood from pruning trees in Eindhoven |
| | | heat transition in housing construction |
| | | 'Geothermal heat for the whole Netherlands' (heat pumps) |
| | | Collective sustainable energy storage devices for heating and cooling |
| | | Sustainable heat and cooling through the use of heat pumps |

Sources: (Klinckenberg and Chobanova 2006), http://www.ez.nl/content.jsp?objectid=41052; http://www.senternovem.nl/eos/projecten/ukr/index.asp (accessed 18.07.06).

**Tale 2: Participation in energy transition platforms**

| **Platform** | Government | Business | NGOs | Intermediaries[8] | 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 |

Source: own compilation based on list of participants obtained from the secretaries of the platforms from SenterNovem

[8] 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.