Development of Policy to Reduce CO_2 Emissions in the Dutch Buildings Sector

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ABSTRACT

Like all western countries, the Netherlands faces market transformation and increasing challenges to developing a sustainable society. This paper describes the development, by the Netherlands Agency for Energy and the Environment (Novem), of the Strategic Framework for the Market Implementation of Energy Efficiency within the Dutch Built Environment (SFBE), an element of the government effort to meet Kyoto Protocol and European Union greenhouse gas (GHG) reduction targets for the Netherlands.

The SFBE was designed using data for long-term Dutch energy-efficiency programs, which give reliable monitoring and evaluation information on energy consumption and savings potential in the Dutch industrial and residential sectors. In addition, the framework design takes advantage of recent insights about the use of marketing techniques to influence customers to adopt energy-efficient and sustainable products and methods. The effects of mandatory and voluntary policy instruments to reduce GHG emissions were assessed, and the building sectors and audiences with the greatest potential for saving energy and reducing GHG emissions were identified.

Results were discussed with peer groups and experts, strategic scenarios were developed and presented to the government, and government decisions about target building sectors and audiences were the basis for the final program (currently being implemented) using the SFBE. The policy instruments selected include building regulations, voluntary local planning, tax changes, and national covenants with key participants.

This work will be enlarged in 2002 to address the whole field of sustainable practices.

Introduction

Developing a sustainable society is not easy. Since the Second World War, the Netherlands has experienced rapid economic expansion and population growth, which have contributed to keeping the country in a continual state of reconstruction and alteration. The Dutch government, along with Novem, the general public, and the business community, are looking for ways to ensure sustainable development in this social and economic context.

An internal government evaluation in the year 2000 resulted in shifts in responsibilities among Dutch ministries. Responsibility for energy conservation policies was moved from the Ministry of Economic Affairs to the Ministry of Housing, Spatial Planning, and the Environment. This reorganization was in response to changing market needs and recently mandated national greenhouse gas (GHG) emissions reduction goals. On behalf of the Ministry of Housing, Spatial Planning, and the Environment, Novem developed a strategic framework for a new program, "CO_2 reduction in the built environment," to help achieve required GHG emissions reductions. This paper describes the strategic framework

and the step-by-step approach taken to develop it and summarizes the resulting program. Kyoto and subsequent European Union (EU) agreements regarding GHG emissions reductions resulted in a six percent emissions reduction target for the Netherlands. The target reduction is relative to 1990 emissions levels and applies to the most important greenhouse gases: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), and a number of fluoride compounds. The target must be achieved between 2008 and 2012.

The Ministry of Housing, Spatial Planning, and the Environment has emphasized the need to tighten current policies to achieve a reduction of this magnitude, and Novem's programs for the built environment must contribute to achieving the CO_2 reduction target. The Ministry directed that market segments where CO_2 reduction potential is highest should be targeted, with focus on audiences who are in the best position to achieve the reductions.

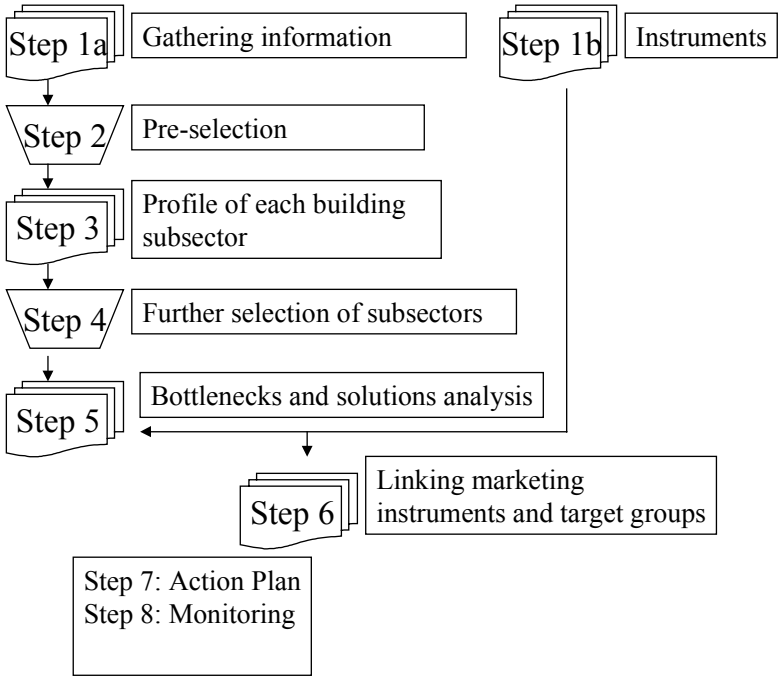
In implementing its energy-saving programs, Novem had in the past concentrated mainly on innovators and early adopters. However, the new framework for CO_2 reduction concentrates on the mainstream market and relies on generally accepted marketing principles to create a system in which a combination of market surveys and monitoring activities will determine the form of energy-efficiency activities.

The Step-by Step Approach

Dutch Ministries follow a guideline known as "From Policy Budget to Policy Accountability" (PBPA) in designing policies. This guideline refers to the two most important events in the Netherlands political calendar: the annual budget discussion and the discussions of the impact of government activities. Under PBPA, policy aims are described in terms of actions with measurable results. The policy goals for CO_2 reduction are expressed in the Strategic Framework for Market Implementation of Energy Efficiency in the Built Environment (SFBE). The subsections below describe the step-by-step plan used to develop the SFBE (Figure 1) and the results of each step.

The aim of the step-by-step plan for developing the SFBE was to select, in a structured manner, the subsectors of the building sector with the highest CO_2 reduction potential, and to determine the instruments to use in approaching the parties involved in these building subsectors.

Figure 1. Step-by-Step Plan for Implementing the SFBE



Step 1. Gathering Information

Step 1 involved evaluating existing information in three areas: policy options, CO_2 emissions reduction potential, and available instruments for reducing CO_2 emissions.

Policy options. The main source for the policy evaluation was the "Dutch Climate Policy Implementation Plan" of the Ministry of Housing, Spatial Planning, and the Environment (For more information, see Ministry of Housing, Spatial Planning and the Environment 1999). This plan presents clear goals for meeting national and Kyoto GHG emissions reduction targets, including a reduction in energy demand in the built environment of the Netherlands of 5.5 Mega tons per year by the year 2010. The document does not specify how and where these targets must be met; only general instruments and approaches are mentioned.

In addition to the "Dutch Climate Policy Implementation Plan," Novem analyzed four other policy documents: the "5th National Act on Spatial Planning," the "Policy Plan: People's Needs, Living in the 21st Century," the "4th National Environmental Action Plan," and the "Innovation Program on Urban Renewal." Although these documents have different aims, they contain valuable elements applicable to the design of CO_2 emissions reduction policies. For example, the policy on spatial planning provided important information on local infrastructure planning (For more information, see Huibers 2002).

CO_2 reduction potential for each building subsector. To determine what measures will be most effective in achieving emissions reduction goals, Novem inventoried the building stock, established the levels of CO_2 emissions for each building subsector, and determined potential emissions reductions. (The building stock is divided up into a number of subsectors. A subsector is defined as a group of buildings with similar building structure and/or function**,**

for example offices or hospitals). For this step, Novem and other organizations used CO_2 reduction potential studies that had previously been carried out. (For more information see Meijer Energy & Environmental Management 1996, ECN 1999, and Novem 1999).

Results of this step showed that the total CO_2 production of the existing building stock was 54.2 M tons of CO_2 per year, and the technical potential for savings (in existing and new buildings, 2000 - 2010) amounted to 33.5 M tons per year. (To see which building subsectors had the largest savings potential, please refer to Attachment 1).

In order to achieve potential savings, the policy instruments to be implemented must be effective for the target audiences; thus, the next step was an evaluation of policy instruments.

Evaluation of policy instruments.This step involved an overview of existing policy instruments to reduce CO_2 emissions in the built environment and the problems or obstacles addressed by each type of policy. There is a wide range of instruments, from legislation to promotional campaigns and including financial strategies (both taxes and subsidies), education/ information exchange strategies (publicity, education, and demonstration projects), legislative vehicles, voluntary agreements (covenants), and benchmarking. This overview step is of particular importance as it allows discussion of the actual use and feasibility of each instrument in the political context. These policy instruments, with their potential assets and limitations for enforcing CO_2 emissions reductions, are used later in the step-by step plan to create an effective marketing approach.

Step 2. Pre-Selection of Building Subsectors

Using the inventory developed in Step 1, Novem developed a complete overview showing the CO_2 emissions reduction potential for each building subsector. With the help of this overview, an initial selection was made of the building subsectors with the largest potential to reduce CO_2 emissions. Subsectors with low or no CO_2 emissions-reduction potential were categorized as "non-priority" or were merged with other "combined" subsectors. (An example of a combined subsector is "office and health and sport facility buildings"). Another reason for merging subsectors is to create a combined target audience to whom the same emissions reduction strategy applies. This is the case with private homebuilders and parties associated with existing office buildings. Merging these groups allows emissions reduction efforts to efficiently focus on common solutions to similar problems faced by the two groups.

The target audiences, who were determined to have sufficient savings potential to meet the Climate Policy Implementation Plan targets included municipalities, housing associations, real estate developers and institutional investors, and homeowners. (See step 4 for the complete list of target audiences selected by the Ministry of Housing, Spatial Planning, and the Environment).

Step 3. Profile of Each Building Subsector

This step analyzes the selected building subsectors so that in the subsequent steps the extent of potential savings and the most effective strategies for achieving them can be determined.

Analyzing the different building subsectors entails determining the roles of the parties involved. Achieving CO_2 emissions reductions depends to a large extent on people's efforts and thus on their conscious and subconscious decisions and behaviors. To reduce energy consumption, it is necessary to determine which parties have the most influence on consumption and how they influence consumption decisions and behaviors. Some parties directly influence decision making (e.g., those who work in housing corporation maintenance), and others have an indirect influence (e.g., architects). Novem listed the decision makers and those with indirect influence on decision making for each of the 13 building subsectors pre-selected in Step 2 as having the largest emissions reduction potential (listed in Attachment 2). The following characteristics were analyzed for each subsector:

- which parties play a "decision-making" or "indirect-influence" role,
- each party's motivation to take action to reduce CO_2 emissions,
- the starting points and obstacles to achieving CO_2 emissions reductions, and
- relevant energy-related trends and developments, such as changes in the housing market, developments in real estate, and financial developments in the health services subsector.

Step 4. Further Subsector Selection – Short List

Based on the results of Step 3, Novem ranked the building subsectors with the greatest potential to reduce CO_2, accounting for both technical savings potential and the realistic possibility of achieving the savings, based on seven criteria, which were grouped into three categories; these criteria were developed in collaboration with the Ministry of Housing, Spatial Planning, and the Environment:

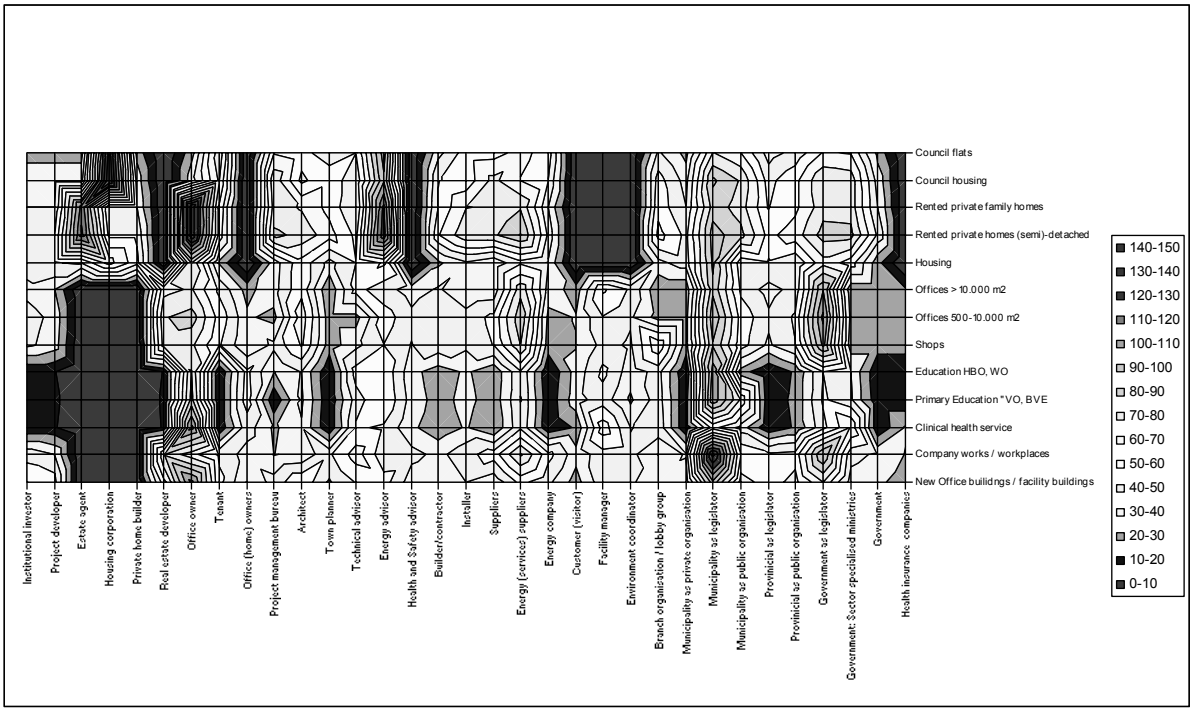
- **Feasibility**
  1. Self-interest in CO_2 emissions reduction of parties involved
  2. Possibility of influencing the parties involved
- **Public image**
  3. Role model function of those selected parties
  4. Place on the actual political agenda (of the issue of CO_2 emissions reduction)
- **Cost effectiveness**
  5. Size of potential reduction
  6. Social cost , i.e., costs to society of achieving the full savings potential, measured in relative, not absolute, terms
- **Potential program effectiveness**
  7. Extent to which program can reach decision makers.

The first four criteria are for the parties involved in each building subsector. Although it is impossible to apply these criteria quantitatively, the key parties involved in the different subsectors were readily ranked using these criteria, and the rankings were validated by experts and members of the target groups. Criteria 5 and 6 are quantitative and supported by the results of a decade's worth of energy-saving programs by energy companies, among other evidence.

The seventh criterion, to assess access to decision makers, was added because it is vital to determine whether an energy-efficiency program will reach decision makers directly.

The results of the assessment using the seven criteria are presented in a three-dimensional diagram (Figure 2). The horizontal axis shows the parties involved, and the vertical axis shows the subsectors of the built environment. Lighter colors represent opportunities for energy savings. The darker the shade, the less chance of a cost-effective approach to saving energy and reducing CO_2 emissions. Varying the weights of the criteria, based on experts' input, causes different scenarios to emerge.

Figure 2. Score of Target Groups in Each Subsector



Steps 3 and 4 above gave insight into which building subsectors and participants have the greatest potential to reduce CO_2 emissions. Part of Step 4 involved determining the societal cost effectiveness of CO_2 emissions reductions for each building subsector. This figure is an average of a range of reduced emissions. Novem selected the most cost-effective mix of building subsectors and target reduction levels in relation to total societal target levels. On the basis of these scenarios, the Ministry of Housing, Spatial Planning, and the Environment chose six target audiences for further action to reduce CO_2 emissions. These groups are: municipalities, housing associations, real estate developers and institutional investors, homeowners, office owners, and private homebuilders.

Step 5. Analysis of Obstacles and Solutions

Step 5 involved translating the maximum technical saving potentials into realistic achievable savings potentials. To do this, it was necessary to:

- describe as accurately as possible why energy-saving solutions succeed or are not accepted by target audiences;
- estimate the desired and achievable target levels of CO_2 reduction for each building subsector, taking into consideration the policy instruments available.

Given these targets, Novem then described:

- the changes in policy and consumer behavior required to give the parties in each subsector the opportunity to contribute to the target reduction;
- the possibilities, activities, and consumer needs that can realistically be addressed.

Step 6. Linking Marketing Instruments and Targets

Based on the marketing surveys, Novem decided to use a two-track approach to identify the actions to be taken to reduce CO_2 emissions.

Track 1 – local infrastructure planning. Local infrastructure planning is based on bringing parties together to reach consensus on viable energy-saving solutions. It is important that each party benefit from this cooperation either directly (e.g., financially) or indirectly (e.g., from improved comfort or healthier homes). An example of a policy for local infrastructure planning is the existing standard "Energy Performance on Location (EPL)," developed in collaboration with the Ministry of Economic Affairs and the Ministry of Housing, Spatial Planning, and the Environment. If all options prescribed under this standard are implemented, a location will have an energy-performance value of 6. (Theoretically, a location can score a "10" if the use of fossil fuels is reduced to zero).

An extended form of local infrastructure planning is the existing climate covenant/ voluntary agreement between the Dutch government and municipalities. This program involves a climate scan, performed by independent parties, to assess the performance of municipalities on specific climate issues. Benchmark techniques are used to stimulate improved performance. Special advisors encourage the parties involved to join forces to improve performance. For instance, a municipality can choose to cooperate with housing associations to accelerate the implementation of solar energy technology or with energy companies to stimulate the installation of wind turbines. The program helps parties choose the most cost-effective energy-saving measures.

Track 2 –The sector approach. In the sector approach, groups (e.g., hospitals, financial institutions, government offices) with specific energy-use patterns and energy consumption levels are identified. Agreements are made at the highest level possible (preferably nationally) to stimulate CO_2 reduction in these sectors. If possible, long-term agreements are made between the government and the parties involved. Financial and technical support is offered to help with the non-cost-effective aspects of CO_2 reduction. (Support is offered only if measures prove cost effective by 2010).

The two tracks are followed in parallel to stimulate the market to produce optimum solutions.

[NOTE: The description of this two-track approach presented is a simplification. The scientific underpinning of the approach can be found in the works of Rogers (1995) and Moore (1999)].

Step 7. Action Plan

In recent years, government support of energy efficiency has focused on funding experiments and disseminating general information. Specific actions have generally been left to energy companies.

These policies have changed for two key reasons. First, electricity sector restructuring has drastically changed the role of the utilities, who are no longer in a position to offer free support to the public for energy-efficiency measures. Second, evaluation of experimental programs shows that although many concepts were good, products seldom reached the mainstream market. Since 2001, therefore, programs have focused on the challenge of stimulating the mainstream market.

Rogers' (1995) theories about diffusion of innovations provide important insight about the diffusion of new products and methods into mainstream markets. The most crucial stage is the point at which products and methods move from innovators to the mainstream market. The gap between those two was studied by Moore (1999), who showed that the use of peer groups and demonstration projects could speed up the "crossing of the chasm" between innovators and the mainstream market. The theory was tested in Dutch municipalities where examples and well-known local politicians were used to persuade the majority of municipalities to include CO_2 reductions in their local energy and policy plans.

The success of this approach in Dutch municipalities was the basis for Novem's development of an action plan for CO_2 emissions reductions programs, based on the obstacles and solutions identified in Step 5 above. Rogers' and Moore's theories have led to improved planning compared to previous methods that were driven by intuition and trial and error. Nonetheless, emissions reductions strategies cannot be implemented overnight. In the CO_2 action plan, Novem emphasizes that further research is needed into the gap between innovation and broad-scale market introduction.

Step 8. Monitoring

The final step in SFBE development entailed the design of the program and impact monitoring at the national level. Impact monitoring will involve the cooperation of a number of Dutch institutes including Statistics Netherlands (CBS), Novem, and the Energy Research Center of the Netherlands (ECN). Although it will be virtually impossible to precisely attribute CO_2 emissions reductions to specific actions, it will be possible to point out the success and failure factors of programs.

Summary of Results of the Framework Design Process

The program that resulted from the step-by-step method described in this paper includes building regulations, voluntary local planning, tax changes, and national covenants with major players. The SFBE was approved by the Dutch parliament in 2001 as part of the official government policy on energy efficiency. The program budget is roughly 17.6 million

Euros for the year 2002. It is expected that some additional measures will be necessary in the near future, such as the energy performance on location (EPL), to ensure that the Netherlands achieves its Kyoto emissions reduction goals.

Conclusions

The strategy described in this paper is intended to help the Netherlands move from programs of voluntary support to an accepted set of regulations that will ensure improvements in energy efficiency and thus reductions in GHG emissions. Such a strategy has worked in the past for programs like the Energy Performance Norm (Novem 2001) for dwellings. Other similar programs in the near future will focus on health and building materials and their contributions to developing a sustainable society.

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Attachment 1

Priority building subsector	Priority target audiences within these subsectors	Technical savings potential (kton/a)	Societal and economic savings potential (kton/a)
(semi) Detached housing	Homeowners, municipalities	6,226	488
Family housing	Homeowners/ municipalities	7,907	608
Council housing	Housing corporations, municipalities, institutional investors	2,597	400
Council flats	Housing corporations, municipalities, institutional investors	1,936	298
New Office buildings and facility buildings	Project developers, institutional investors, municipalities	938	77
Existing office buildings	Office owners, institutional investors, municipalities	2,618	476
Clinical health care	Office owners	1,860	348
Shops (existing)	Office owners, institutional investors, municipalities	1,655	167
Newly built housing	Project developers, housing corporations, municipalities, private home builders	2,889	263
Total		**28,626**	**3,123**

Attachment 2

Pre-Selected Relevant Building Subsectors

Office buildings/ facility buildings

New office buildings
Newly built company workplaces
Clinical health service building stock
Existing primary and secondary schools
Existing colleges and universities
Existing shops
Existing Offices 500 – 10,000 m^2
Existing Offices > 10,000 m^2

Housing

Newly built houses
Existing private (semi)-detached houses
Existing private family homes
Existing council housing
Existing council flats