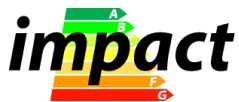




Guidelines for Good Practice in Energy Performance Certification of Existing Buildings

Colophon

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Improving Energy Performance Assessment and Certification schemes by Tests

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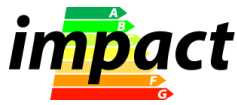
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Introduction

Since the 4th January 2003 the Energy Performance of Buildings Directive (EPBD) 2002/91/EC entered into force. Three years later was the official deadline Member States had to transpose the Directive into national law. Energy certification of buildings (art. 7) is one of the main requirements to be implemented by the Member States to promote the energy performance of buildings.

The IMPACT project started in 2005 in the framework of the Intelligent Energy Europe Programme. The IMPACT project aims to support national actors with the implementation of the directive and to contribute to the preparation of market actors for the introduction of energy labelling. For an effective implementation of energy labelling, aspects like quality control, tools and communication need to be prepared thoroughly and tested. Within IMPACT energy performance certification for existing buildings is tested in practice in 6 countries: Belgium, Denmark, France, Germany, Spain and the Netherlands.

Based on the learning's from these IMPACT tests good practice guidelines have been developed for energy certification throughout Europe. These guidelines cover the essential process steps for energy performance certification. They are based on the status of national implementation of the EPBD as it developed in each individual Member State represented in the consortium, during the course of the IMPACT action.

The guidelines presented are intended to constitute a non-exhaustive list of options which may be taken into consideration by national implementing bodies, their advisors and/or executive representatives. They may act as reference information in a time of changing legislation and support the revision/review of national implementation plans. Any singular option must be considered in the framework of the prevailing national legislative, regulative and market context at the time of consideration. No legal consequences can be linked to references made to national legislation which has come into force, is foreseen, under preparation or not yet in force.

The experiences and outcomes of the action have been regularly reported to the participants of the Concerted Action - Energy Performance of Buildings Directive (CA-EPBD) by the consortium's partners. The CA-EPBD is the IEE support activity involving the representatives of national government ministries or governmental affiliated institutions in charge of preparing the technical, legal and administrative framework for transposition of the EPBD (2002/91/EC) in their own country.

This report is an extract based on 6 national test reports, a cross-country compilation report and a cross country evaluation report which can be downloaded from the IMPACT site: www.e-impact.org. More in-depth information can be found in these reports.

The energy performance certification process -split up in process steps with related quality aspects and main questions concerning implementing and carrying out energy performance certification of buildings- is presented in Figure A. The main outcomes of the national IMPACT tests are summarised in Table A. Subsequently, based on the findings of the national tests, this report describes general good practices guidelines. These guidelines are presented by answering 10 of the main questions identified on energy performance certification of buildings.

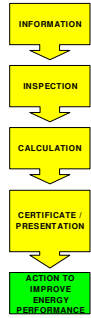



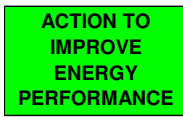
Process	Quality aspect	Corresponding questions
Overall certification process		
	Capacity experts	Is there sufficient expert capacity? If no: How to overcome the national expert capacity problem?
	Quality of expert	How can expert quality and independence be guaranteed?
	Overall quality control	How can overall process quality be guaranteed?
	Efficiency, required time/costs	How to come to an efficient and cost-effective process?
	Individual process steps	
	Awareness stakeholders and end-users	How to commit stakeholders and create their awareness? How to create awareness among end-users?
	Coverage of targeted buildings	
	Balance between accuracy and costs of the inspection	What are options for an inspection with an acceptable accuracy and acceptable costs?
	Balance between accuracy and costs of the calculation method (level of detail, asset / operational)	What are options for a calculation method with an acceptable accuracy and acceptable costs?
	Understanding end-users	What are options to make a certificate understandable?
	Acceptance end-users	What is needed to get the certificates accepted by end-users?
	Creating incentive for action	How to challenge end-users to take energy saving measures?
	Measures actually taken	Can we monitor the impact of energy certification on energy savings?

Figure A Energy Performance Certification process, related quality aspects and questions for the overall process and per process step.

An optimal approach for success in a specific country depends on the national context. All approaches have their advantages and disadvantages, which are thoroughly described in the background report *Cross country evaluation of Energy Performance Certification* [IMPACT/34/2006/WP3].

Main outcomes national IMPACT tests

Table A Main outcomes of national IMPACT tests

Quality aspect/process step	Outcomes	Countries
Expert capacity/ overall process Expert quality/ overall process	Health and safety inspectors and master craftsmen can successfully issue certificates for residential buildings. Preconditions for success are: use of a simplified method and training in both energy certification and energy savings in buildings.	France, Germany
Accurate and effective calculation method/ calculation Efficiency, required time and cost / overall process Understanding of end-users / certificate and presentation	For apartments a specific approach is developed. The calculation and recommendations concern the entire apartment block. The entire building and each individual apartment all have the same energy label (based on asset rating). The certificate describes the overall building on 6-8 pages and additional one page with specific information of the apartment transferred. The mentioned energy consumption is based on the measured (operational) climate-corrected heating consumption of the whole building. For the individual apartment certificates this consumption is divided by the total building area and multiplied by the area of the apartment.	Denmark
Accurate and effective calculation method / calculation	A complex calculation method based on building simulation generates a high workload, requires specialists and is sensitive to mistakes.	Spain
Efficiency, required time and cost / overall process	Split the tailored energy advice from the more standard recommendations on the certificates. This can also help in help in addressing the different interests of seller and buyer of a home with the appropriate information.	The Netherlands
Efficiency, required time and cost / building inspection	End-users can be involved in the preparation of the building inspection for the collection of general building characteristics and drawings of the construction.	The Netherlands
Understanding of end-users / certificate and presentation	The label based on classes were far more appreciated in Belgium, while in Germany the coloured band strip was slightly more accepted. This was particularly true for housing associations.	Belgium, Germany
Acceptance of end-users / certificate and presentation	Important criteria for acceptance of the certificate are: <ul style="list-style-type: none"> - Clear content and layout - Officially approved document - Good performance experts - Limited cost - Picture of the building Personal presentation / elucidation is highly appreciated	Belgium, Denmark, France, Germany, the Netherlands

The tests have been carried out by: Ecofys and SenterNovem (Netherlands), Dena (Germany), Tribu Energie (France), SBI (Denmark), BBRI and 3E (Belgium), Ecofys S.L. in co-operation with Generalitat de Catalunya and Adigsa (Spain). The outcomes of the tests do not necessarily represent the position of the implementing bodies of the individual member states.

Guidelines for good practice in energy certification of buildings

The evaluation scheme (Figure A) serves as basis for the guidelines for good practice in energy performance certification. As it appears from discussion with IMPACT partners the main issues countries encounter during implementation and execution of energy certification are covered by this scheme.

By means of ten questions presented in the evaluation scheme, recommendations for good practice in the certification process are formulated. Keep in mind that an optimal approach for success in a specific country depends on the national context and that the solutions are purely based on findings of the IMPACT project. All solutions paths have their advantages and disadvantages. For detailed overviews reference is made to the cross country evaluation report [IMPACT/34/2006/WP3], the cross-country test compilation report [IMPACT/12/2006/WP2.0] and the national test reports.

1. Is there sufficient expert capacity?

First, it is essential to determine if there are enough experts available to issue the annual demand of energy certificates. The number of necessary certificates can be used as a rough estimate. In addition, it has to be taken into account that in the initial period the demand for certificates is high and after a few years the amount will decrease to an average yearly demand. This average annual demand depends on the validity term of the issued certificates. For example, in all IMPACT countries except Denmark the validity term will be 10 years.

Country	Certificates needed per year	Needed capacity
Belgium	325,300	1,340 experts
Denmark	110,000	1,200 certified active experts
France	2,200,000	6,000 LAT experts (full time units)
Germany	< 500,000	5,500 experts (based on asset rating procedure)
Spain	1,000,000	2,245 experts (full time units)
The Netherlands	500,000	1,000 (full time units, residential and non-residential)

[Reference: IMPACT/34/2006/WP3]

2. How to overcome the national expert capacity problem?

There are several ways to overcome the national expert capacity problem.

1. Extension of tasks of experts, who already pay visits to buildings regularly. For example, health or safety inspectors, craftsmen and chimney sweepers. Preconditions for success are use of a simplified method and additional training for these people in energy certification and energy savings in buildings.
2. Phased implementation of energy certification. This diminishes the pressure for the need of many experts on short term, and fits more the average yearly demand in the end.
3. An additional option for countries with few energy experts is training for trainers, e.g. people who recently have completed their training are thereupon used to train new experts.

Lead-Asbestos-Termite (LAT) Experts for energy certification in France

In France, from July 1st 2007 more than 2 million energy certificates need to be delivered yearly for dwellings. There are not enough energy experts available to issue so many certificates. To solve this capacity problem, it was decided to use lead-asbestos-termites (LAT) experts that already do building inspections as part of the sales process of a building. In the IMPACT project it was tested: *If these LAT-experts were able to issue the energy certificate?* This was one of the main questions of the Ministry of Housing.

The LAT-experts are in place since 1996 when it became mandatory to have a diagnosis concerning asbestos in buildings. This implies that building inspections are already carried out by these experts on regular basis.

Because these experts are not specialized in the energy field, they were trained and the calculation method and tool were simplified (using less than 50 input data). It appeared that under these circumstances the LAT-experts were perfectly able to issue energy certificates. This was proved by controlling their certificates afterwards.

However, during the IMPACT test it was also observed that the experts had problems with the assembly of a tailored building energy advice. Currently, additional steps, such as training, are taken to overcome this barrier.

[Reference: IMPACT/22-23/2006/WP2.3]

3. How can expert quality and independence be guaranteed?

There are several solutions to guarantee the quality of the expert. One way is to establish a national accreditation system run by an independent organisation, which is responsible for accreditation and control. Another possibility is qualification requirements for experts in legislation, however without a national organisation in place, which controls this accreditation.

To become an accredited or qualified expert, several requirements have to be fulfilled. There are two main approaches found in IMPACT:

1. Minimal education on energy and building physics and key courses/training, and/or pass an exam. In most cases this level consists of a final degree in architecture, engineering or building physics. Practical experience can be used as trade off for the key course and/or the passing of the exam.
2. No minimal education on energy and building physics, but a guarantee through the quality of the exam. In addition, key course/training has to be attended and the exam has to be passed.

It is also possible to use both approaches in one country. The accreditation can be personal or company based.

Additional measures to guarantee the quality of the expert are:

- Compulsory liability insurance. This can also be a requirement to become or remain accredited. In case of persistent bad performance of an expert his/her insurance can be withdrawn.
- Annual training. This can also be a requirement to remain accredited and is also a good opportunity to introduce lessons learned to the experts (feedback mechanism)
- Good access to up-to-date information

4. How can overall process quality be guaranteed?

One important measure to ensure overall process quality is defining (compulsory) clear rules and guidelines for the process. This can be achieved by national standards that give clear instruction and by national regulations and guideline documents.

In addition, overall process quality can be guaranteed through a national accreditation system. An independent organisation is responsible for accreditation and quality control. When a country already has legislation and/or controlling institutes in place for e.g. energy audits, it is interesting to investigate if this structure can also be used for energy certification. This will limit bureaucracy and costs. If countries will not implement a national accreditation system, initiatives for quality assurance should be encouraged on voluntary bases. These initiatives should represent all relevant market actors and can be lead by independent organisations (e.g. energy agencies).

The quality of issued energy certificates can be controlled by:

- Centralized reporting of main results (register e.g. building type, label) as basis for some basic statistic analysis. If addresses are also registered, for example to select addresses for random checks, than privacy legislation may be a limiting factor and should be checked.
- Centralized collection of input data and outcomes in a database for validation. This enables an in-depth analysis and selection of addresses with deviation from average values for input data, energy consumption and/or label. Necessary precondition for these evaluations is a compulsory standardised electronic data system implemented in all software solutions used for certification. Certificates may be checked consequently:
 - in desk research
 - at the building site (inspection)

During the design phase of the database it is important to take into account that the collected data is also useful for monitoring and evaluating energy certification as a whole.

Subsequently, it is important to translate findings of the checks into improvements of the energy certification process (use feedback mechanisms e.g. like annual training of experts).

Finally, penalties can be used, such as fines, in case of bad performance of the experts. As ultimate consequence, the auditor/audited company may loose its accreditation and/or insurance.

An elaborate quality control system in Denmark

On behalf of a national secretariat, quality assessment in Denmark will be managed by a union of independent private companies.

The quality assessment scheme consists of the following elements:

- Each certificate must be registered to a central database and gets a unique number
- Automatic screening upon registration (select reports that deviate from the average)
- General control (statistical analysis of tendencies and patterns in the scheme)
- Visual control - desk report control (review of reports, handbook compliancy check)
- Field control (field inspection of completed certificates)
- Registry and analysis of consumer complaints

[Reference: IMPACT/25-26/2006/WP2.4]

5. How to come to an efficient and cost-effective process?

There are several approaches to limit time consuming activities during the energy certification. National circumstances and specific pre-conditions that need to be met, determine to a large extent if approaches work out favourably.

A non-exhaustive list of possibilities:

- Simplified methods / calculation tools / default values / using reference buildings
- Operational rating, often limited to a specific market segment e.g. non residential buildings and/or old residential buildings
- Handbooks, checklists etc.
- Involve real estate agents or end-users in the preparation of the inspection (data collection of straightforward building characteristics (e.g. type of house, date of construction, number of residents, number of floors and installations, and to provide construction drawing and user manuals for central heating boilers) by the owner/real estate agent)
- Use persons like master craftsmen (like chimney sweepers), health and safety inspectors, who already regular visit buildings for inspections or other services, for the entire energy certification (the certification may in that case be limited to a specific market segment (e.g. residential buildings).
- Split energy certification from tailored energy advice. Recommendations based on simple decision trees, possible complemented with general advices, on the energy certificate. In addition, a tailored energy advice is offered on voluntary basis. However to reach a substantial part of the market an additional voluntary advice needs to be embedded in national energy policy. For instance, by linking the advice to other instruments as financial support, white certificate system etc.
- Quality embedded in process, this means take care of solutions to assure expert and overall process quality (see questions 3 and 4).

The Netherlands splits the extended energy advice from the energy certificate

In the Netherlands, it is considered and tested in IMPACT to split the elaborate tailored energy advice from the energy certificate. The main reason for this decision is to limit cost for implementation of the energy certification scheme.

The energy certificate is based on the outcomes of a certified calculation method. The list of recommended energy saving measures are specific for the building, but they do not take yet all the detail building characteristics (e.g. ventilation channels, material of window frames) into account. As a consequence, it is possible that not all recommendations can be applied in the building concerned.

As a separate instrument building owners can be offered a thorough voluntary tailored energy advice. This split has the advantage that the tailored advice can be directly addressed to the persons who are really considering to take measures. However, from the field test it also appears that people are not willing to pay very much for a tailored energy advice (about 50 Euro). This means that the voluntary energy advices probably need to be linked to other incentives. Currently it is under consideration to link the certificate and the energy advice to other supporting mechanisms for energy saving measures in buildings. Examples of these mechanisms are: subsidy scheme, white certificate system (as in the UK or Italy), include energy saving measures in the rent validation system etc.

[Reference: IMPACT/13-14/2006/WP2.1]

6. How to commit stakeholders and create their awareness? How to create awareness of end-users?

Information campaigns are essential for a proper functioning of the energy certification system in the market. The dissemination of information has to be tailored to the target groups, such as house owners, tenants, housing associations, energy consultants / experts etc.

Additionally, an early involvement of essential market actors in the formation of the national policy concerning the energy certificate systems brings about awareness and commitment for (new) energy certification schemes. At the same time possible barriers and failures will be recognized and it offers the opportunity for the policymakers to anticipate on these problems at an early stage.

It is recommended to look at national opportunities to link energy labelling to other policy instruments. For instance certain shift of energy labels (e.g. from D to B) can be used as criteria to become eligible for financial support schemes, such as subsidies or low-interest loans for energy saving measures. It is assumed that in this way awareness and commitment to carry out savings in existing buildings can be enforced considerably.

The EPBD holds the obligation that the energy certificate is presented to the prospective owner or tenant, when a building transfer takes place. How and when the energy certificate should be presented is not prescribed. One possibility would be to introduce the certificate in the process when the prospective owner or tenant views the building or apartment. In this way the certificate will most effectively influence the decision process. Another or additional option is to supplement the certificate to the sales or rent contract.

In Denmark energy performance certification for small buildings has been mandatory since 1997. The interest among the end users of the schemes however has been moderate. In principle the schemes were mandatory and should therefore need no special promotion. In practice however, the coverage in average was 50 %, while only about 25 % of the flats got a certificate. A barrier was e.g. that there was a lack of public campaigns and advertisement. The communication aspect will be taken better care of in the new certification scheme.

[Reference: IMPACT/25-26/2006/WP2.4]

7. What are options for a calculation method with an acceptable accuracy and acceptable costs?

It is recommended to use simplified calculation methods. These calculation methods are characterised by the possibility that standard default values can be used, when detailed data is not easily available. The outcome of the calculation with default values is less accurate than in case building specific data are used. However, by using default values the method may also become less sensitive for erroneous input. It has to be assured that the reliability of the outcome is acceptable. The use of detailed input data should be encouraged by keeping the default values “on-the-safe-side”, leading to slightly higher overall results.

In general, operational rating requires less time and costs than asset rating. So it can be investigated if operational rating is an acceptable alternative for asset rating. Preconditions are that: (1) input data of several heating periods are easy accessible, this depends on the cooperation of building owners; (2) classification per building type is possible (enough building specific data available for benchmarking and similarities within one category). Operational rating limits the scope of recommendations for improvements to standard recommendations. To limit the influence of user behaviour, the operational rating can be limited to large multi-family buildings. To reduce the influence of local climate (relevant especially for countries with different climatic zones) correction factors can be used.

Sensitivity analysis of simplified and extensive methods in Germany and Belgium

A simplified approach uses default values, in case values of the input data are not easy available.

Geometric simplifications allow neglecting the following elements:

- Dormers occupying less than one third of the total roof surface.
- Projections and offsets in the façade with a depth of less than 20 cm.
- Additional surfaces in the area of basement steps.
- Heated rooms in an otherwise unheated roof-space (loft) or basement with a floor-space of less than one third of the total floor-space of the loft or basement.
- Additionally window areas could be estimated to 20% of the floor space, if windows weren't significantly small or large.

A.o. it is concluded that:

- Certain simplifications may be permitted if no detailed information is available or if its determination is too expensive or time consuming.
- Simplifications should not, as a rule, lead to an improvement of the results (default values used in simplifications should not lead to more positive results).
- Neglected parts of the building should be listed in the energy certificate in such a way that references to improvements also include a (general) indication of the improvement potential of these parts of the building.

The sensitivity analysis in the German residential buildings test proved that the simplified method using default values leads to acceptable results and generally leads to only slightly higher calculated energy demands.

Furthermore, the experts regarded the technical default values sufficient and correct. In addition, they indicated that further simplifications on the buildings geometry and surface areas would significantly reduce the time needed for inspection. For non-residential buildings also a more simplified approach for the zoning would be appreciated by the experts.

In Belgium the sensitivity for a complete set of input parameters has been studied as a first step to come to rules for simplifications.

[References: IMPACT/17-18/2006/WP2.2 and IMPACT/27-28/2006/WP2.5]

Certification of flats in Denmark

Denmark had already a certification scheme in place since 1997. The aim in IMPACT was to optimise and test the certification scheme for apartment buildings, as the existing scheme was not adopted well by energy consultants, real estate agents and owners of flats. Energy certificates were only prepared for approximately 20-25 % of the traded flats. The scheme was perceived as not attractive, too expensive and not reliable (e.g. calculated consumption differed from metered energy consumption). Within IMPACT a new approach for the certification of flats has been tested.

Key elements in this new approach are:

- The energy label and the savings are based on a calculation for the whole building (asset rating). The energy label class for the whole building and for each individual apartment is the same.
- The inspection and calculation procedure are based on using typical apartments for describing the overall building which leads to lower certification costs.
- The displayed energy consumption for heating is based on the metered and climate corrected energy consumption for the whole building. For each individual apartment the energy consumption for heating is calculated by dividing the energy consumption for the entire apartment building by its total area and multiplying by the area of the apartment. When there are more similar apartments in a building also size categories can be used for this calculation. This calculation matches with the dominant way (>98%) of distribution of heating costs in apartment blocks. For apartment buildings with individual heating system a different approach is described in the national report.
- The certificate describes the whole apartment block on 6-8 pages and additionally a one page certificate will be issued for each apartment. This page includes a description of how the individual payment for each apartment takes place for this building and furthermore the energy consumption of the apartment.

In several countries it is not finally decided yet how to take care of the energy certification for apartment buildings. It might be interesting for them to learn from the Danish approach.

[Reference: IMPACT/25-26/2006/WP2.4]

Calculation methods and tools tested in Spain

Two calculation tools were tested. The first, called LIDER-CALENER_VYP, is the official Spanish certification tool. The second tool, called EPA (ED and NR), is developed in the framework of a European project. The LIDER-CALENER_VYP is based on a complete building simulation, needs a detailed input of data and is quite complicated to use. EPA is quite easy to use with less additional training. However, it does not generate an energy certificate automatically. During the tests, it appeared that both tools still need further development. For both tools improvements suggestions have been given to the developing teams.

From the IMPACT test it is recommended to look after a more easy and practical energy certification calculation procedure (like EPA) and take the simplified calculation methods of other countries (Denmark, France, Germany and the Netherlands) into consideration.

Based on the findings of the Impact test, the Catalan government considers to develop a new, more simple tool, but this tool will not be available in short time.

[Reference: IMPACT/30-31/2006/WP2.6]

8. What are options to make a certificate understandable?

It is recommended to pay at least attention to the following aspects:

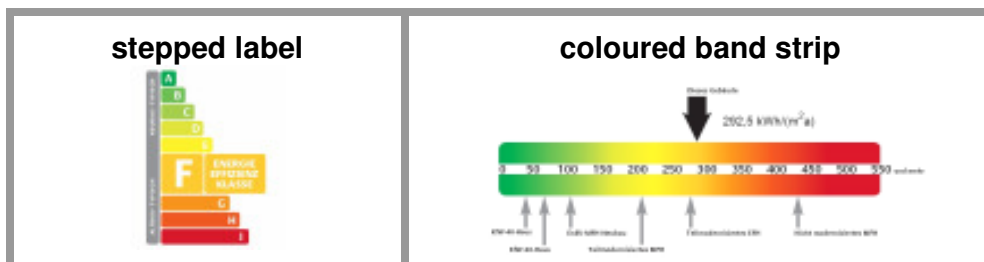
- Avoid misunderstandings on differences between calculated and metered values (energy bills). For example use a label based on asset rating and base the energy consumption displayed on the certificate on metered values in apartment buildings.
- Technical terms used in the certificate, such as primary energy, final energy, CO₂-emissions, need to be explained.
- When end-users are considering taking energy saving measures, they usually need to have additional information. For additional explanations and for initiating follow-up activities easy access to professional information has to be taken care of. For instance, put name, address and telephone number of the expert or of the regional/central info point on the certificate. An option proposed is to add the recommendations for improvements to the certificate as an extra annex document that landlords do not need to present to tenants.

Comparison of different label types in Belgium and Germany

In the Belgian and German IMPACT field test the end-users attitude to two different label types were investigated.

In the German residential test the participants could choose between an energy class label and a coloured band strip label. In the Belgian test the Flemish draft certificate contained a linear indicator label, whereas the energy advice report contains several A to F class labels. The results in both tests have lead to contrary results. The classes were far more appreciated in the Belgian test. In the German test the coloured band strip was slightly more accepted. This was particularly true for housing companies.

[References: IMPACT/17-18/2006/WP2.2 and IMPACT/27-28/2006/WP2.5]



9. What is needed to get the certificate accepted by the end-user?

It is recommended to pay at least attention to the following aspects:

- Clear content and layout
- Official approved document, (mandatory certificate format)
- Good performance experts
- Limited cost
- Customise the certificate by adding a picture of the building
- Personal presentation / elucidation

In Germany and France housing associations/companies expressed their concern regarding the displayed recommended energy saving measures on the certificate. They fear that tenants use this information for demanding improvements or as argument for not paying the (entire) rent. Solutions for these concerns may be found in raising awareness on this issue or in splitting the recommendations from the certificate.

10. How to challenge end-users to take energy saving measures?

End-users need insight in the costs and benefits of the energy saving options. In addition, it is important that other possible benefits, for instance improved comfort level, of energy saving measures are closely communicated.

This insight can be indicated on the energy certificate, on additional information sheets added to the certificate and/or a separate tailored energy advice report.

It is also of importance that end-users, who seriously consider taking energy saving measures, have easy access to professional information and experts.

Finally, the impact of energy certificates can be strengthened by embedding the instrument in the overall policy to incite energy saving in buildings. This can be done by directly using the recommended energy savings and label on the certificate as basis in other policy instruments.

Promotion strategies

In Denmark the following promotion initiatives have been planned to support alliance partners in their information efforts regarding the new certification scheme:

- Detailed brochures targeted at professional groups.
- An information leaflet targeted at house-owners. Primarily, the leaflet is to be handed out by the energy consultants performing the certifications. The purpose is to urge house-owners to carry out the energy savings suggested in the certification.
- A press kit about the new scheme for national and local newspapers as well as trade magazines.
- Continuous updating of information about the scheme on the Danish Energy Authority's web site, www.ens.dk.
- Contact with energy consultants and end users on a daily basis through the scheme's secretariat.

In The Netherlands the existing voluntary Energy Performance Advice (EPA) scheme has been promoted successfully:

- The EPA scheme was subsidised. For the implementation of recommended measures an additional investment subsidy was available.
- The government closed covenants with municipalities and the social housing sector in order to stimulate these actors to promote EPA's. As a result several local EPA-campaigns, often embedded in campaigns for the promotion of energy savings and renewable energy, have been conducted.
- National promotion by the ministry of VROM (television commercials, web-site) and SenterNovem (support to market actors and municipalities).






[References: IMPACT/25-26/2006/WP2.4 and IMPACT/13-14/2006/WP2.1]

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IMPACT/17-18/2006/WP2.2	Impact National energy performance certification tests – Germany, Dena.
IMPACT/22-23/2006/WP2.3	Impact National energy performance certification tests – France, TRIBU ENERGIE.
IMPACT/25-26/2006/WP2.4	Impact National energy performance certification tests – Denmark, SBI.
IMPACT/27-28/2006/WP2.5	Impact National energy performance certification tests – Belgium, BBRI and 3E.
IMPACT/30-31/2006/WP2.6	Impact National energy performance certification tests – Spain, Ecofys S.L.
IMPACT/34/2006/WP3	Cross country evaluation of energy performance certification, Ecofys.

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