

# ***Dutch Action Plan for Sustainable Building: a win-win combination of energy savings in buildings and environmental improvements to reduce CO<sub>2</sub> emissions***

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## **1 - SYNOPSIS**

Since the mid-1990s Action Plans have accelerated the application of sustainable building in the Netherlands. Monitoring has shown that the effects in the period 1995-97 were particularly significant for energy savings: additional savings equal to 8 million tons of CO<sub>2</sub> reduction are expected by the year 2020. During the implementation of these Action Plans, the combination of sustainable building measures and energy savings proved to be an advantage. In the near future this may result in a broader environmental rating system for homes, in addition to the existing energy performance standard.

## **2 - ABSTRACT**

In 1996 the Dutch Ministry of Housing, Spatial Development and the Environment (VROM) began a two-year Action Plan for Sustainable Building, which was later extended to 1998-99. Under this plan energy-saving measures are combined with ways to reduce the material flows compared to the building process, to increase the use of environmentally friendly products, and to reduce water usage etc.

Continuous monitoring has proven that this comprehensive approach speeds up the introduction of combined energy-saving measures, although energy is just one of the aspects in the sustainable building concept. This is a win for energy savings. Energy is always a good starting point for projects on sustainable buildings: local authority energy plans are extended to cover sustainable building plans, or general water saving is combined with savings on domestic hot water, etc. Therefore, using experiences from several energy-saving programmes makes implementing a sustainable building programme far easier and more successful. Thus a win for sustainable building.

This paper not only explains this process to show this win-win combination, but also presents in detail, the quantitative results of the Action Plan for Sustainable Building 1996-97. Figures show that about half the newly built houses achieve a lower energy level than the legal (Energy Performance Coefficient; EPC) level, and that energy-saving measures are still the most popular way to improve the sustainability of buildings. The expected long-term effects of the first two-year period are additional energy savings equal to 8 million tons of CO<sub>2</sub> reduction by the year 2020.

## **3 - INTRODUCTION**

Saving energy and improving energy efficiency has been an important issue for several decades, but since the late 1980s it has become increasingly related to the environment, and more specifically to the reduction of greenhouse gas emissions. Over the same period renewable energy sources (wind, hydro, photovoltaics etc.) have been increasingly integrated into energy policy and sustainable energy sources, such as seasonal energy storage, biomass, heat pumps etc., are being granted additional development budgets. This is evident

throughout the Dutch energy policy and has even resulted in a separate policy paper entitled “Renewable Energy Advancing Power, Action Programme for 1997-2000” (see references). A tradition has evolved of using instruments such as insulation programmes, subsidy schemes for boilers, building standards, demonstration projects, improving building construction and insulated glass etc.

However, sustainable building is a more recent topic. In a sustainable building energy use (as low and sustainable as possible) is just one of the aspects that should be integrated. Other aspects include: low (raw) material use, reduced use of water and water management, potential for retrofitting the building for continued, future use etc. The Dutch sustainable building policy began in the early 1990s and was related to the National Environmental Policy Plan (NEPP+) of May 1989 and June 1990. A specific result of this plan was the Policy Declaration on Environmental Targets for Construction 1995. This declaration was signed by Ministry of VROM, representatives from the construction industry, principals, trade unions, local and provincial authorities. These parties agreed to implement a package of environmental targets covering 15 topics.

An important acceleration was initiated by the Sustainable Building Action Plans described in Section 4. The first plan was published at the end of 1995 and the second in 1997. At the time of writing, a draft version of a new plan (2000+) for a new four-year period is being discussed and will be published in the autumn of 1999. All these action plans are monitored and this is where Novem assists the ministry. Some of the results from these two plans are presented in Section 5, which also includes relevant results from the energy policies. Section 6 emphasises experiences from the implementation of these Sustainable Building Action Plans. Results from Sections 5 and 6 show that both the sustainable building and energy-saving policies benefit from this approach. Section 7 presents general conclusions regarding the sustainable building and energy policies, with recommendations for future mutual advantages.

## **4 - DUTCH SUSTAINABLE BUILDING ACTION PLANS**

### **4.1. First Action Plan for Sustainable Building**

The first Action Plan for Sustainable Building was designed to take maximum account of the needs and wishes of market parties (e.g. developers, building contractors, architects), who were expected to cooperate in implementing the plan. This envisaged a four-track strategy:

- harmonisation
- application
- consolidation and
- preparation.

Harmonisation activities were planned to make the information available on sustainable building into a more uniform and readily accessible form. Application activities concern coordinating the concepts embodied by sustainable building. To ensure that the progress made by the harmonisation and pilot projects is a permanent one, a consolidation track was set up. To give these new plans a stronger base, studies were carried out in the preparation of each track. Together these form the framework of the strategy, combined with two themes, energy and water. Figure 1 shows these topics and the spearhead activities.

**Table 1: First Action Plan for Sustainable Building, the framework.**

<p><b>Harmonisation: Improving clarity and access</b></p> <ul style="list-style-type: none"> <li>• package of measures for sustainable building</li> <li>• national information centre</li> </ul> <p><b>Application: putting sustainable building into practice in the construction industry</b></p> <ul style="list-style-type: none"> <li>• application of sustainable building techniques at so-called VINEX sites</li> <li>• application for current housing stock</li> <li>• retail trade and consumers</li> <li>• demonstration projects and central government as role model</li> </ul> <p><b>Consolidation: securing the future of sustainable building</b></p> <ul style="list-style-type: none"> <li>• sustainable building in land use plans</li> <li>• sustainable building in building regulations</li> <li>• tax changes</li> </ul> <p><b>Preparation: getting ready for the future</b></p> <ul style="list-style-type: none"> <li>• education and apprenticeship schemes in the building industry</li> <li>• long-term vision</li> <li>• environmental rating system</li> </ul> <p><b>Energy</b></p> <ul style="list-style-type: none"> <li>• energy conservation in the built environment</li> </ul> <p><b>Water</b></p> <ul style="list-style-type: none"> <li>• reduction of water use in households</li> </ul>
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To implement actions related to energy, the Ministry of Housing, Spatial Planning and the Environment (Ministry of VROM) and the Ministry of Economic Affairs (Ministry of EZ) worked in close harmony to:

- extend the agreements with housing and tenants' associations;
- study the possibilities for including energy-saving incentives in legislation on rented property;
- determine whether fiscal instruments can be used to promote energy conservation;
- ensure that the Environmental Action Plans drawn up by the public utilities (MAP's) correspond with the measures proposed in the Action Plan for Sustainable Building.

The various spearhead activities were selected to achieve maximum environmental efficiency at minimum cost, and represent a considered response to market interest in sustainable building. Section 5 presents the results of monitoring this Plan, as well as a global overview of the second Action Plan, which was first implemented at the end of 1997.

#### **4.2. Second Action Plan for Sustainable Building**

Using the experience gained from the first plan, the ongoing policy development and special interests market parties set new emphasis within the four tracks. The new two-year period 1998-99 emphasises project implementation, with clear targets, project owners and specific actions. To tighten the relationship with the market as much as possible, project owners are generally non-governmental organisations. A project owner is responsible for a more detailed project plan, the finance of the project and the implementation. He also makes a quarterly progress report.

The two special themes of this second plan, energy and water, are now incorporated into the tracks and projects (see Figure 2). Energy receives specific attention in several projects e.g. the national checklist (guidelines giving practical measures), long-term agreements for non-residential buildings and energy infrastructure.

**Table 2: Second Action Plan for Sustainable Building, framework and projects.**

<p><b>Harmonisation</b></p> <ul style="list-style-type: none"><li>• guidelines (checklist) for sustainable housing</li><li>• guidelines (checklist) for sustainable non-residential buildings</li><li>• guidelines (checklist) for sustainable urban planning</li><li>• guidelines (checklist) for sustainable earthworks, road building, hydraulic engineering</li><li>• national information centre for sustainable building</li></ul> <p><b>Application</b></p> <ul style="list-style-type: none"><li>• application in new houses</li><li>• application in present housing stock</li><li>• retail trade and consumers</li><li>• intensive use of space</li><li>• energy infrastructure</li><li>• lead water pipes</li><li>• demonstration projects and central government as role model</li><li>• agreements with market parties and the utility building sector</li><li>• action: 20% increased use of wood</li><li>• reduce construction and demolition waste</li><li>• energy reduction for earthworks, road building, hydraulic engineering</li></ul> <p><b>Consolidation</b></p> <ul style="list-style-type: none"><li>• sustainable building in land use plans</li><li>• sustainable building in building regulations</li><li>• tax changes</li><li>• environmental performance for homes</li><li>• review of government instruments for housing regulations</li><li>• improved standard specifications for road building and hydraulic engineering</li></ul> <p><b>Preparation</b></p> <ul style="list-style-type: none"><li>• environmental rating system</li><li>• education</li><li>• international</li><li>• water</li><li>• innovative building</li><li>• research and development</li></ul>
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#### **4.3 Action Plan (2000+)**

The Ministry of Housing, Spatial Planning and the Environment is currently preparing a new Action Plan (2000+) for a four-year period, split into two-year implementation plans. The drafts, which are now under discussion, include:

- emphasis on three areas : urban planning, energy and consumers;
- within these areas the existing building stock will be more important than new buildings;
- higher level of integration, including sustainable building in the policies of the various ministries;
- consensus on quantitative and qualitative targets for government and market sector.

This programme will be submitted to the Dutch Parliament by the end of 1999.

## **5 - RESULTS OF THE SUSTAINABLE BUILDING POLICY**

Since this policy started, special attention has been given to monitoring and this is where Novem has been supporting the ministry. Since 1994 a biannual report has been produced showing progress and results. Since the end of 1995 this report is used by the Ministry to inform Parliament on the progress of the Action Plan for Sustainable Building.

Monitoring is carried out at three levels:

1. monitoring the progress of projects and products produced;
2. monitoring the (direct) results of the projects;
3. monitoring the (overall) environmental effects of the Plan of Action.

These three levels are presented in Figure 3. The impact of policies and actions, other than directly related to this plan, are not included in the diagram, but are taken into account in the monitoring.

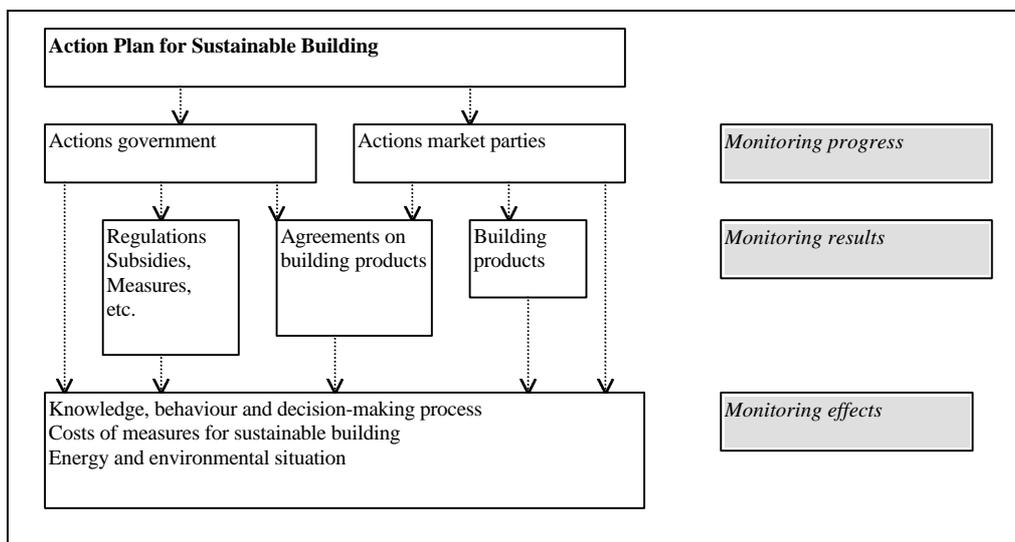


Figure 1 : Monitoring the Action Plan for Sustainable Building.

### 5.1. Results of the first Action Plan for Sustainable Building (1995-97)

Figure 4 summarises the main conclusions from the monitoring. Sections 5.1.1 to 5.1.4 give more detail of the results (for monitoring level two) relating to the energy policy. These sections describe the numbers of sustainable houses and the agreements with housing associations (track realisation), the energy performance and local policy (track consolidation). The overall effects (third level) of the plan with regard to energy use and CO<sub>2</sub> emissions are presented in section 5.1.5.

Table 3: General conclusions from monitoring the Action Plan for Sustainable Building.

<p><b>Harmonisation</b> national consensus on the checklist for sustainable new houses is realised; others checklist are being prepared national information centre operational and already well known</p> <p><b>Realisation</b> 15% of new houses are 'sustainable' slow start to the special sustainable building subsidy</p> <p><b>Consolidation</b> incorporating sustainable building into legislation: still a long way to go three voluntary support programmes receive an increasing number of participants</p> <p><b>Preparation</b> Long-term perspectives studied and used in the second plan</p>
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#### 5.1.1 Sustainable houses

It was not yet possible to monitor the contribution of sustainable houses in the total number of new houses. This is because it takes a long time (up to two years) between applying for a building permit and occupying the house. A qualitative study into building permits over 1996 concluded that around 15% were for houses that could be classified as sustainable. Another, more in-depth study was also carried out on permit

applications in 1995 and 1996, as it was expected that the impact of the sustainable building policy would be visible. The penetration rates for the individual measures in a sustainable house vary widely, from almost zero to over 95%. Figure 5 shows the rates for measures concerning energy; these rates are in general higher than the measures concerning water, materials etc.

**Table 4: Penetration rates for energy-related measures in sustainable houses 1995-96.**

Measures in a sustainable house	Penetration rate 1995-96 %
Separate metering of energy use	80-85
Very efficient boiler	45-65
Boiler with low NO <sub>x</sub>	35-55
Very efficient glass in heated rooms	35-40
High level of roof insulation	15-15
High level of floor insulation	8-18
High level of wall insulation	8-15
Energy performance max. 1.3	<5
Energy performance max. 1.2	<5
House orientation to the south	10-15
Solar boiler system	< 8

#### 5.1.2 Agreements with housing associations

At the end of 1996 a declaration of intent regarding sustainable building was signed by the housing and tenants' associations, the association of energy distribution companies, the Ministry of Housing, Spatial Development and the Environment, the Ministry of Economic Affairs and Novem. It was agreed that:

- at least 1,400 euro will be invested in sustainable building measures for each new social house or apartment;
- housing associations will use the national checklist for sustainable maintenance when maintaining the social housing stock;
- during the period 1997-2001 around 1 billion euro will be invested in sustainable measures related to housing maintenance;
- around 15% energy savings will be achieved for the total number of houses owned by the housing associations.

#### 5.1.3 Using the energy performance coefficient (EPC)

Since the end of 1995 all new houses must meet a prescribed energy performance level. The level value is a quotient of two figures. One is the estimated energy use for a new house is calculated in accordance with the standards for space heating, ventilators, pumps, water heating, lighting, cooling and humidification. The other is a standardised energy budget determined by the floor area, the area of the building shell and a number of weighting factors. In the quotient the expected energy use is compared to a standard use (i.e. the amount of space is included). This makes it possible to use the same values for all houses.

The maximum EPC was set at 1.4. Several actions from the Plan were then combined with ongoing projects to improve the energy efficiency; all projects supported by the Ministry of Economic Affairs. Measures that result in a lower EPC value (<1.3 or even <1.2) were included in the list of sustainable building measures. Figure 5 shows that there were few houses with these lower values in 1995-96. But it should be kept in mind that an EPC is only required for building permits applied for after December 1995. Research on EPC awareness showed very high values at the beginning of 1996 (over 95%), so it was expected that for 1997 onwards the impact of the EPC would be much greater. Section 3.2. shows the results for 1997.

#### 5.1.4 Local and regional policy

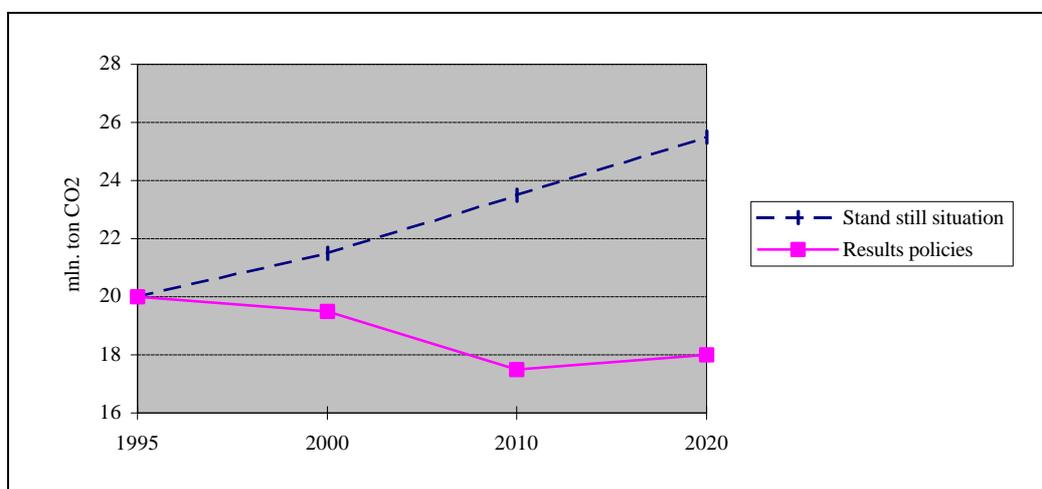
Local authorities have developed sustainable building policies, as well as starting up more specific actions for implementation. Many local authorities, around 79% in 1996, included sustainable building in their priority list, mostly in combination with energy policy. Almost half (44%) the local authorities had started implementing their action plans by the end of 1997. Figure 6 summarises the various agreements. It is worth noting that local authorities often collaborated to form regional agreements.

**Table 5 : Local and regional agreements on sustainable building, 1997.**

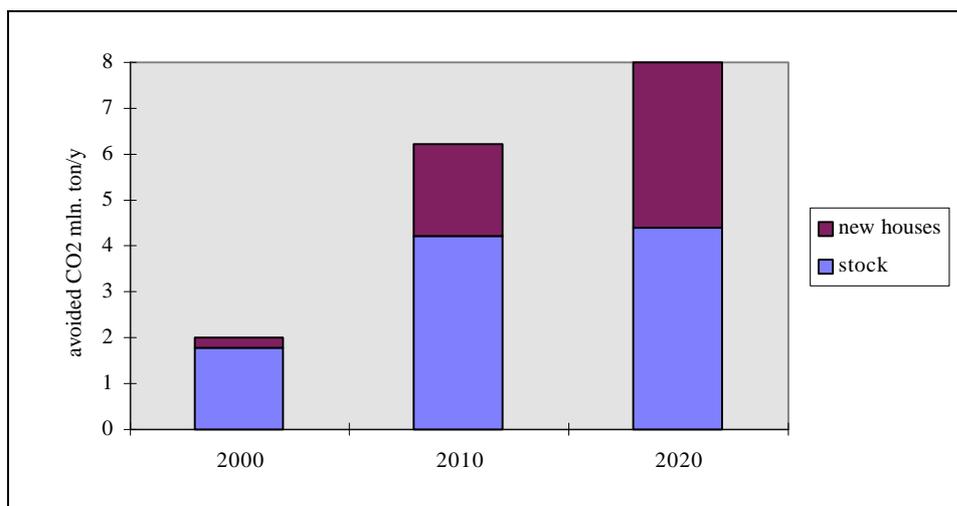
Number of local authorities		Phase of agreement development
absolute	%	
274	44	nothing prepared
162	26	developing an agreement
66	10	letter of intent signed
123	20	agreement signed

*5.1.5 Energy savings and CO<sub>2</sub> reduction*

The long-term environmental impact of the first Action Plan was estimated by the research institute RIVM. They based their scenario on a model for the housing sector: the penetration of each individual technical measure related to sustainable building. Figure 7 presents the results for CO<sub>2</sub> reduction by the year 2020. One line shows the ‘stand still’ situation: the expected CO<sub>2</sub> emission by households, with regard to heating and hot water production. This is what would happen using the current policy by the Ministry of Economic Affairs, including efforts by the energy distribution sector. CO<sub>2</sub> emissions would increase from around 20 million tons in 1995 to approximately 26 million in 2020.



*Figure 2 : CO<sub>2</sub> emissions caused by heating and hot water in houses, 1995-2020.*



*Figure 3: CO<sub>2</sub> reduction, specified for housing stock and new houses 2000-2020.*

The results from additional policies, including the first Action Plan for Sustainable Building should be that emissions will drop to around 18 million tons CO<sub>2</sub> in 2020, i.e. an 8 million ton reduction. This reduction should be realised by:

- a change in the energy supply (e.g. district heating and solar domestic hot water systems);
- increased use of industrial waste hot water for district heating;
- higher level of energy performance for new houses.

By the year 2020 around 55% of the effects should be realised by improving existing housing. Figure 8 shows that, up to the year 2000, the impact of new houses is moderate (about 10%).

Most of the CO<sub>2</sub> emissions reduction by the year 2000 is related to the energy saved by the Environmental Action Plan of the energy utilities: this should result in a CO<sub>2</sub> emissions reduction of 1.1 million tons a year, including around 0.3 million from increased use of district heating.

In the period after 2000 solar domestic hot water systems are expected to have more impact on emissions reduction for hot water production in houses. Figure 9 shows the impact of the Action Plan and the ongoing energy-saving policy, as well as the target for the new Action Programme Sustainable Energy 1997-2000. This shows that from 2000 onwards a large additional effect is expected: at least 15,000 solar systems a year (in 1995 some 3,200 systems were installed).

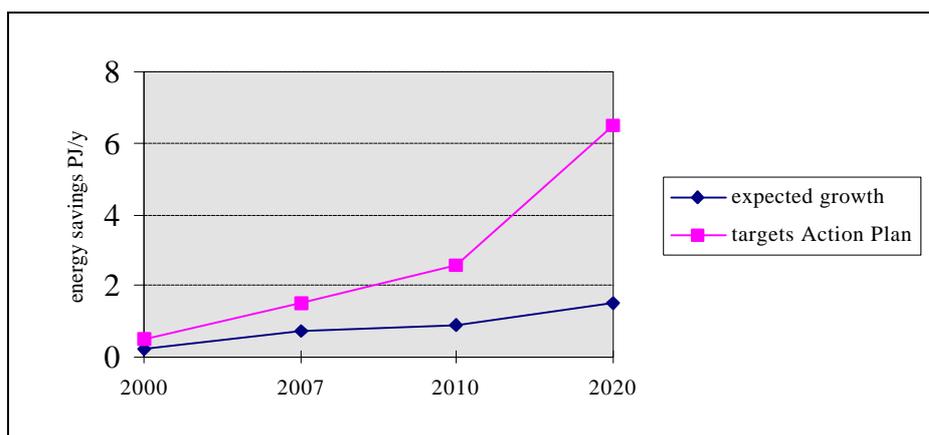


Figure 4: Solar domestic hot water systems in houses and energy saving 1995-2020.

## 5.2 Results of the second Action Plan for Sustainable Building (1998-99)

At the time of writing the second Action Plan is still ongoing. A monitoring report is currently being prepared and will be finalised by the autumn of 1999. This section presents some preliminary results of the measures in new houses, the improved performance standards and the checklists.

### 5.2.1 New houses 1997: much more energy efficient

The 1996 study on building permits was repeated in 1997. The percentage of houses that could be classified as sustainable rose from 15% in 1996 to 25% in 1997. The more in-depth study for building permits applications was also repeated. For the individual measures the large variation in the penetration rates had decreased and for the majority of the measures the penetration rates had increased. Figure 10 shows the penetration rates for measures related to energy, demonstrating that these increased over the entire range. This was not only caused by more interest for sustainable building and implementation of local and regional policies, but also by the EPC legislation. On 1 January 1998 the EPC performance level was reduced from 1.4 (set in December 1995) to 1.2. So permit applications from that date onwards should be for houses with an EPC 1.2 or lower. The increased penetration rates for buildings with EPC values lower than 1.3 and 1.2

(shown in Figure 10) are also caused by the fact that some builders anticipated in 1997 for these new legal requirements.

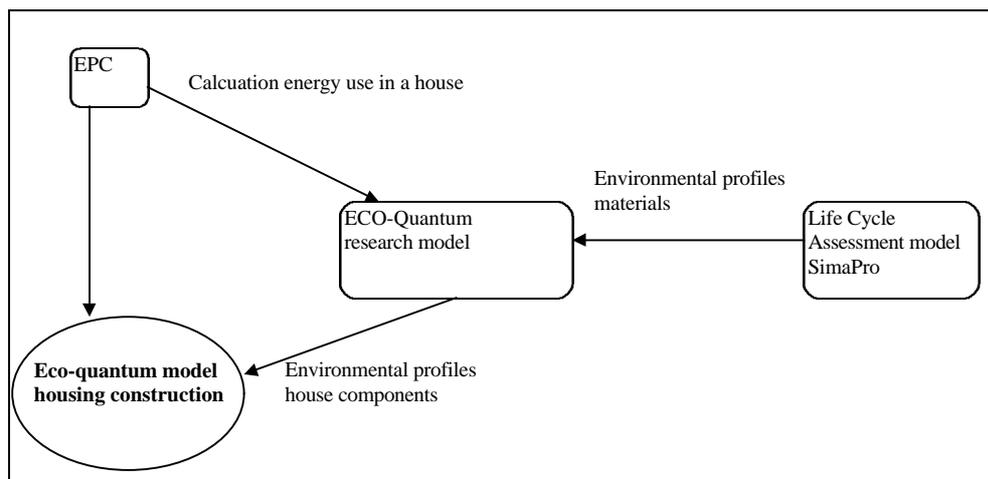
**Table 6 : Penetration rates for energy-related measures in sustainable new houses 1995-97**

Measures for a sustainable house	Penetration rate 1995-96	Penetration rate 1997
	%	%
Separate metering of energy use	80-85	87
Very efficient boiler	45-65	87
Boiler with low NO <sub>x</sub>	35-55	50
Very efficient glass in heated rooms	35-40	80
High level of roof insulation	15-15	32
High level of floor insulation	8-18	41
High level of wall insulation	8-15	25
Energy performance max. 1.3	<5	45
Energy performance max. 1.2	<5	15
House orientation to the south	10-15	29
Solar boiler system	< 8	9

*5.2.2 Performance standards*

The energy performance is incorporated into the legal system of building permits. A lot of experience from energy-saving programmes over the past decades was used in developing the standard. By now, no standard has been issued defining what a “sustainable building” should be, but new standards are currently under development by several projects from the Action Plan. Two new simulation models are almost available for commercial use: Eco-Quantum and GreenCalc. During the commercial use phase it is expected that the next Action Plan will give more emphasis to developing a single performance standard for a sustainable building.

Both the aforementioned models are based on life cycle assessment (LCA). So all impact from the extraction of sand and clay etc., the transport, the building and demolition (including re-use of materials and building components) are taken into account. The Eco-Quantum model is developed for the housing sector. It uses input from the energy performance, models with environmental characteristics for building materials and components, and housing models (see Figure 11). GreenCalc is a more general model, not specifically for houses. It contains four modules (for materials, energy, water and mobility) to determine the environmental impact of a building in monetary units. Project and building developers, as well as building investors are expected to use GreenCalc.



*Figure 5: Overview of the Eco-Quantum model*

### 5.2.3 Growing number of practical measures (checklists)

During the first Action Plan for Sustainable Building several specific guidelines were prepared by the Building Research Foundation with involvement of all relevant organisations, as associations for architects, building developers, municipalities etc. These are a kind of checklist to be used in taking decisions about which kind of sustainable building measures could be used in a building. During the second Action Plan the number of checklists increased to five, and these are now available (in Dutch only) for :

1. New houses;
2. Maintaining of existing houses;
3. Non-residential buildings;
4. Earthworks, road building, hydraulic engineering;
5. Urban planning.

For the third item, an additional impact is foreseen by using the Dubo Internet Register. All kind of organisations can subscribe with real projects on one of the two ambitious level (basic one and additional) they will implement in their buildings. The register is open to the public, so that anyone can search for a developer, constructor, architect etc. to match the level of ambition required for sustainable building. Novem will control the construction plans and the ambitious level they met. The Internet address for the register (in Dutch) is:  
<http://www.dubo-centrum.nl>

## 6 - WHY COMBINE FORCES FOR TWO WINNERS?

Energy is just one of the policy aspects concerning the Ministry of Economic Affairs. A wide range of instruments are used to improve energy efficiency. Since the 1970s improved insulation and more sophisticated heating systems have been promoted to reduce energy used in buildings. The Housing Decree has often been used, especially for implementing energy-saving measures in houses. This Decree includes a minimum quality level for materials used. The Ministry of Housing, Spatial Planning and the Environment governs this Decree, which meant that the two ministries had to cooperate. This cooperation became even closer as separate energy saving measures were combined in the new energy performance system (EPC) and incorporated into the Building Decree at the end of 1995.

The Ministry of Economic Affairs also encouraged local authorities to give special attention to energy saving. Local authorities can obtain special subsidies and support (from Novem) to develop and implement Local Energy Policy Plans. For the Ministry of EZ Novem is also implementing programmes to improve the decision-making process for larger development areas by making the selection of a specific energy infrastructure -during the phase of preparation of the physical planning- more explicit.

Novem supported in the past years studies at regional levels to 'upgrade' the energy performance level (that is for the building as such) to an area, including energy conversion processes in the system (Energy Performance for a Location; EPL). Recently studies are including also the impact of the mobility within and from an area (Energy Mobility Performance). This all results in closer contact with actions covering spatial development and physical planning, and with the Ministry of VROM.

The Ministry of VROM deals with policies on many subjects, not just the Building Decree, but also concerning water use, reducing material waste, recycling, housing policy, spatial planning, environment etc., as well as sustainable building. The programme group for sustainable building at the Ministry of VROM coordinates programmes and actions initiated by several departments within the ministry. By combining efforts both the sustainable building group and the Department of Energy can achieve more impact through less effort (and increase the effectiveness of their activities).

The Action Plan for Sustainable Building comprises many coordination activities, including energy. Market parties are important in these plans as they can put the ideas for sustainable building into practice. Many of these parties (building developers, architects, local governments, installers, housing associations etc.) are also intermediary organisations for the energy policy. When communicating with these organisations, combining actions can have a major impact and the project can achieve more synergy.

Section 5 presents the benefits of policies on energy efficiency and sustainable building. To summarise: the implementation of energy-saving measures has been accelerated by incorporating many measures in the checklists for sustainable building, plus the additional attention given to sustainable building as a new issue. The implementation of sustainable building measures is supported by the need to implement energy-saving measures, given the introduction of the EPC.

Two examples illustrate that this combination of energy saving and sustainable building has already been made: demonstration/model projects and sustainable industrial areas.

In January 1997, 24 demonstration projects for sustainable building were started in the housing sector and 10 in the non-residential sector, mostly in non-profit buildings. These projects were judged on the basis of energy and sustainable building features. All housing projects should be designed for high energy efficiency (EPC less than 1.2) and should include at least two measures concerning water, waste, indoor environment, surroundings (particularly green areas) and environmental impacts of the materials used. In June 1997, another 10 housing projects and seven non-residential projects were selected. In total 151 housing projects and 59 non-residential projects applied for funding. The projects received a subsidy, funded by both the Ministry of Economic Affairs and VROM. When following up these projects there is a close collaboration between Novem (for energy aspects), SEV - The Netherlands Steering Committee for Experiments in Housing- (for the building-related components) and the National DuBoCentrum (for dissemination). More information on the selected projects can be found on the Internet site (<http://www.dubocentrum.nl/voorbeeldprojecten>). On that site also general information on sustainable building in The Netherlands is available.

The Policy Paper "Programme Environment and Economy" focuses on sustainable industrial areas, i.e. sustainable production processes and sustainable layout of industrial areas. Energy plays a major role in both areas. The first objective is to make the processes as energy efficient as possible, and the second is to develop an energy infrastructure that optimises the energy conversion process and the internal transport systems in the area. Aspects such as water use (industrial, second-quality) recycling, waste prevention, combined collection systems for wastes to facilitate recycling, reduction of material used for the production processes etc. are all elements for sustainable industrial areas. In the Steering Committee for these areas the representatives from both the Ministry of Economic Affairs and the Ministry of VROM have a joint mission: to internalise at the company level the fact that the combination of environment and economic gives both profits; and to end the thinking that improving the environment reduce economic growth.

## **7 - CONCLUSION AND INTERNATIONAL OPPORTUNITIES**

The implementation of energy-saving measures in buildings was boosted by the promotion of the concept and practice of sustainable buildings: policy makers at national, regional and local levels were made aware of the environmental benefits of energy savings. Additional funds were made available for energy-saving measures, in combination with other efforts. Data on the progress and results of the Action Plan for Sustainable Buildings, as presented in this paper, demonstrate this acceleration.

The Action Plan for Sustainable Building took advantage of existing networks, initiatives and experiences with programme implementation of energy savings. Examples are given for the local and regional policy papers (starting with energy and expanding to sustainable building) and agreements with market parties. Two examples of close cooperation at national level (the two Ministries responsible) are also presented to show these joint operations: the model (demonstration) projects and sustainable industrial areas.

There is a great deal of interest in the integration of measures, which will only increase in the future. Energy performance measures (EPC) are developing on a more regional scale (EPL). Sustainable building performances will be tested on general environmental impact and for specific fields (water, radon-emission, material) new performance measures will be developed in the shorter term, using experiences in the field of energy. These (foreseen) developments should start a discussion, especially by energy specialists, as to how and when to integrate these performances.

The international component for sustainable building is expected to become increasingly important. For the energy sector the European Union is expected to set new standards; labels for apparatus and equipment currently exist at EU level. In the near future international standards, particularly EU standards, will become more important for sustainable building. It should be clear that the promotion of sustainable building materials is not a kind of protection for the national companies. To avoid even the risk for a delay, actions should be developed to develop international standards and ensure that sustainable building materials measure are promoted within European competition.

A lot of international cooperation on energy is organised in collaboration via the IEA Implementing Agreements. In 1998 a workshop was organised to discuss priorities in driving the building sector market toward more sustainable building. The experts, mostly involved in one of the seven IEA building-related Implementing Agreements, agreed on around 15 priority areas. Several concern codes, standards, performance rates etc. relevant to energy aspects and sustainable building. Discussion is ongoing as to whether the sustainable building items should be incorporated into the existing IEA Implementing Agreements or if a separate one should be initiated. With respect to the experiences presented in this paper on the Action Plans in the Netherlands, initiating a new Implementing Agreement would provide the best opportunity to accelerate the promotion of the sustainable building concept and related energy savings.

## **8 -ACKNOWLEDGEMENTS**

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