Transition towards Sustainable Production: Policy Planning for a Systems Change

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ABSTRACT

This paper presents a new government program designed to set the first steps towards sustainable production. A shift over the last years in national policy priorities, from process energy-efficiency towards energy efficiency over the product life cycle, called for a new strategy and better integrated policy. This strategy for a more sustainable and energy efficient production in the main sectors of the Dutch economy is being developed together with industry partners, to ensure maximum effectiveness and stakeholder commitment. The program is managed by the Dutch Ministry of Economic Affairs, in close collaboration with many industry stakeholders.

Introducing Transitions and the Policy Context

Energy policy has a long history in The Netherlands, as in all industrialized countries. The Ministry of Economic Affairs, which is in charge of this policy, originally designed policy to guarantee a reliable energy supply. In later years, environmental issues such as the relationship with CO2-emissions became more important as well, which resulted in energy efficiency being added to the energy policy goals. Energy efficiency policy is implemented via various policy instruments, each targeting a specific sector of the economy. The main instruments developed for energy efficiency in industrial production, services and products include: long-term agreements on energy efficiency (LTAs), International Benchmarking, energy efficient product development, energy labels for household appliances and cars, eco-design and several subsidy programs focusing on different target groups (industry, households, non-profit organizations).

The shift towards more integrated policy with a focus on sustainability is seen worldwide, in international, European Union and national policies. Internationally, the framework is given by the agreements on sustainable production and consumption in Johannesburg (UNEP 2002) and the CO2 reductions agreed in the Kyoto Protocol (implemented under the UNFCCC, UNFCCC 1997). Within the European Union, the Integrated Product Policy Green Paper and the Lisbon agenda – the EU's commitment to becoming the most competitive economy worldwide by 2010 – are leading policies. These international and European policies are translated into several national policy documents, such as the Fourth National Environmental Policy Plan ('Nationaal Milieubeleidsplan 4 – NMP4', VROM et al. 2001) and the Energy Conservation Plans (EZ 1999).

National implementation of the Johannesburg agreements and the Lisbon agenda is still under development. A coherent national policy is not available yet, however, several initiatives have been started. The transition program on sustainable production can be seen as one of the initiatives implementing these agreements.

In addition to the LTAs and International Benchmarking the transition program on sustainable production has started. This program is necessary to create the right framework for initiating leapfrog changes. Existing policies focus on step-by-step changes and this is likely to be not enough to solve persistent environmental problems like CO_2 emissions (VROM et al. 2001). In this approach energy is the major focus point but other environmental and social issues can also be addressed to allow industry to make a strategy on sustainable production. The energy transition program aims to develop a strategy, in good partnership with industry and other stakeholders, for the practical implementation of sustainable production. Radical, innovative system improvements, including new components and process designs, new approaches for production and distribution as well as learning how to design a transition towards sustainable production, open up the way to a very energy efficient industry. Transparency and taking responsibility are keywords for the energy transition program, and a focus on practical experiments to learn – jointly – how to move forward is at the program's core. This applies to the 'enlightened' industry partners participating in the program as well as to the Dutch Ministry of Economic Affairs, who is managing this program (EZ 2002).

The Program's Heritage: LTAs and the Benchmarking Covenant

Energy efficiency in industry (industrial products and production) is the focus of the Transition towards sustainable production. Since the 1990s, the main policy instrument for this is covenants (Long Term Agreements, LTAs) between representatives from specific sectors of industry, services or commercial sectors and the government. The first covenants were signed in 1992 and most of them ended in 2000. Between 1992 and 2000 a total of 44 LTAs were contracted, including 29 with industrial sectors.

The LTAs results were monitored on a yearly basis. At the end of the first ten year period an overall evaluation was performed. This evaluation learned that the LTAs have fulfilled their goals: the result between 1989 and 2000 was on average 22,3 % (or approx 2% per annum) energy efficiency improvement (energy consumption per unit produced), equal to 157 PJ energy conservation or 9 Mton CO_2 emission reduction per annum. This contributed to an annual saving of about 700 million Euros for the Dutch industry (Novem 2001) .

Following up on the results of the evaluation in 2000, a new form of covenant was added for the most energy intensive industry sectors, in order to take their international playing field more in to account. This covenant is called the International Benchmarking and includes: Oil refineries; Iron, steel and non-ferrous metals; Breweries; Cement; Chemical industry; Glass; Paper mills and Sugar industries; Philips and Miscellaneous industries.

The philosophy underpinning the Covenant is that companies should come to rank among the top ten percent worldwide (the "Top Global Performers") in terms of energy efficiency.

For the medium energy users in industry a new type of LTA was designed and agreed upon. In December, 2001, this LTA-2 for the period 2001 – 2012 was signed by 16 sectors with a total of 520 companies and an annual energy consumption of 250 PJ (Novem 2001b). For more information on the LTA-'s also see the ACEEE paper 'Energy Efficiency throught LTA's: Broadening the Horizon in the New LTA Approach (Gerrtis 2003).

Next Step Is a Further Integration of Policies and Moving Towards Sustainability

At the moment there is a need for more integration between the energy conservation instruments and more social or environmental directed instruments. This need is felt by both the Ministries and by industry. The ministries are in discussion about policy integration. This also fits in the ongoing trend towards sustainable entrepreneurship and corporate social responsibility, which means that industry pays attention to triple P: people, planet and profit.

There also is a need to find new instruments to make some real, leapfrog, changes. The instruments now in place are designed to stimulate regular but relatively small improvements. To solve some of the very firm environmental problems this will not be enough, a step change in efficiency is needed. In the last environmental policy document, the Fourth National Environmental Policy Plan, transition is mentioned as a new approach to get to these step changes (VROM 2001).

The concept of managing a transition towards sustainable production is not uniquely found in the Netherlands. Although the Netherlands internationally leads with this approach, there is still much learn from other countries, such as Austria, Sweden, Finland, Germany, Belgium and the United States. These lessons include best practices on specific policy issues, and experiences, e.g. the U.S. Industries of the Future program. When transposing these experiences to the Netherlands, it is important to focus on the competitive strengths of the Dutch economy, in logistics, networking and a knowledge base in, for example, the metallurgic, chemical and agricultural industries (Singels, 2002).

Phase 1 of the Transition Program on Sustainable Production

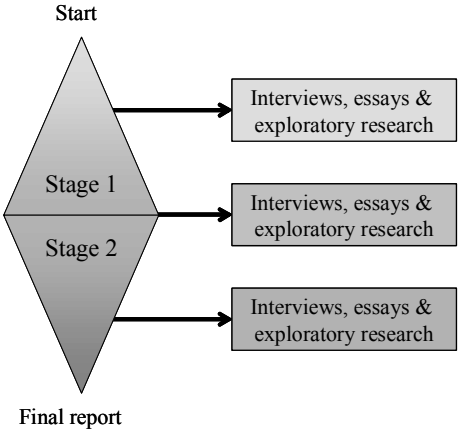
The program started in June, 2002 with a stakeholder analysis, to identify "enlightened" partners in the industry, research institutes and other Ministries, nationally and internationally. These partners were invited to present their views on the practical implications of the route to sustainable production and on the first steps towards this goal. This approach served to collect various opinions regarding the further development on the Government's activities and to commit partners to the program. The research question that lies at the heart of phase 1 reads: 'What actions are required from the government and from market parties to stimulate and facilitate systems changes and leapfrog technologies for energy efficiency, without this having undesired economic, environmental or social consequences?'.

Program Design

Key elements in the program design were: co-operation and communication with all relevant stakeholders; openness about the goals and process of this program; raising support for the program and getting stakeholders to take their own responsibility for sustainable development. In this program, the government has taken the position of a process manager, allowing the stakeholders to set the agenda and determine the relevant issues.

The program was executed by a project team, consisting of a balanced mix of government and industry partners, each representing a different department or company: Shell Oil Company, Philips, DSM, KPN, the research institutes Technical University Delft and TNO and the Government's economy and environment departments.

Figure 1. Program Design Overview



The program design of the Transition towards Sustainable Production has included a mix of instruments, with the main focus on allowing an open interaction between government and industry stakeholders (MEK team 2002a).

This design can be characterized by two stages: an information collection stage, during which stakeholder opinions and other relevant inputs were analyzed, and a second convergence stage, in which all the views and opinions were aggregated in the final outcome of phase 1. (see Figure 1: program design overview). Table 1 presents an overview of the instruments applied in this phase.

Table 1. Instruments Applied in Phase 1

Stage 1 'Information Collection'	A project team that includes expertise on all aspects relevant to phase 1 of the program
	Essays invited from Dutch and International experts in the field of sustainable production
	Interviews with Dutch industry stakeholders, NGOs, Intermediary organizations and Dutch and international research organizations
	Overviews composed by Novem (Dutch national energy agency) of: (1) existing government programs to support energy efficient production and sustainable development in Industry, and of (2) the parties involved in 20 case studies of (small-scale) transitions
	An analysis of energy scenarios applied by international organizations
	An overview of international developments (potential opportunities and barriers) that would be of interest to a Dutch policy on the transition towards sustainable production
	An inventory of businesses involved in cleaner production in three countries (United States, Singapore, Germany), by the Attaches for Science and Technology at the Dutch Embassies in these countries
	Presentations and bilateral discussions at European fora (8th European Roundtable on Cleaner Production and the EU Integrated Product Policy meetings)
Stage 2 'Convergence'	Project team discussions to determine the focus of the final result and the main conclusions of phase 1
	A stakeholder workshop with over 30 participants from industry, research institutes and the government to raise support for the transition towards sustainable production and collect views on the criteria and conditions for implementing sustainable production
	A stakeholder workshop to determine conditions for a transition towards sustainable production, define potential pilot projects and to raise additional support for the program
	A discussion paper presenting the core conclusions of phase 1 of the program, which was circulated among stakeholders to verify these conclusions
	An internal workshop (government and energy agency representatives) to discuss the organizational conclusions of phase 1

Results of the First Phase

The first phase of the Transition towards Sustainable Production program focused on identifying and committing partners to the program's goal and to define, together with stakeholders, how the further development towards sustainable production should be initiated.

One major result of this first phase was an integrated stakeholder view on the future energy supply for industrial production. The common opinion found with industry stakeholders was that, over time, production will become sustainable, reflecting international trends for products and production processes. The main question for industry partners is whether this development can be directed towards an outcome which is beneficial to the Netherlands and to Dutch Industries, based on their competitive advantages. This question was found to be appealing to the Dutch Industry, and ambitious and interesting for the government, and should therefore be the starting point for phase 2 of the program. However, it also was confusing as to the practical implications and some conditions that needed to be fulfilled. These aspects concerned the concept of transition, the ability to manage a transition, the participation in a transition, and the necessary framework for a transition. These are described in the next paragraphs (MEK team 2002b). (The outline of phase 2, which intends to take away the confusion, is described in the next section.)

The concept 'transition': alright in principle, but not practical enough as a guiding principle. At the start of the transition program, the government choose the metaphor of 'a trip to the South' to visualize their approach. With this metaphor, the government expressed its view of this program having a loosely defined goal, including various modalities and the option for 'travelers' to choose their own destination. This metaphor backfired when it was presented to industry partners: these stakeholders are not interested in a government leaving its goals undefined and determining later on if they have fulfilled goals. Businesses do not want significant uncertainty, i.e. they want to know exactly what the government expects from them. In addition to this, industry stakeholders indicated that they would like a clarification on how the government intended to manage the proposed transition.

Managing a transition: this is not a government role, but initiating and creating a framework for transitions is. Stakeholders, and especially industry, question the manageability of a transition for a government. Stakeholders feel that innovations are brought forwards by market parties, operating in an international field, and de potential role of the Dutch government in steering this process is limited. Still, stakeholders think that a government can speed up this development process and support it to move in the desired direction by a suitable framework. This framework should include adequate infrastructures (physical and otherwise) for innovations that improve resource efficiency, facilitating the search for new routes to sustainable production en the elimination of regulatory barriers for pilot projects.

Participating in a transition: a conditional yes. Industry stakeholders have expressed a clear interest in participation in a transition towards sustainable production program. Their main goal is to clarify, jointly, the implications of a transition for their business processes. They are willing to invest in this goal, if the government is equally willing to support this

trajectory. They are not yet willing to supply large funds for pilot projects, as they lack a clear understanding of the targets and policy framework for these pilots.

Transitions require a new policy framework. The policy framework to stimulate a transition towards sustainable development will be different from today's policies. The requirements for this new framework are yet unclear, as is the transition trajectory itself. Nevertheless, stakeholders do indicate some elements for this future policy framework:

- Setting a clear long term goal and taking the lead in determining short term targets;
- Engaging in a long term commitment for transition programs;
- Eliminating specific barriers, in field as waste regulations and licenses to operate;
- Internalization of environmental costs in prices (via international agreements);
- Setting the right example, e.g. in government procurement;
- Creating an international level playing field;
- Keeping an open eye to societal and technological trends and dynamically adapting policy to these trends; and
- Specific attention to (physical and non-physical) infrastructures.

Lessons Learned from Phase 1 of the Program

An evaluation of phase 1 of the project learned that the program was moving in the right direction, but that a refocusing of its targets and approach would be necessary to achieve the goals of the program. The required adjustments can be characterized by the following lessons learned:

The program goal needs correction. The research question for phase 1 ('What actions are required from the government and from market parties to stimulate and facilitate systems changes and leapfrog technologies for energy efficiency, without this having undesired economic, environmental or social consequences?') and the resulting program goal suggested to the project team and to the involved stakeholders that the concept of (managing) a transition towards sustainable production had been sufficiently clarified to be able to create a complete overview of the aspects of the route towards sustainable production in a short time.

This – unintended – suggestion resulted in a lot of pressure on participating (industry) stakeholders to specify and choose transition routes at a time when they felt that the transition itself was still unclear and that more work was needed to clarify goals for this transition. The lesson from this was that a better management of process steps and the expectations of all parties involved and a restart of the program including a better definition of the goals of a transition would be required to prevent this pitfall in the next phase.

The search for pilot projects. The search for potential pilot projects for a transition towards sustainable production during phase 1 made clear that this would require far more detailed criteria than were available during phase 1 of the project. Stakeholder consultations revealed that their support for (a series of) pilot projects would be dependent on the availability of a reference scenario for sustainable production, detailed for a small number of business sectors in the Netherlands. This reference scenario should include a long term perspective (or vision)

and well-defined interim targets. The lesson is that these criteria and the reference scenario should be developed early in (phase 2 of) the program.

Sequential steps in the process. Experiences from earlier transition studies and projects showed that such a process requires a number of well-defined process steps, to realize a complete analysis of a transition route and to build commitment from the stakeholders involved. The steps are sequential, but are not necessarily completed in linear order, as the information that is required often comes incomplete and can only be fully understood when it is applied in a next step, for example to analyze a specific case.

This program has been executed under a lot of time pressure, resulting in insufficient time to give adequate attention to all these steps. This created uncertainty about the meaning and the goal of some stages for the stakeholders involved in phase 1 of the program. The lesson is that a good timing of the steps in the process, and a clear communication of this to the stakeholders, is essential for a successful program execution and should receive more attention in phase 2.

The government's role and position. Phase 1 made clear that the government and industry stakeholders have different ideas about each other's responsibilities in the program. The government expected that industry would be able and willing to join a transition to sustainable development even if its goals and the policy framework for this transition are yet unclear. Industry stakeholders, on the other hand, expected an explicit lead from the government in clarifying long term goals. In addition to this, industry was neither able - nor willing - to participate in a transition if it required big jumps forward (leapfrogging to sustainable production), because the risks of this approach were not manageable. The fact that the government would be interested in leapfrogging to new technology systems, and seemed to be willing to make substantial financial contributions to those willing to 'jump', did not change this.

These lessons were learned at the end of the 1st phase of the program, and have been implemented in the phase 2 program design.

Conclusions of the First Phase

The first phase resulted in an overview of the views and opinions of stakeholders, from industry, research institutes and NGOs, on the concept of a transition towards sustainable production and on the route towards this goal. It also showed some lessons that can be use to design the phase 2 of the program. Following up on these results and lessons, the project team agreed on two conclusions, supported by the government and industry representatives in the team.

Follow-up necessary, on several specified items. The results of phase 1 clearly indicated the directions for further activities and the elements that should be present in a follow-up program. Such a phase 2 program should include:

- The determination of a clear goal for this transition and specific interim targets;
- The reduction of the scope of 'sustainable production' to a few well-defined product / production chains;

- An in-depth analysis of the chosen product / production chains, with a focus on the long-term goal and on the status quo in the involved industries;
- Targeted attention for end-users of new products, and for potential leaders of innovations; and
- Pilot projects and experiments to gain hands-on experience with transition management.

Integrated program required, in a good organizational context. A phase 2 program could only be successful if all necessary activities are integrated into one coherent program design, under a single steering body and centralized project management. This should safeguard the interaction between the elements of a phase 2 program, thereby reducing the risk that activities would focus only on long term options – but fail to include the short-term challenges in the plans – or only on solving current difficulties – without focusing on the sustainability issue at hand. Furthermore, a good phase 2 program would need to pay sufficient attention to developing a long-term arrangement for government support of the transition towards sustainable production. This should minimize the risk that the government's endorsement for this transition would halt after completion of the project, thereby causing the decline of industry involvement as well.

Phase 2

Starting point for phase 2 of the program was the understanding that the transition towards sustainable production will happen, because international trends will inevitably lead to products and production processes in time becoming resource efficient. The main question about this development is whether it can be directed towards the desired outcomes and if it can strengthen competitive advantages of the Dutch industry. If so, that this development would lead to substantial benefits for the Netherlands and to increased innovative power and a better knowledge base for the Dutch industries (MEK team 2003).

Program Design

Phase 2 of the program started in January, 2003, with a focus on developing a detailed vision of (the transition towards) sustainable production, and, with this vision as a starting point, on designing feasible transition routes that take the status quo as a starting point and describe the actions needed to start the transition towards sustainable production. The building blocks of phase 2 are 3 steps, described in the following paragraphs.

Step 1: developing a framework and setting clear goals. Developing a vision on sustainable production in the Netherlands around 2030 and the resources (including energy) then required for these production systems of the future. This vision should include a selection of cases (transition routes) that are expected to be exemplary for the changes that lie ahead on the route towards sustainable production and the expected developments in the involved sectors of the economy. The vision will be developed by an authoritative group of high-ranking industry representatives, supported by the program management team, and reviewed by a wider stakeholder forum via a workshop in the 2nd quarter of 2003. This review will serve to test the viability of the vision for this group of stakeholders, and will

provide the input needed for the completion of the vision. The stakeholders involved in this stage are mainly similar to those in phase 1, with more stakeholders constantly getting involved as well.

Step 2: detailing transition routes and formulating clear questions and short-term goals. Detailing transition routes to form a detailed view of the systems changes that are expected to materialize within the selected sectors of the economy in the next 20 years (as part of the envisioned transition). These views will include descriptions of the technological and organizational challenges that are likely to be required for these systems changes and of the parties that potentially could lead or participate in finding solutions for the challenges. The detailing of transition routes will be done by working groups consisting of industry representatives, supported by researchers and a representative of the program management team. Detailed transition routes will be presented to a wider audience (including industry stakeholders, a wider government representation, researchers and other interested parties) in the 3rd quarter of 2003, again via a workshop. The workshops output will be used to finalize the detailed transition routes, and to test their acceptability to other parties. Following up on this, the working groups will determine if there are elements of the transition routes that would benefit from pilot projects in 'the real world', to provide practical experience with the necessary technical or organizational challenges.

Step 3: selecting pilot projects. Selecting potential pilot projects to gain practical experience with the challenges imposed by a transition towards sustainable production. Upon completion of the transition routes, the program management team will draw up a list of the elements in these routes that would require (or benefit from) pilot projects and will issue a call for proposals from industries and their partners to perform experiments on these elements of transition. The design of this stage in the program will depend on the outcome of the two previous stages and the legal and financial framework that is currently under development for supporting businesses in the transition towards sustainable production.

With this three-stage program design, the government expects to be able to develop a good overview of the implications of a transition towards sustainable production, and of the steps needed to accelerate this transition in the Netherlands in a way this is beneficial to the Dutch economy and industries. This will require a significant participation from involved industries, with ideas and with time to bring these forward. Consultations during phase 1 of the program resulted in an industry-wide commitment to provide this input, provided that the government would take care of a suitable program design, would commit itself – via high-ranking administrators – to this program and would provide adequate facilitation for the industry representatives participating in the program. We believe that these conditions are met with this program design and that this design incorporates the lessons learned from phase 1 of the program, so that a successful phase 2 can be expected in 2003.

Expected Results of Phase 2

Phase 2 of the program will end in December 2003. The expected results are:

1. A coherent vision on the way sustainable production can look like in 30 to 50 years, and the resources (including energy) necessary for this;

2. A selection of three to five transition routes, including a detailed vision on how this route will develop the coming 20 years and the stakeholders involved;
3. Short term goals and questions per transition route that form the basis for the selection of pilot projects; and
4. A shortlist of pilot projects.

The main result of this phase will be the consensus between government and industry on the framework and long-term goals for the transition towards sustainable production. The second important result will be a selection of pilot projects that can start this transition and will deliver a contribution on one of the selected transition routes.

Status Quo of the Program

At the time of completion of this paper, phase 2 of the program was proceeding along step 1. Interviews with high ranking industry representatives are underway; the completion of the vision is expected in early June 2003. A first, preliminary selection has been made of the industries that should be the focal point of the rest of the project, based on four criteria:

1. the industry's energy intensity and energy consumption is significant;
2. a major part of the product cycle can be influenced from within the Netherlands;
3. the Netherlands have a comparative advantage (e.g. infrastructure or knowledge);
4. the sector will still be important for the Netherlands in the long term (30 to 50 years).

Table 2 gives an overview of the first selection of industries, and their (relative) ranking on the criteria. This overview was discussed with stakeholders at the "energy transition day", when more then 200 industry, research institutes and government representatives discussed the energy transition in the Netherlands.

Table 2. Preliminary Selection of Relevant Industries

Sector	Consumption (in PJ)	Part of chain in NL	Comparative advantage NL	Long-term relevance
Chemical industry	321	+	+	+[1]
Refineries	120	+	+	-
Base metal/metallurgy	70	+	+	+
Oil and gas exploration	34	0	0	-
Paper and card	33	+	0	+
Dairy industry	17	+	+	+
Glass	12	+	0	0
Rubber, synthetics, carpet & textiles	10	+	+	+
Coarse ceramics	9	+	0	-
Philips	8	0	0[2]	0
ICT infrastructure	8	0	0	+
Margarine, fats and oils	7	+	+	+
Sugar	6	+	+	-
Meat processors	5	+	+	0

Outlook

The long-term outlook for the transition towards sustainable production can be characterized by the five items listed below.

- **Goals and ambition.** The long-term goal of the transition program is to come to a sustainable way of production in the Netherlands. We do not want to set goals in terms of percentages of CO2 reduction or other resource usage. We do want to belong to the top ten best in the world in terms of sustainability based on an innovative, knowledge based and competitive industry.
- **Long term cooperation.** This program is not something you can do for one or two years. To really go together on the route to sustainability you need long-term commitment from industry, consumers and the government. Goal of this years phase in the program is to develop a long-term platform where on a regular basis the results are evaluated, the goals and ambition are reflected upon and the mutual commitment is confirmed.
- **Agreement on route and actions.** Getting agreement on the framework, long-term goals and transition routes is this year's main focus. This agreement should be regularly tested and discussed and if necessary there should be the flexibility to adjust "en route".
- **Start of experiments.** Phase 2 will end in December, 2003, with a shortlist of possible and necessary pilot projects to start the transition. These projects will start in the beginning of 2004. The projects will be closely followed and monitored. Results will be discussed in the above mentioned platform and used to define new projects or adjust the routes and goals.
- **On the road to sustainability.** At the end of this year to route to sustainability will be clear and the partners to travel along this route together will be known and committed. This is however not a static process. Routes may change, as may partners, too. A main aspect of this route will have to be the flexibility to change according to lessons learned along the way and to communicate openly together at all times. If we find a way to do this together, a more sustainable society will be one giant step closer.

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