

ENERGY CERTIFICATION SCHEMES AND IMPACT TEST PREPARATION

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IMPACT

Improving energy performance assessment and certification schemes by tests

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Project description

The background of the IMPACT project, which is conducted in the framework of the Intelligent Energy Europe Programme, is the implementation of the directive on the Energy Performance of Buildings (EPBD) in 2006. In existing building certification schemes barriers have been reported regarding quality, the communication aspects, the certification of apartment buildings, lack of expert (auditor) capacity. In order to have an impact on the energy consumption of buildings all aspects in the certification process need to be addressed properly. In order to contribute to tackling these barriers IMPACT has the objective to:

- 1) Test energy performance certification for existing buildings in practice in 6 country pilots
- 2) Exchange experiences and success factors
- 3) Derive recommendations for improvement of tools, certification schemes, training of experts and communication
- 4) Support the EPBD implementation process in 6 countries
- 5) Disseminate project results on a National and EU wide scale

The tests are conducted in: Denmark, The Netherlands, France, Germany, Belgium and Spain.






Target groups for IMPACT are:

- National stakeholders responsible for EPBD implementation (ministries, building research institutes, national energy agencies)
- Market actors (experts, building owners, intermediary organisations like real estate agents or municipalities).

The project is divided in 5 work packages. The work package leaders and the main deliverables are listed below.

WP0	Coordination	Ecofys	
WP1	Test preparation	SBi	Overall report on national tests
WP2	National tests	Dena	National test reports (6) Overall report on national tests
WP3	Evaluation and synthesis	Ecofys	Synthesis report with best-practice approaches and guidelines as basis for dissemination activities
WP4	Dissemination	SenterNovem	EU newsletter National newsletters National workshops for implementation stakeholders National workshops for markets actors

Project partners

Ecofys The Netherlands	
SenterNovem The Netherlands	
Deutsche Energie Agentur GmbH (dena) Germany	
Tribu-energie France	
Danish Building Research Institute (SBI) Denmark	
Belgium Building Research Institute BBRI / WCTB Belgium	
3E N.V. Belgium	
Ecofys S.L. in cooperation with Generalitat de Catalunya and ADIGSA Spain	  

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1 Introduction

This report describes the result of the first IMPACT work package on the preparation of the National tests. In order to prepare the national tests and to provide guidelines for EPBD implementation, it is important to learn from experiences and approaches in the different countries. Within this work package the existing information and experiences with energy performance certification are exchanged and compiled. Furthermore test set-ups have been prepared and exchanged.

The report comprises three parts. Part 1 (Chapter 3) is an analysis of the available information of existing certification schemes. Part 2 (Chapter 4) is a compilation of national test approaches to be carried out in work package 2. In Appendix 1 is the current (April 2005) status of implementation of EPBD in the member states participating in the IMPACT project.

Information in this report is treated in alphabetic order, according to English name of the countries.

1.1 Abbreviations used in this document

BBRI	Belgian Building Research Institute.
DENA	German Energy Agency.
DPE	Diagnostic de Performance Energétique, energy performance certificate – France.
EAP	Energy Advice Procedure - Belgium.
EBA	Energiebedarfsausweis / Wärmebedarfsausweis, energy performance certificate for new buildings – Germany.
EI	EI energy index, measure for primary energy consumption of an existing building - The Netherlands.
ELO	Energy management scheme for large buildings – Denmark.
EM	Energy certification scheme for small buildings – Denmark.
EPA-ED	EU project Energy Performance Advice in Existing Dwellings. www.epa-ed.org
EPA-NR	EU project Energy Performance Advice in Non Residential buildings. www.epa-nr.org
EPA-U	Energy Performance Advice for existing non-residential and non-industrial buildings – The Netherlands.
EPA-W	Energy Performance Advice for existing dwellings– The Netherlands.
EPBD	Energy Performance of Buildings Directive.
EPC	Energy Performance Coefficient, new buildings – The Netherlands.

EPU	Energy performance of new office and school buildings – Belgium.
EPW	Energy performance of new dwellings – Belgium.
PHP	Passive House Platform – Belgium.
PV	Photovoltaic solar energy.
RES	Renewable Energy Systems.
RUE	Rational Use of Energy (energy saving measures).
SBi	Danish Building Research Institute.

2 Summary

In the light of the Directive on the Energy Performance of Buildings (EPBD), the introduction of energy performance certification schemes for existing buildings will be tested within the six EIE IMPACT countries. This report describes the result of the first work package on test preparation. In order to prepare the national tests and to provide guidelines for EPBD implementation, it is important to learn from experiences and approaches in the different countries. Within this work package the existing information and experiences with energy performance certification are exchanged and compiled. Furthermore test set-ups have been prepared and exchanged.

In the six member states participating in the IMPACT project, only four energy certification schemes do exist, representing three countries:

1. Two schemes have existed in Denmark since 1997 – one scheme, *ELO*, for large buildings (+1500 m²), and,
2. *EM*, another scheme for small buildings. Both schemes are mandatory, the *ELO* scheme annually and the *EM* scheme in case of selling a dwelling.
3. In the Netherlands the *EPA* scheme has existed since 2000. This voluntary scheme is aimed at existing dwellings.
4. In Germany the “Energiebedarfsausweis” is a mandatory certificate and was introduced in 2002 with the amendment of the Energy Savings Ordinance. It covers new buildings as well as thoroughly renovated buildings. The existing scheme is part of the application for building permission and is enforced by the federal states. For existing buildings the certification may be applied on a voluntary basis.

New energy certification schemes are being prepared around Europe to meet the requirements in the EPBD. Some of these schemes, the ones that are closest to being ready, are also treated in this report. These schemes are two Belgian schemes, two Dutch schemes, a Spanish, a French and a German scheme. In Denmark the existing schemes are under revision, and will lead to three new schemes, one for blocks of flats, one for small residential buildings and one for large (+1000 m²) buildings.

The results of this survey will be valuable input for those countries that are about to prepare national energy certification schemes for the implementation of the EPBD.

2.1 Energy certification in Europe

Among the IMPACT project partners only Denmark and the Netherlands have until now had the opportunity of gaining experiences with certification schemes for

existing buildings. In Germany valuable lessons can be drawn from the field test conducted in 2004.

Selections of lessons learned from these existing schemes are given below:

- Mandatory certification (without penalties) does not lead to 100 % penetration. In Denmark, the overall penetration is 50-60 % and only 20-25 % for flats.
- Reliability is a critical success factor:
 - Differences between calculated consumption and actual consumption (Denmark). This is difficult to explain to the end-user.
 - Repeatability can be low, mainly due to differences (errors) in the building assessment process (the Netherlands). For example, when two experts access the same building, they often get different results.
 - The savings advice's differ a lot and are dependent on preferences of the expert (the Netherlands, Denmark, and Germany).
- Quality certification of auditor organisations as such does not guarantee a good quality (the Netherlands). In Denmark a comprehensive quality control system is in place in which all certificates are centrally checked on inconsistencies.
- Limited expert capacity in markets with high demands leads to low(er) quality (the Netherlands).
- Certification of flats is a complex task to manage (the Netherlands, Denmark, and Germany).

2.1.1 Certification of flats

The problem regarding certification of existing residential multifamily buildings has only been addressed in the Dutch and Danish schemes on a substantial number of dwellings. The Danish ELO certification scheme on multifamily dwellings has covered buildings with a total heated floor area larger than 1500 m². In the EM scheme owner-occupied flats was covered in conjunction with selling the flat.

According to the EPBD the new certification schemes must also include certification of flats when they are rented out. This significantly increases the number of flats to certify and thus the importance of establishing a sound and efficient certification scheme for flats in all the member states.

2.2 Status of planned EPBD implementation

The status of the implementation of the Energy Performance of Buildings Directive (EPBD) was given by the participants of the IMPACT project by April 2005, and will thus rapidly be outdated. All findings from this survey is presented in Appendix 1. Some of the findings are listed below:

- Calculation methods for certification: most IMPACT countries seem to go for asset rating based on standard behaviour.
- Quality control structures: there are large differences between the countries varying from elaborate quality control schemes (Denmark) to none (France).
- Simple certification methods using laymen as auditors and simplified audit and calculation procedures are tested in France and Germany.

2.3 IMPACT tests

All IMPACT teams have decided, with support from their national feedback committees and experiences from the few existing certification schemes, to have residential buildings in their national tests. Spain and Germany plan to test certification of existing, non-residential buildings as well.

The reason for the massive interest in residential buildings is that this building type has proven to cause special problems. These problems are recognised in those certification schemes, which have existed in Denmark, the Netherlands and Germany for some years and in the setting up of the new schemes as requested in the EPBD.

In the planning process of the work in WP2 of the IMPACT project there is thus a great opportunity to cover all aspects regarding the certification of residential buildings. IMPACT will at the end of the project be able to give suggestions to certification schemes for residential buildings based on detailed knowledge gained from the national tests.

The tests in each country will cover all essential elements in the certification process (tool, quality control, training, and communication); nevertheless a different focus can be distinguished in each country:

- Denmark: testing certification of flats using a new scheme under development.
- The Netherlands: testing the newly developed certification tools and process for single-family homes as well as flats.
- France: testing the newly developed 3CL tool and training for laymen that already do building inspections (for lead, asbestos, termites) in order to meet the giant need for experts.
- Germany: sensitivity analysis of field test results in order to arrive at a simple method; set-up of a monitoring system for certification; development of support tools for issuers; pilot for non-residential buildings.
- Belgium: test Energy Advice Procedure for existing dwellings as part of the process to arrive at a final certification method.
- Spain: compare two tools for energy performance certification auditing (CALENER and EPA-ED / EPA-NR).

2.4 Lessons learned

In a cross country feed back exercise on the planned tests of the IMPACT project, the partners have stated their gained experiences to their test-plans from the other countries. A summary, by country, is given below. The full cross country feed back scheme is found in Appendix 4.

2.4.1 Belgium

The main barrier recognised for the federal state of Belgium is that the EPBD will be implemented at a regional level, possibly with different solutions and in different national languages. The other major concern is how to guarantee coherence between certification for new and existing buildings.

From the IMPACT partners, Belgium has gained useful input from the Netherlands about quality checks, tests realised by external experts and the need to pay attention to the good/bad interaction with subsidy mechanisms. Quality checks will be included in the Belgian tests and hopefully also in the tests by national experts, in 2006 Energy Advice Procedure (EAP) experts will be trained and start working. The promotion of energy performance certification with subsidies will not be part of the Belgian tests.

The German experiences with sensitivity analysis, the large consultation of actors at a national level, the tests realised by external experts, the experiences with certification at several levels of complexity (simple and complex method), the enquiries to end users on several levels and the testing of several certificate layouts are very interesting. Sensitivity analyses will also be implemented in Belgium. The number of issued certificates will be more limited than those applied in Germany, and the resulting data background will thus be more limited. Only one scheme complexity level will be tested in Belgium. End-users will be asked for their opinion on the tested scheme.

From France an example of an enquiry to end-users has been a valuable input and will be tested in Belgium.

From the Danish tests, Belgium is especially interested in the newly adopted test on flats and information about the education of certification experts. Experiences from the Danish test on flats will not be tested in Belgium, but might well come into the final recommendations.

2.4.2 Denmark

The main identified barriers for implementing the EPBD in Denmark is:

- Energy savings are not visible and do thus only give marginal social status - in contrast to new kitchens and bathrooms.
- The certificate is only one paper among many others when a house is sold, the market penetration of the existing schemes is limited, even though the schemes were mandatory. The prime reason for this is assumed to be the lack of penalties.
- The present schemes are not connected with the rules for obtaining a permission to use the building.
- There is no penalty if the certification has not been made.

The importance of creating a national knowledge base with information about the energy quality in the certified buildings is one of the major lessons learned so far from the IMPACT project in Denmark. But also the importance of making energy plans in the certificates, primarily focussing on the profitable measures.

2.4.3 France

The main barrier in France for implementing the EPBD in full force is the number of certificates to deliver: 2 million per year at the beginning of the scheme. Another major barrier is the fact that 1/3 of French dwellings is heated by electricity.

A tool, 3CL, have been developed for the certification. The tool can estimate the energy consumption in the dwelling as the auditor answers 10 questions.

The use of many different types of experts in Germany is considered a good idea and will be implemented in France.

In Denmark there are highly qualified experts, who are considered the key to a good certificate. Maybe this situation will also be possible in a few years' time in France. The work done on certification by consulting engineers and other, less qualified, experts will be evaluated, especially when dealing with the advising of energy savings measures.

Among the questions that France would like to have answered are:

- Is wood considered a renewable energy, and if so how is it taken into account in the energy primary scale?
- Do the building owner and the expert have to be independent in the case of new buildings?
- How and who will do some advertisement about the certificate in the other member states?

2.4.4 Germany

The main barriers in Germany are identified as:

- Large number of certificates to be issued in the first years and the low number of available experts, especially for non-residential buildings.
- Many housing companies treat certification with reservation.
- Germany will have to improve the return of issued certificates to the national/state-wide certificate database.
- The situation about expert qualification is unclear.

On the positive side is that the calculation method for residential buildings has been introduced and tested. Different software packages are available. The calculation method for non-residential buildings is available, but still needs to be tested. The database for issuers and certificates has been established by Dena, but the return of information by issuers needs to be improved. There is a great interest in certification from homeowners and tenants and many regional initiatives have been initiated. There are a large number of voluntarily registered experts for residential buildings.

In Denmark all certificates are centrally registered. A similar system will be difficult (impossible) to implement in the German ordinance. Denmark also has a national registration of experts. Such a national registration / qualification regulation is not implemented in German legislation, it is the responsibility of the federal states (conflicts).

2.4.5 The Netherlands

The major barriers to overcome for implementation of EPBD in the Netherlands are identified as improvement of quality control and certification of experts and improvement of the the communication process from the experts to the end-users (the certificate itself and the communication regarding energy saving measures).

On the positive side there is an extensive network of (certified) experts available in the Netherlands. Certification as tool for building asset management and communication to tenants has been tested (changing the EPBD from a possible burden to an added value opportunity for housing associations).

The Netherlands can learn from testing of 'simple methods' in other countries (Germany and France), as certification is currently perceived as too expensive by the Dutch government.

The Danish test on flats may provide useful input for the Dutch approach. In the same context the explanation of the difference between asset rating for average behaviour and actual consumption needs attention. It will probably be implemented in the Dutch test, as owners will participate that do not sell their house but go for energy advice. The Danish situation with central quality control on issued certificates will probably be the recommendation for the government. Experiences from the existing Danish schemes have shown that mandatory schemes not necessarily lead to a 100 % penetration. The Netherlands needs to consider how to effectively promote or enforce certification.

2.4.6 Spain

The major barriers in Spain for implementation of EPBD are identified as:

- A final official calculation tool is not available yet. The current version is quite complicated to use.
- The required type of experts for certification of buildings is not clear yet, neither is the training programme.
- The process of establishing quality control is not clear yet. Example enquiries from Germany and Denmark will be used as inspiration.
- No mass information or dissemination activities have been launched from the government (yet).
- It is not clear what will be the final role of different actors (national, regional and local authorities) in the EPBD implementation process.
- There seems to be no special interest by involved actors (architects, property developers, owners, and tenants...) due to lack of information.
- No final certification schemes have been prepared yet. Experiences from Germany and Denmark could be used in Spain.

As Spain doesn't have any experience in certifying buildings, it will be possible to do it in a right way from the beginning, building on top of lessons learnt from other countries that have gone through the learning process.

The Danish test on flats is interesting, and Spain will be interested in the solution from Denmark adopted in the final recommendations.

In France an easy and cheap certification calculation method is being tested to identify if the uncertainty is within a reasonable range. Two tools have been selected for test in Spain, advanced CALENER tool and the two simpler tools from the EPA-ED and EPA-NR projects.

3 Existing energy certification schemes

In a questionnaire survey, the existing energy performance certification schemes of the countries participating in the IMPACT project were analysed. The questionnaire focussed on advantages and disadvantages of the different schemes and the success criteria for new ones to be implemented in conjunction with the EPBD. The questionnaire is found in Appendix 2. Section 3.1 describes the existing schemes in Belgium, Denmark, Germany and The Netherlands and section 3.2 describes the planned schemes in France and Spain.

3.1 Overview of the existing schemes

Country	Abbreviation	Name	Start
Belgium	EAP	Energy Advice Procedure	2005
	Energiecharter	Energy charter	2004
	PHP	Passive House Platform	2003
Denmark	EM	Energy certification scheme for small buildings	1997
	ELO	Energy management scheme, large buildings	1997
Germany	EBA	Energiebedarfsausweis	2002
		Wärmebedarfsausweis	2002
Netherlands	EPA-W	Energy Performance Advice, existing dwellings	2000
	EPA-U	Energy Performance Advice, existing non-residential buildings	2005
	EPC	Energy Performance Coefficient, new buildings	1995

Belgium: Belgium is a federal state composed of three regions (Flemish region, Walloon region and Brussels Region). The regions are responsible for the rational use of energy and are therefore in charge of the implementation of the energy performance of buildings. The situation has therefore to be considered at the regional level.

For the moment (August 2005), there's no official certification scheme in Belgium. However, certification schemes for new buildings are under preparation. In the Flemish region; this scheme for new building is based on the future energy performance regulation for new building (as imposed by the EPBD). The declarations made at the end of the construction will among other serve to establish the energy certificate. As well the new regulation as this scheme are for the moment under development. This scheme will enter in force for dwellings and offices in January 2006.

The only scheme available at the national level (July 2005) suitable for existing buildings is the Energy Advice Procedure (EAP). This procedure is focusing on

existing single-family dwellings and is an advice procedure and not a certification scheme according to the definition of the EPBD.

Denmark: In Denmark there are two existing schemes, one for large buildings (+1500 m²) and one for small buildings.

In the certification scheme for large buildings, the Energy management of large buildings (Energiledelsesordningen, ELO) buildings must be surveyed and labelled each year by a certified consultant.

The scheme for small buildings, Energy certification of small buildings (Energimærkningsordningen, EM) claims that a house or apartment must be labelled each time it is sold. A label issued in the EM scheme is valid for three years.

France: No existing national schemes for energy certification of buildings exists, but the planned scheme is described in chapter 3.2.

Germany: One mandatory energy certification scheme exists, ("Energiebedarfsausweis" certificate of energy-demand) for new buildings and thoroughly renovated buildings as part of the application for building permission. For buildings with low internal temperatures (<19 °C) a "Wärmebedarfsausweis" (certificate on heat demand) is mandatory. This certificate is basically a simplified EBA and covers fewer characteristics. The contents of the scheme and a template of the EBA certificate are regulated by a federal administrative regulation. The federal template does not contain a label, but lists the calculated values for the building as well as the maximum values according to the Energy Savings Ordinance. The administrative regulation covers the energy relevant building data, which has to be included in the certification and the different approaches for new buildings, renovated or extended buildings and buildings with low internal temperatures. The certificate template does not contain any suggestions for improvements, since it is only mandatory for new or renovated buildings. The schemes are enforced by the federal states, which can either refer to the federal administrative regulation or resolve upon additional regulations. The certificate is voluntary for existing buildings. At the moment there are 33 different voluntary regional certification schemes, that in some cases include a label and recommendations, with different approaches and complexities. The voluntary certification is often issued during an energy advice procedure.

Some unofficial certificates do also exist in Germany, of which the more dominating are listed below. They have all increased requirements to the energy consumption, are controlled by an external organisation and use a standardised procedure. The end user of these certificates are building owners and building sellers.

Examples of voluntary schemes in Germany:

- Qualitätsgeprüftes Passivhaus, Zertifikat des PHI (quality-checked passive-house), issued by Passivhaus Institut Dr. Wolfgang Feist. The scheme operates on national basis

- Niedrigenergiehaus-Zertifikat Schleswig-Holstein (low-energy-house-certificate Schleswig-Holstein), issued by Arbeitsgemeinschaft für zeitgemäßes Bauen e.V.(arge). The scheme operates on regional basis in northern Germany.
- RAL-Gütezeichen "Niedrig-Energie-Bauweise - Planung und Ausführung" (RAL-quality mark "Low-Energy-Construction - planning and conducting"), issued by Gütegemeinschaft Niedrigenergiehäuser e.V. The scheme operates on national level.

The Netherlands: In the Netherlands three energy certification schemes exist, for existing dwellings, for existing other buildings (non-residential and non-industrial) and for new buildings (residential and non-residential/non-industrial buildings).

The certification scheme for existing dwellings, Energy Performance Advice (EPA-W) is issued in 2000. The scheme is voluntary, but for the EPBD introduction, this scheme will be converted to a mandatory certification scheme for existing dwellings.

For existing non-residential (and non-industrial) buildings a new, voluntary scheme will be issued in the second part of 2005. This scheme will be converted to a mandatory scheme to be introduced with implementation of EPBD.

The Energy Performance Coefficient (EPC) of new buildings was introduced in 1995. This scheme is a mandatory part of the building permit; for the moment there is no label coupled to this Energy part of the building permit. The building however needs to meet a minimum energy performance expressed as a maximum value for the EPC index. The building permit concerns in principle all the relevant items of the building process (building construction (safety) fire safety, energy, and health).

Spain: No existing schemes for energy certification of buildings exist, but planned scheme is described in chapter 3.2.

Information about certification schemes in other European countries can be found in Dicke N, et al (2003).

3.1.1 Certification of apartments

A special subject in terms of certification are flats, which have proven to give some unforeseen problems e.g. in terms of inspection (block of flats vs. individual apartment), energy calculation, comparison between measured and calculated energy consumption, etc.

Country	Experiences on certification flats
Belgium	For the moment no scheme applicable to existing apartment building exists. For new buildings, the new regulation in the Flemish region sets both energy requirements at the flat level and building level. An energy certificate will be delivered to each new flat

	<p>from January 2006. In the two other regions, no official decision has been taken yet (July 2005).</p> <p>The way to take existing apartment buildings into account is currently being studied. A study on the way to extend the EAP to apartment buildings was conducted in 2005.</p>
Denmark	<p><i>1997-1999</i></p> <ul style="list-style-type: none"> – Individual certification of each flat in a block of flats. <p><i>1999-now: (owner occupied)</i></p> <ul style="list-style-type: none"> – Individual certification of a flat and a rough estimate of the entire block of flats. <p>or</p> <ul style="list-style-type: none"> – Supplementary certification for the flat if: <ul style="list-style-type: none"> – Small buildings (<1500 m²): a less than 3 years old certificate (EM) for the whole building exists. – Large buildings (>1500 m²): an (ELO) energy management report for the whole building exists. <p>or</p> <ul style="list-style-type: none"> – Individual certification according to the EM scheme in case of flats in single-family houses or row houses. <p>Only 20-25 % of the flats that are sold have a certificate because the user:</p> <ul style="list-style-type: none"> – don't think the certificate is attractive enough, – think that the certificate is too expensive, – think that the certificate is not giving reliable information.
France	<p>No existing certification scheme, so no experience in certification of existing flats.</p> <p>In new buildings: 1974-2000, certification per flat. Since 2001: per building.</p>
Germany	<p>The existing scheme concentrates on new buildings and renovations that require a building permission. Therefore the certification of single apartments is not covered by the existing scheme. Since there is no mandatory certificate that has to be presented when buildings are sold or rented, there are very few experiences with the certification of apartments. If a (new) building is being sold or rented, the energy certification has to be offered for inspection to potential buyers and tenants, since the certificate is part of the building documents. One focus of the new certification scheme in Germany will cover the question of how the certification can be extended to existing buildings and cover single apartments. It is still an open discussion whether to certify each apartment or to have representative apartments for large apartment buildings.</p>

The Netherlands	<p>The EPA-W energy performance certification system allowed for certification of individual flats/dwellings, as well as for larger building complexes (multi-story apartment buildings or large blocks of row dwellings). In the so-called building complex EPA the energy performance of a whole multi-family building is assessed based on a number of assessments for typical reference dwellings describing the whole building. The building complex EPA has been developed to offer a cost-effective solution for housing companies/associations owning (multiple) apartment buildings. The goal, stimulating building owners to assess (and to invest in) energy savings at a building level, could be well met with this instrument. In recent years the EPA instrument has also been used as tools to embed energetic building quality in building portfolio asset management and as tool for communication to tenants. The experience gained in the past years with the energy certification of flats reveal different questions regarding the use of certificates in the communication to individual tenants, or individual flat owners; which is one of the requirements of the EPBD.</p> <p>Energy labels per flat in one multi-apartment building vary significantly as a function of the location of the flat in the building. Furthermore the energy saving measures required to attain a certain energy label also vary significantly.</p> <p>This raises questions how to deal with individual energy certificates for flats in a large building:</p> <ul style="list-style-type: none"> • Should the certificate reflect the energy quality of the overall building or the individual flat? The energy certificate will have its impact to the property value of the flat(s). In multi-owned buildings individual flat owners may have improved their flat more than others. • Should the energy certificate reflect the actual differences of energy consumption of flats in a building? • How to come forward to differences in the settlement of energy consumption in buildings? Sometimes energy consumption is individually measured and paid by the tenant or flat owner. Sometimes the overall energy consumption is measured at a building level, and equally distributed to the individual flats (so the paid amount per flat does not correspond to the actual consumption per flat), or distributed taking into account individual heat demand measurements but compensated for the location of the flat in the building. • Is it required that the certificate can be used also as means
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	<p>for assessing and communicating the individual energy cost as part of the total housing costs (rent/mortgage + energy costs) of a specific flat?</p> <p>For The Netherlands no final decisions on the approach for apartments have been taken yet. However it seems reasonable to differentiate according to the way energy consumption is measured and billed. When energy is measured and billed collectively a building certificate would be appropriate (collective installations). When energy is measured and billed individually certificates per flat would be appropriate (this can be the case for collective installations as well for individual installations).</p>
Spain	No experiences regarding this topic.

3.1.2 Building types included

The existing energy certification schemes are described table1, for new and for existing buildings respectively.

The schemes that will enter into force in the future are not integrated into these tables.

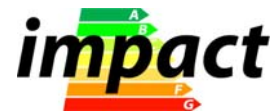


Table 1. Overview of existing energy certification schemes in the six IMPACT partner countries.

	Belgium Energy Advice Pro- cedure	Belgium Energiecharter	Belgium Passive House Cer- tificate	Denmark Energy certification of small buildings	Denmark Energy management of large buildings	France	Germany Energiebedarfsausweis (EBA)	Netherlands Energy Performance Advice (EPA-W)	Netherlands Energy Performance Advice (EPA-U)	Netherlands Energy Performance Coefficient (EPC)	Spain CALENER
New buildings:											
All buildings			x			x	x			x	
Dependant on size				x	x						
over [m ²]					1500						
less than [m ²]				1500							
Dependant on building type		x				x	x			X	
Inspection of building		x	x		x						
Evaluating of building drawings				x	x	x	x			x	
Calculations made by:											
- consulting engineer			x	x		x	x			x	
- energy consultants		x	x			x				x	
Label, certificate		x	x	x		x					
Presentation of information to the users				x	x		x				

	Belgium Energy Advice Pro- cedure	Belgium Energiecharter	Belgium Passive House Cer- tificate	Denmark Energy certification of small buildings	Denmark Energy management of large buildings	France	Germany Energiebedarfsausweis (EBA)	Netherlands Energy Performance Advice (EPA-W)	Netherlands Energy Performance Advice (EPA-U)	Netherlands Energy Performance Coefficient (EPC)	Spain CALENER
Existing buildings:											
All buildings			x			-		residential	non residential		
Dependant on size				x	x	-					
over [m ²]					1500	-					
less than [m ²]				1500		-					
Dependant on building type	x					-	x ¹⁾	x	x		
Dependant on building age						-		x	x		
built before						-		<1998	<1998		
Inspection of building	x		x	x	x	-		x	x		
Evaluating building drawings	x			x	x	-	x	x	x		
<i>Collection of energy data:</i>											
- based on calculations	x		x	x		-	x	x	x		
- based on registered data	x				x	-		x			
Label, certificate, advises			x			-		x	x		
<i>Presentation to users</i>	x			x	x	-		x	x		
during assessment						-	x				
personal explanation of report						-		(x)	x		
report send by mail			x			-		x	x		

1) Depends on the degree of renovation.

2) The energy index (which determines the energy label) is calculated independent of the actual consumption or user behaviour.

3) The energy savings potential takes into account the actual energy consumption and occupation as input data for the user behaviour.

3.1.3 *Functioning of the schemes*

Belgium: The EAP is currently (early 2005) introduced in the three regions.

The EAP is a voluntary based procedure giving information to the owner about the quality of the building and of the heating and domestic hot water installation + a list of bespoke recommendations. This procedure will mainly be applied when the owner wants to refurbish the building. The context of tax deduction and subsidies (see below) will also favour the application of the procedure.

The documents delivered to the owner are composed of two parts:

1. An 'attest' of the energy efficiency of the building (not THE certificate according to the definition of the EPBD) indicating the quality of the building and of the heating installation. It is based on conventional occupation pattern (independent on the real use of the building) and is entirely based on calculations.
2. Advises point out the most appropriate measures to undertake in order to save energy in the building. The energy savings calculated for each recommendation formulated by the procedure are based on the actual energy consumption known via the energy bills (when available). These savings are therefore integrating the comportment of the user.

The application of an energy audit (as the EAP) is one of the 8 measures in Belgium taken under consideration for tax reduction. Until now, this measure was not applicable due to the fact that there was no recognised procedure. Owners asking to recognised energy experts to apply the EAP will get this tax deduction.

Subsidies are also available at the regional level when applying the EAP. Relevant information (in national language) about subsidies can be found at the following web-sites:

Flemish Region	http://www.energiesparen.be
Walloon region	http://energie.wallonie.be
Brussels Regions	http://www.ibgebim.be

The 'Energie Charter' is a covenant in which Flemish building professionals commit themselves to build low energy houses.

The scheme concerns new construction as well as refurbishment. The start and the end of the works are announced to the certifying body, which is responsible for possible inspection of the works. The energy performance of the building is checked by a calculation based on building drawings. There is no actual certificate handed out to the owner. Due to a recent cutback by the Flemish region in the co-financing this scheme is not yet operational.

The certifying body, named the Passive House Platform (PHP), is a non-profit organisation that promotes the passive House concept and technology in Flanders.

Because of its highly innovative and extreme criteria concerning energy performance, the Passive House concept addresses only a very small segment of the home owners.

Denmark: In 1997, a new act “The Act to Promote Energy and Water Savings in Buildings” was passed in Denmark to promote energy and water savings and to increase efficiency in all utilisation of energy and water in buildings.

Energy Certification is mandatory in residential buildings, public buildings and buildings used for trade and private service. Both new and existing buildings are included. Buildings, which are exempted, are buildings used for commercial production and for energy production and buildings with very low energy consumption.

The act is divided into two parts: one for small buildings (area under 1500 m²) and another for large buildings (more than 1500 m²).

For large buildings energy rating is not calculated, but based on registration of the actual consumption. For all buildings an energy plan shall be drawn up that includes proposals for profitable savings for all types of consumption of energy and water of the building. Furthermore, the energy plan shall include an estimate of investments and annual savings involved in the individual proposals and the estimated economy during lifetime of the measures proposed.

Finally the plan shall state the user-economic cost-effectiveness of the individual proposals. Energy rating and an energy plan shall be drawn up once a year. Energy rating shall consist of a standardised energy rating based on inspection of the building and the owner's registration of actual energy and water use and CO₂ emission. The energy plan shall include proposals for profitable saving for all types of energy and water use in the building.

The label consists of four ratings on a scale from A to M. The actual heat consumption is climate corrected yearly to a normal year through the use of degree days by the ELO consultant, while electricity and water consumption is not climate corrected. Finally, the energy performance and total environmental impact are calculated and rated (A to M) on behalf of amount and emission figures for the actual supplied electricity and heat.

Information (in Danish) about the two existing energy certification schemes in Denmark are found at:

EM	http:// www.emsekretariat.dk
ELO	http://www.energiledelsesordningen.dk

Germany: The EBA certificate is part of the energy calculation for application for building permission. The Energy Savings Ordinance from 2002 provides the requirements on energy efficiency for new and renovated buildings. The building permission is only approved if the evidence on energy efficiency is provided.

The reference value is the primary energy demand of the building, which covers the quality of the buildings thermal envelope and the efficiency of the technical (heating and hot water) systems. The reference value is dependent on the building shape, i.e. the ratio between building envelope and volume. The maximum values have been lowered with every amendment of the Energy Savings Ordinance, taking into account the state-of-the-art in building materials and tech-

nical systems. Nevertheless all measures are also bound to the fiat of economic efficiency.

The calculation method covers primary energy demand for heating and hot water. Auxiliary energy is covered by the efficiency coefficient of the technical system, where also renewable energy sources are taken into account. The calculation is based on standard climatic and user data and leads to a comparable primary energy characteristic of the building. For buildings with large windows, i.e. more than 30 % of total exterior wall area, the evidence of the summer conditions has to be provided.

The certificate has to be presented on demand to the legislation of the federal states. It has to be made available for potential purchasers, tenants and other covenants of the building.

All new buildings constructed from 2002 to today ought to have the certificate. In the existing mandatory certificate there is no labelling included, only the maximum values are given as comparison. Since the certificate only covers new and renovated buildings there are no recommendations for energy efficiency included.

For the voluntary certification of existing buildings several regional agencies and associations offer energy certificates, which in some cases do, in some cases do not include a label.

To reach national harmonisation, dena developed a prototype of a certification scheme with a label and recommendations that ought to serve as a basis for the implementation of the EPBD requirements.

Netherlands: *Existing dwellings:* The EPA-W process was introduced in 2000 as a voluntary policy instrument aimed at stimulating home owners to take energy efficiency and renewable energy measures. Within the method the energetic quality of an existing dwelling or complex of dwellings is calculated. The resulting energy index is independent of user behaviour. The energy advice however does include user behaviour by taking into account the measured use of natural gas and the dwelling occupation. Advice is given for possible improvements (measures, financial effects, and payback times). Only EPA's executed by certified consultants were eligible for subsidies (subsidy for the EPA itself and for the proposed measures).

The calculation method determines the energy consumption for space-heating, domestic hot water and electricity for fans and pumps. Renewable energy sources are also taken into account, such as passive solar energy, solar collectors, photovoltaic panels, heat recovery, and heat pumps. Based on the primary energy consumption under standard indoor and outdoor conditions, an energy performance index is then calculated, known as the Energy Index (EI). The EI is defined in such a way that it is independent of the housing geometry and the user behaviour. This means that the EI is only determined by the energy quality of the building. A large villa can therefore have the same EI as a small apartment, as long as their energy quality is the same (same level of insulation, same installations etc.). The EI will therefore serve as a basis for EPBD energy certification.

EPA-W has been introduced for individual homeowners as well as for social housing and commercial apartment building owners (multifamily housing).

Existing, non-residential and non-industrial buildings: Before the introduction of the mandatory Energy Performance Certificate, the EPA-U process will be introduced as a voluntary policy instrument aimed at stimulating non-industrial companies and institutions to take energy efficiency and renewable measures. Within the method energy consumption of an existing building is calculated. Advice is given for improvements (financial effects are calculated). Only certified companies are allowed to perform the EPA-U. The calculation method determines energy consumption for space-heating, domestic hot water and electricity for fans and pumps. Renewable energy sources are also taken into account, such as passive solar energy, solar collectors, photovoltaic panels, heat recovery, and heat pumps. Based on the primary energy consumption under standard indoor and outdoor conditions, an energy performance index is then calculated, known as the Energy Index (EI). The EI is defined in such a way that it is independent of the building geometry and the user behaviour. This means that the EI is only determined by the energy quality of the building. The EI will therefore serve as a basis for

EPBD energy certification. The methods to determine the EI differs from the existing residential buildings, The first software-concept for this method is available since 2004 and is still in development. The EPBD legislation will be incorporated as much as possible to this calculation method, because in is still developing.

New buildings: All new buildings need to be built according to the EPC requirements in the Building Code. The EPC Energy Performance determination method is based on the national standards NEN 5128 and NEN 2916 and is operational as part of the building code since 1995.

A standard calculation showing that the Energy Performance Coefficient (EPC) of a new building meets the maximum value set in the building code is a mandatory part of the building permit; for the moment there is no label coupled on this Energy part of the building permit.

The EPC calculation method determines an energy performance coefficient (EPC) which represents the primary energy consumption of the building, independent of the building geometry. A maximum EPC value is enforced by the building codes. This value is lowered periodically, thus strengthening energy performance requirements. The EPC will serve as a basis for EPBD energy certification for new buildings.

3.1.4 Number and type of buildings with existing schemes

In **Denmark** there are approximately 1.5 million small buildings, which are under the EM scheme. Of these approx. 300 000 have got a label and approx. 50 000 new labels are issued every year.

There are approximately 28 000 large buildings which should be labelled every year under the ELO scheme. Nearly 50 % (15 000) of these buildings are actually labelled every year. Over the period approximately 100 000 labels have been issued under the ELO scheme.

In **The Netherlands** approximately 600 000 EPA certificates for existing dwellings have been issued over a period of 5 years, giving an average of 120 000 certificates per. year. These numbers include so-called building complex EPA's in which a large number of apartments or row-housing blocks are certified based on a number of reference dwellings enabling the characterisation of the building block as a whole. The total stock of existing buildings included in the EPA scheme is approx. 6.4 million (dwellings constructed before 1998).

Since the introduction of the EPC regulation for new buildings in 1995, 780 000 new dwellings have been built according to the EPC scheme regulations.

In **Germany** approximately 335 000 certificates have been issued over a period of 3½ years and now about 165 000 certificates are issued every year for new buildings. Additionally the necessary certificates due to selling or renting of existing buildings have been estimated to approximately 2.5 million new certificates in 2006. Since the certificates will be valid 10 years the amount of necessary certificates declines from 2006 on. The total building stock under the scheme is estimated to approximately 40 million units.

3.1.5 Financing of the schemes

The individual building owners paying for the labels finance the major part of the existing certification schemes.

Table 2. Financing of the existing schemes.

Financing existing schemes	EAP	EC	PHC	EM	ELO	EBA	EPA-W	EPA-U	EPC
Mainly paid by individual owners	x		x	x	x	x	x	x	x ¹⁾
Subsidy for the certification survey	x	x	x				x		
Reduction of the cost									
Subsidy for energy saving measures	x						x		
Link of subsidised loans									x
Other	x								x

1) Paid for by developer/builder; recovered by the sales of the building to the individual owner.

In France, there is no national certification scheme, but there are financial measures to promote energy savings, called "*credit d'impôts*". For instance, if some one asks a professional to insulate his roof, he can deduce 20 % of the amount to

his income taxes. (25 % for insulation; condensation boiler; 40 % for renewable energy; etc.).

Further information are found at:

http://www.ademe.fr/presse/Communiqués/cp2005/cp_2005_01_20credit_d'impot.htm

3.1.6 Legal status of the schemes

Both schemes in Denmark are mandatory and address new and existing buildings. The ELO scheme must be conducted every year and address buildings that are larger than 1500 m². The EM label addresses small buildings, and must be made when the dwelling is sold. Even though the Danish schemes are mandatory, only 50-60 % of the buildings, which requires a label, have got it. Most of the labels are issued around the larger cities. In the countryside it is more common to save the cost of the label.

The Dutch EPA-C scheme for new buildings and the German EBA for new buildings are mandatory as part of the building permit for new dwellings, non-residential and non-industrial buildings. The other schemes for existing buildings are (still) voluntary.

Country	Abbreviation	Legal status	Start
Belgium	EAP	Voluntary	2005
	Energiecharter	Voluntary	2004
	PHP	Voluntary	2003
Denmark	EM	Mandatory	1997
	ELO	Mandatory	1997
Germany	EBA	Mandatory	2002
The Netherlands	EPA-W	Voluntary	2000
	EPA-U	Voluntary	2005
	EPC	Mandatory	1995

3.1.7 Promotion of the schemes

Belgium	
EAP	Promotion about the scheme begins in 2005, in parallel with the formal recognition of energy experts at the regional level.
Energiecharter	<p>The building professionals participating in the action are grouped on a list that is published and distributed via several public channels. This way private persons interested in building a low energy house can take contact with subscribers of the Charter.</p> <p>The participating buildings (house) are registered into a central database with public access. This way it has also commercial value for selling or renting.</p>

Passive House Certificate	The Passive House Platform (PHP) organises the promotion of the concept in the Flemish region. Housing associations or project developers are a.o. addressed.
Denmark	
EM	The Danish Energy Authority promotes both existing Danish energy certification schemes. The interest among the end users of the schemes must be considered moderate. In principle the schemes are mandatory and do thus need no any special promotion.
ELO	
Germany	
Energiebedarfsausweis	The mandatory scheme is mainly promoted by legislation. There is no real promotion to end-users. The voluntary scheme for existing buildings is being promoted to different extents by the regional energy agencies and associations that offer the certification in the context of an Energy Advice Procedure.
Netherlands	
EPA-W	<p>Until the end of 2003 the EPA's were subsidised. For measures (i.e. solar water heaters) an additional investment subsidy was available when an EPA was conducted and the measure was advised.</p> <p>Municipalities were stimulated to promote EPA's as a result of a National Climate Covenant between the government and the municipalities. A goal has been set for municipalities to stimulate that 30 % of the existing building stock receives an EPA. A climate policy subsidy for municipalities is linked to this goal. As a result several municipalities execute(d) EPA-campaigns. EPA's have also been embedded in RUE and solar water heater/ PV campaigns due to the extra investment subsidy for measures when an EPA was conducted.</p> <p>A similar covenant has been closed between the national government and the social housing sector (housing associations). A similar goal of 30 % EPA has been set. Drivers for housing associations are/were: preparation for the introduction of the EPBD; it was free due to the subsidy; required in order to get extra investment subsidy for measures; as useful planning tool for renovation and maintenance projects; as basis for embedding energy quality in building stock asset management.</p> <p>National promotion by ministry of VROM (television commercial, web-site) and SenterNovem (support to market actors and municipalities).</p>

	<p>The EPA programme led to the development of an infrastructure of EPA consultants/companies. These consultants/companies, among which large utilities, have organised their own promotion.</p> <p>Penetration results after 5 year promotion program:</p> <ul style="list-style-type: none"> • Private homeowners: limited penetration of 1.6 %; interested mostly when additional subsidy for measures could be received; mostly reached in campaigns organised by municipalities / utilities. • Tenants have not been targeted directly • Housing associations: penetration of 22.5 % in 5 years (in total 540.000 EPA's).
EPA-U	<p>The same promotion channels will be used for the EPA-U scheme for existing non-residentials and non-industrial buildings. Furthermore the certification scheme will be promoted as part of information about the EPBD.</p> <p>The results of 50 pilots show that end-users are very interested in the mandatory labels.</p>
EPC	<p>No real promotion, the scheme is mandatory as part of the National building codes and checked by the local government as part of the building permit process.</p> <p>Besides the existence of a national info website (by SenterNovem) no active promotion takes place towards end-users, as the scheme is mandatory.</p>

3.1.8 Training of consultants

Four schemes have mandatory training of the consultants and 3 voluntary. In four of the schemes there is a requirement for the consultants to have a professional background as architects or engineers.

In **Belgium**, the Brussels region, some auditors of the *EAP* are already formed and no complementary formation is foreseen in the near future.

In the Flemish region, only energy experts recognised by the region will apply the EAP. The energy expert accreditation can be obtained by following a formation or until end 2005 by demonstrating experience within the domain. The formation is composed of an optional three-day theoretical formation, and a mandatory two-day practical formation, as well as a test. No particular background is set to candidate energy experts.

In the Walloon region, the formation will be mandatory. It will be composed of 5 days including theoretical formation, practical tests and use of the tools. The formation is followed by an exam. The professional background of the energy consultants is under discussion. The application of the procedure will not be open to anyone and condition (to be defined) will have to be fulfilled.

The *Energiecharter* is not in operation yet, and training is thus not started.

The *Passive House Platform* organises information sessions 2 – 4 times per year. The content focus on explanation and demonstration of the calculation tool (excel-sheet, translated in Dutch, directly from the German version (PassivHaus-ProjektierungsPaket).

In **Denmark** the training are based on courses with duration of 2 times three full days, ending with an examination.

In order to be approved in the *EM* scheme as an energy consultant one must be a trained engineer, architect, construction designer or the like, one must have taken out a compulsory, professional liability insurance license. In addition the energy consultant needs a minimum of 5 years documented, relevant experience in building technology and energy consultancy. The consultants must have a compulsory professional liability insurance, which must be kept in force at least 5 years after the last certification. Further, they are obliged to take the admission course for the Energy Certification Scheme and must have passed a test.

Around 500-600 EM consultants are registered in Denmark.

In addition to that, all consultants have to follow a yearly one-day training course, and further they receive a newsletter telling about new rules, clarifications, frequently asked questions and general information of the development of the scheme at least four times a year. The information for the consultants is based on experience from the quality control, reported energy certification and technical research and development.

A typical *ELO* consultant is an engineer, who must have at least 4 years of energy advising experience in the last 5 years. The consultants and the company that he is working for must be covered by a professional insurance. The *ELO* consultant or his company pays a yearly fee of 470 € ex. VAT a fee of 20 € ex. VAT per finalised case and fees for received material. In addition to that, the mandatory *ELO* training course costs around 2560 € ex. VAT per person. The collected fees amount to a total of 240000 €, which covers the service of the secretariat. Around 500-600 *ELO* consultants are registered in Denmark.

It is very important that the rating is reliable, and it has to be done by someone who has an extensive knowledge of buildings. Denmark has had big problems (in the rating for small buildings) to have building owners to understand the difference between the calculated rating (for an average family) and the amount they actually pay. It has to be clarified and explained in the certification paper.

In **Germany** approximately 95000 architects, 30000 civil engineers and 1000 other (by federal legislation) have the right to issue the mandatory certificates in the existing scheme. They are all registered members of architectural / civil engineering associations (permission for building application) and other, dependant on federal legislation (e.g. master craftsmen, energy consultants). There is no additional mandatory qualification or certification concerning the building certificate.

For the voluntary certification there are different regulations in the Federal States concerning the qualification of Energy Consultants for Buildings, who are in most cases authorised to issue the regional certificates. Besides architects and engineers with a permission for building application, master craftsmen are authorised if they do a vocational training (“Gebäudeenergieberater im Handwerk” Energy Consultant for Buildings in Trades) that is offered by the local Chambers of Trade and cover about six weeks of training (200 to 240 hours).

In **The Netherlands** there is no standard format for the training of the *EPA-W* consultants. The training courses for experts are provided by 12 organisations on a commercial basis; the courses are based on meeting the National quality certification scheme BRL 9502. A course is normally scheduled for two or three days.

Similar training courses are available for the EPC scheme (based on national standards NEN 5128 and 2916) and will be available for EPA-U based on the currently developed National quality certification scheme BRL 9503.

3.1.9 *Quality control*

The **Belgian** situation is that the consultants applying the *EAP* scheme have to be certified at the regional level.

The *Energiecharter* is not operational yet, so no decision has been made on this issue yet.

For the *Passive House Platform* the minimum education of the consultants is not defined and no certification is needed, as the PHP organisation is the only responsible for issuing the certificates.

For the **Danish** *EM scheme*, every energy label must be reported to the secretariat for the energy certification. The report include the date, information on the building, the information registered during the audit, most of the calculation results and all proposals for energy saving measures from the energy plan including required investment, and estimated savings. Reporting also includes thermal values for every building part, expected losses in the boiler, pipes and tanks, data for solar radiation, number and state of different appliances etc. All data are registered in a database and are controlled automatically by the system for lacking information or typing in failures and secondly by the Secretariat.

Certification data not meeting the requirements or suspicious data are investigated further. All data in the database are used on regular basis to calculate the number of labelled buildings, and the number is compared to the amount of buildings sold in the same period. In addition, the data are used to calculate the number of proposals, the investments and the possible savings and other kinds of information from the scheme. The quality assurance system is designed to identify the general situation of the certification and to identify specific areas of problems in the scheme.

The general status and registered problems are used as input for information to the consultants in training courses or in the regular information letters. When-

ever it is necessary, additional training or additional control is carried out. There have been made several quantitative and qualitative investigations of the consumer acceptance of the scheme and the number of measures carried out, and investigations of the barriers for the use of the scheme and for carrying out the energy savings. The results have been used for improvement of the scheme.

Further, the quality of the certification is inspected through a quality control system including new certification of selected buildings chosen by a random selection in 1 out of 500 cases. This includes a new calculation of the consumption and comparing of registration as well as the proposals for energy saving measures. A visual control of some of the certification forms is made of at least 1 out of 100 reports to see if all information is presented in an accurate way, etc. Consultants who do not meet the quality of the certification lose their registration and possibility to work as an *EM* consultant.

The committee of the energy certification of small buildings and the secretary treats complaints about the energy certification of a building. If major failures are identified, the consultant has to provide a new certification and can be held responsible for economic losses by the owners. If the consultant does not meet the requirements, the committee has the right to withdraw the registration or can make additional quality inspections. The Danish Energy Authority treats disagreements and complaints of the decision of the council.

The establishment of a coherent quality control has had a relatively high priority in the Danish *ELO scheme*. Experience obtained through the early years of the scheme showed that it is evident that energy labels and plans have a high level of reliability and uniformity, if the scheme is to gain ground in the sector.

The quality assurance consists of the following procedures/initiatives:

- random control of reports by inspections covering around 5 to 10 % of all reports
- quality assurance as result of enquiries
- external evaluations

The use of the standardised software programme ELO-PC ensures that data are treated in a consistent way and that obvious errors and missing information are caught during typing in of data. However, experience shows that the built-in automatic of the programme also has the disadvantage that some ELO consultants tend to focus too much on the programme and its output. Some of the examples are:

- uncritical use of ELO-PC standard solutions,
- lack of comments on conspicuously high consumption levels,
- lack of engagement and use of own observations.

The checking is initiated and assessed by the registration committee and carried out by an impartial consultant. Experience and knowledge obtained through the spot checking is shared with all ELO consultants if it is assessed to be relevant, just as it is used as input for the development of education, ELO-PC, ELO Web and training course material. Occasionally, enquiries received by the secre-

tariat or committee are also used as basis for checking reports. Finally, the scheme and its impact have been evaluated through different evaluations/examinations.

In **Germany** the basic education level of the consultants ought to ensure the quality of the issued certificates. The regional legislation accounts for the quality inspection of the certification to the extent of assuring that the calculated values are within the statutory limits. Since the certificates are part of the application for building permission all certificates are transferred to the responsible building authorities.

The **Dutch** government decided at the end of 2001 to improve the quality of the EPA-W scheme and to facilitate the market by the creation a certification structure for EPA-W consultants. In the subsidy program of the government for 2002 it already was stated that as from the first of July 2002 only EPA's given by certified EPA consultants would be subsidised. On June 3rd 2002, the Council of Acknowledgement agreed to the final version of the certification system (BRL9502). With these final terms the five certification institutes, established in The Netherlands, could officially start certifying EPA companies. The costs these institutes ask for carrying out the certification are approx. 1400 € (excl. tax) for the access research, and more than 1500 € (excl. tax) for the audits every year. Compared to the profit an EPA can provide, approx. 20 €, the costs for the certification are relatively high. It depends on the number of EPA advises, given by an EPA consultant, what the overall certification costs for each EPA will be.

On the following topics quality requirements are mentioned in the final terms, which have to be addressed to be a certified EPA consultant:

1. The advice (the EPA-report, the use of certain EPA-software, monitoring file);
2. The process (scope, assignment, preparation, inventory of recent situation, choice of energy saving measures, delivering advice);
3. The company (registered with the Chamber of Commerce, third-party insurance against damage following the giving advice (in so far as this damage is attributable to the advice), personnel, tools and instruments);
4. The internal quality control (general, quality handbook, quality policy, responsibility/competence, internal quality chart, description of procedures, requirements of procedures);
5. The external quality control (access procedure, follow-up controls, dealing of complaints by certification institute);
6. The process certificate.

The certification institutes check randomly chosen projects. The number of checks depends on the number of EPA's reported.

The minimum educational levels for consultants of the EPA scheme are (this level is required for at least one person of an EPA consultancy company):

- Level of basic education:

- Higher vocational education (HBO) in the fields of civil, mechanical or electrical engineering,
- or an intermediate vocational education + (MBO+) in the same fields with additional training on building physics or installation engineering.
- Level of additional training:
 - Training for EPA consultants given by one of the recognised training centres.
- Experience:
 - Several years' experience in the field of energy conservation techniques (knowledge of matters relating to comfort and indoor environment is a must).
 - The EPA consultant must also have advice skills (communication, anticipate on the wishes of the client).

The consultants do not have to be certified themselves, the organisation however has to be certified based on a process certification. As described above at least one of the consultants needs to meet the minimum requirements on education and experience. In practice this can result in EPA's done by under qualified persons.

For the *EPA-U* scheme quality control is based on meeting the National quality certification scheme BRL 9503. At the moment BRL 9503 is still in concept and will be published in October 2005.

For the *EPC* scheme no quality certification scheme has been implemented. Certification of the consultants is not mandatory, but wanted. Currently the municipality is responsible for assessing the quality and completeness of the building permit request submitted, including the obligatory energy certificate calculation. In practice it occurs that the available capacity in time and knowledge with regard to checking the energy certificate calculations submitted is varying between municipalities and at times too limited.

Quality survey EPA-W

At the beginning of 2003 Novem carried out a study aimed at gaining a better insight into the quality of the EPA advice issued after implementation of the certification scheme. It also looked for opportunities for improving the quality of this advice. In the first part 24 EPA recommendations that were produced in 2002 by certified companies were checked. In the second part, ten certified EPA consultants were invited to attend a workshop, which consisted of two modules. During the first module the ten consultants all carried out an EPA evaluation for the same house. These consultants then all sat together to discuss the results of this EPA advice and to learn from each other.

Both the control intakes in 24 homes and the results of the workshop showed that mistakes are easily made. For example: the surface area in use. Estimates by the ten consultants varied from 77.0 to 103.6 m². But other aspects also showed wide-ranging differences.

The question, of course, is how is this possible? The quality study showed that deviations are caused by (a combination of) several factors:

- Surface areas (unintentionally) input twice.
- Surface areas were forgotten and not included.
- The sizes on the drawings were not checked thoroughly
- Addition and subtraction errors: e.g. forgetting to deduct the glass surface areas from the facade area, so that the total area of solid facade is far too large.
- Interpretation problems, such as in the attic: should this be included in the usage area, or not?
- Inclusion of areas that are outside the thermal envelope.

Deviations are allowed, to a certain extent, and do not necessarily stand in the way of a good advice. There is currently no standard for the extent to which these measurements may deviate from reality. Drawing up a clear guideline for this is one of the follow-up activities resulting from the quality study.

With regard to the advice also large deviations occurred:

All consultants selected the largest and easiest 'catch': i.e. insulate the facade and windows and replace the central heating boiler and domestic hot water boiler.

However, the consultants did not agree on the implementation method, the quality, extensiveness and priorities of these measures. Examples include: insulate the inside or outside of a construction, the thickness of the recommended insulation, insulate the entire building envelope or just parts thereof, use/not use solar energy systems, the type and capacity of the solar energy system.

The study showed that consultants also provide different information concerning the costs and benefits of the measures they recommend. Certainly these differences are closely related to the variations in evaluation data, the recommended measures and the historic energy consumption used. But apart from this, there are also differences in the way this data is presented. One consultant specifies the costs and benefits per measure, while others only provide this information for the total package of measures.

3.1.10 Communication to end users

Within the *EAP* scheme in **Belgium**, 2 types of documents are delivered to the end user, an attest and the energy advice. The attest contains:

1. The global evaluation of the building shell.
2. The global evaluation of the heating system.
3. The global evaluation of the hot water production system.

As well for the building shell as for the heating system, the advice contains detailed information about all walls, components of the heating system + list of recommendations with an evaluation of the savings that can be realised. If the auditors make an evaluation of the investment costs, a calculation of the payback time is made. The advice contains also an indication about the technique to adopt in order to apply the recommendation.

For the *Energiecharter* scheme no decision has been made yet.

For the *Passive House Platform* (PHP), the end users receives a certificate and an extensive list with technical information gathered in the calculation procedure, such as energy consumption, air tightness of the building plus indoor com-

fort description. Promotion, explanation and information on the Passive House concept are an important part of the PHP's aim and included in the issuing of the certificate.

In **Denmark** both schemes operate in the same way with respect to communication to the end users, who will receive a certificate, a label and an energy plan. The energy plan contains calculations of economic sound energy savings, which can be made in the building. The report is send by mail to the end user. In the ELO scheme there is a follow up the next year when the building is labelled again.

In **Germany** a report of main calculated energy data is given to the end user with no special explanation. The mandatory certificate is part of the building documents. The Energy Consultant explains the voluntary certificate for existing buildings to the end-user on inspection of the building.

In **The Netherlands** a standard report (extensive and technically oriented, sometimes only the summary is delivered) is produced for the *EPA* scheme. The report contains at the moment no energy label and is limited to energy consumption and an advice on energy saving measures and the possible savings. According to the quality certification system there has to be personal communication, in practice the final report is often send by mail. Evaluation learned that private homeowners mostly appreciated the contents of the *EPA*-report. The appreciation by housing associations was more limited. Sometimes their low interest could be explained because the *EPA* was done only in order to get extra investment subsidies for measures to be implemented.

In the *EPA-U* scheme an extensive and technically oriented report will be produced. If labelling will be mandatory for the EPBD certification scheme, there will be a label in this scheme. Personal communication of the results of the scheme is anticipated.

For the *EPC* scheme a standard a governmental energy performance certificate will be developed. On the final content and layout no decisions have been taken so far.

3.1.11 Barriers in schemes

Questionnaire 1 of WP1 (Appendix 2) contained a set of questions, which was related to the barriers endeavoured in connection with the existing energy certification schemes. The questions were grouped in four sections, dealing with different phases of the execution of the schemes:

1. Information and promotion of the schemes.
2. Penetration on the market.
3. Assessment of the buildings.
4. The execution phase.

In the following a summary of the answers to these questions is shown. When the answers are shown graphically, the percentage of the individual answers are calculated from the total number of existing energy certification schemes, which is part of this survey.

General comments to barriers

In **Belgium** an internal workgroup of the *PHP* is investigating how to unify the calculation method such that differences in interpretation are excluded in the future and certification is uniform for all certified buildings. The complexity of the calculation tool however will remain and could slow down the market penetration of the certification procedure. The complicated and extensive static calculation method combined with an obligatory pressurisation test on site represents an important cost for the house owner. Quality control on site is another hot issue that is addressed in the work group: it is not yet certain that this will be part of the certification procedure. The results of this work group are expected soon.

In **Denmark** there is an economical and legislative barrier, which has to be solved somehow. A house owner can, by law, not charge the tenant for additional costs spent for energy saving investments although the tenant gets the benefits in terms of lower energy bills.

In the **Netherlands** there has been some discussion about the quality of the issued *EPA-W* certificate, and it seems that some consultants have merely made the minimum required effort to make the labels. This has resulted in a varying appreciation of the scheme. Due to a strong growth of the professional consultant infrastructure, even with the elaborate certification scheme, quality could not always be safeguarded. More than once the announcement of the end of the subsidy scheme led to booms in the EPA demand. As a result in a short time many EPA's had to be conducted leading to occasional poor quality.

The final EPW-W report is not really appealing to end-users. In practice the EPA consultant often didn't use the assessment as an opportunity to provide a personal advice to the homeowner. He/she comes, makes an inventory of the dwelling and installation, leaves and sends the report after some weeks. Here an important communication opportunity is missed. In the report the consultant seldom addresses comfort and indoor climate issues as is required by the certification system. In practice the costs have been determined by the available subsidy (200 € for an EPA); this limits the possibilities for better qualified consultants and also requires an efficient high volume effort in order to become profitable.

In **Germany** the large variety of the voluntary certificates for existing buildings is a barrier for national introduction, since the comparability and consistency of the certificates is rather low. There are also some obscurities about the qualification of experts and need for national harmonisation.

Information and promotion

The information and promotion questions stresses how differently schemes have been promoted over time and points to reasons for why a scheme has had little success. It seems that most of the schemes suffer from lack of public campaigns.

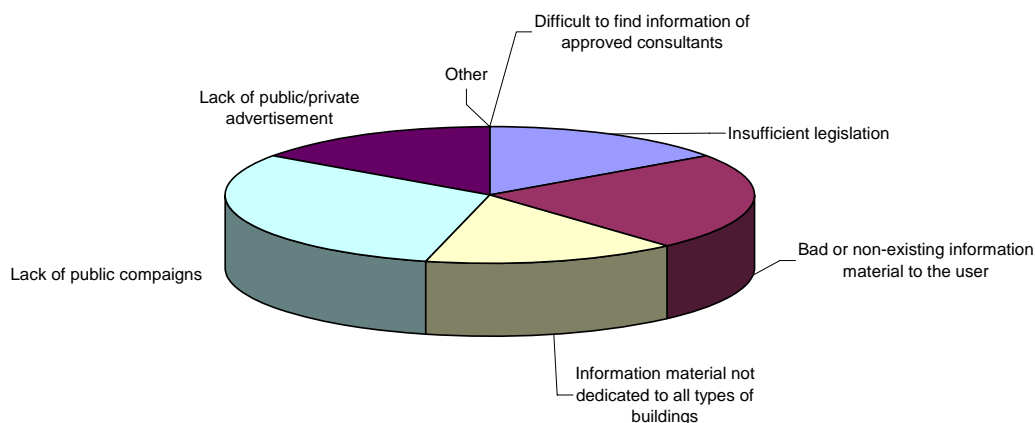


Figure 1. Identified barriers to existing certification schemes with relation to information about and promotion for the schemes. Result of the answers given to the questions in questionnaire 1 of WP1.

Penetration on the market

The questions relating to market penetration of the schemes focus on the difference between mandatory and voluntary schemes. The major drawback of the existing schemes is the lack of or limited interest for the schemes among the homeowners.

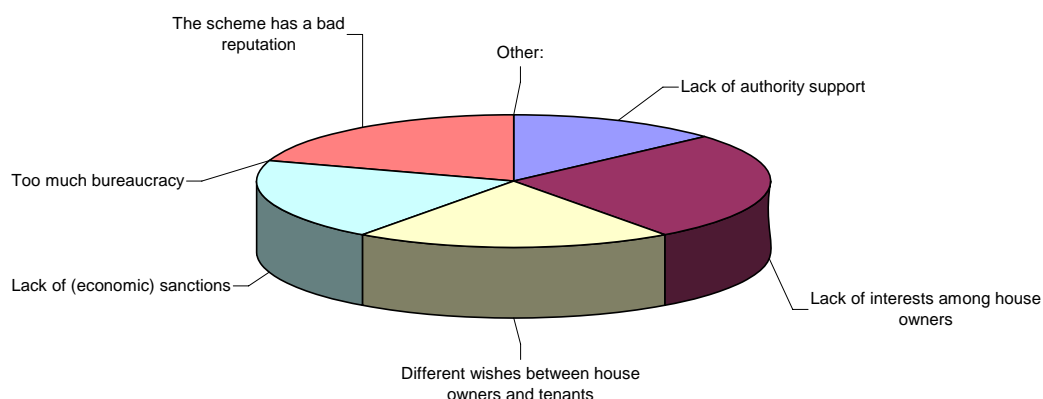


Figure 2. Identified barriers to existing certification schemes with relation to market penetration of the schemes.

Assessment of the buildings

When talking about the assessment of the buildings the barriers are almost evenly spread among the possible answers. There is thus not a unique answer, but the new schemes should address the issue of the difficulties of setting an

sound assessment scheme and have the necessary number of certified consultants available for the required number of assessments.

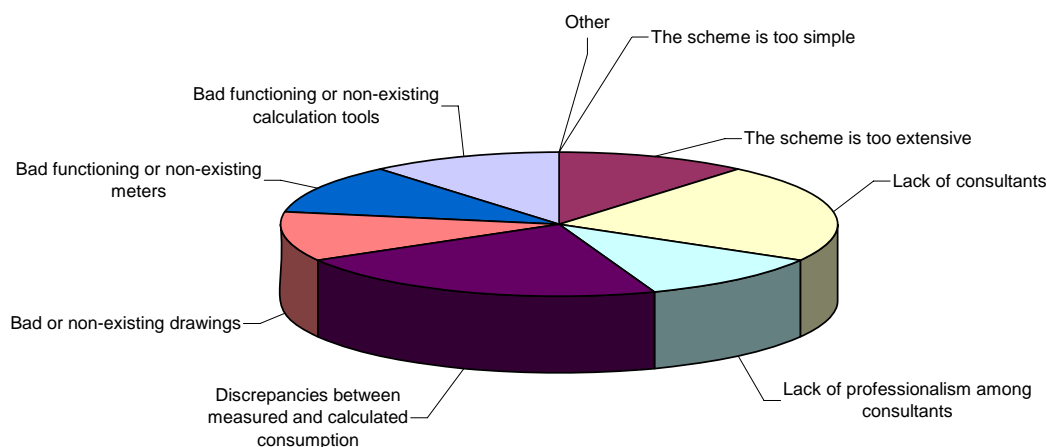


Figure 3. Identified barriers to existing certification schemes with relation to the assessment of the schemes.

Execution phase (implementation of measures)

The dominant barrier in the execution phase is the "lack of profitability". This means that the building owner mistrusts that the investment in the calculated energy saving measure will be paid back within a reasonable time.

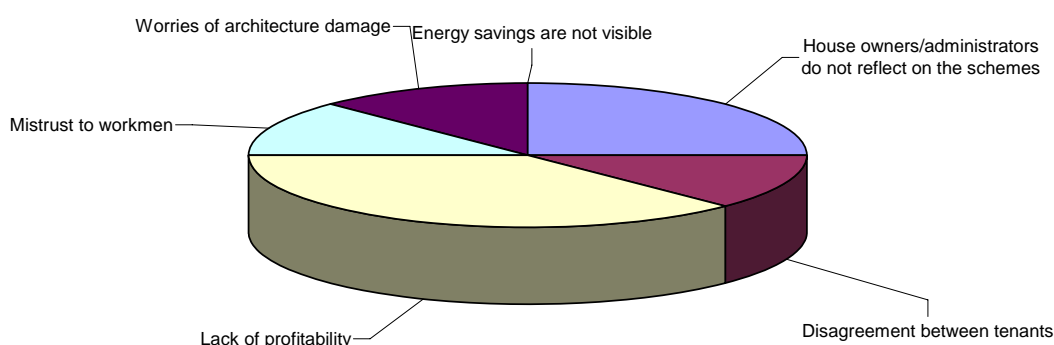


Figure 4. Identified barriers to existing certification schemes with relation to the execution phase for the schemes.

3.1.12 Lessons learned

Country	Success factors
Belgium	There is too little experience to be able to judge the existing schemes.
Denmark	In 1998/1999, a questionnaire survey - named the Barrier Examination – was carried out among ELO consultants and building owners involved in the scheme. The survey showed that stakeholders were quite satisfied with the scheme. Among the conclusions were:

	<ul style="list-style-type: none"> – The ELO scheme has implied that quite many buildings, which have not used energy advising before, have been introduced to energy management, etc. – The ELO consultants received positive feedback for their work from their clients – In general, the clients find the ELO service relevant – It was found that there is a considerable un-exploited potential for energy savings in buildings participating in the scheme and in particular in buildings that despite the legal requirement does not take part. <p>In 2000, an evaluation of the two schemes: ELO and EM, was initiated by the Danish Energy Authority and carried out by COWI. The evaluation was based on registration of energy labels in the secretariat during the period 1997-2000.</p> <p>The conclusions of the evaluation of the ELO scheme were:</p> <ul style="list-style-type: none"> – The data registration is not perfect, and part of the data material is uncertain. In particular, the registration and follow-up of the saving potentials and proposed saving initiatives do not allow a consistent assessment of whether, when and to what extent suggested saving-proposals have been implemented. Hence it was recommended that registration procedures could and should be improved. – Even though the scheme is compulsory, only around 42 % of potential buildings and 52 % of the total area in m² are registered in the Scheme. Yet there is a considerable geographical variation, with 55 % of the large buildings in Greater Copenhagen being registered and, in the other end of the scale, only 31 % in Storstrøms County. – One of the main reasons for the non-coverage in certain areas is that building owners have not been acquainted with the Scheme. It is notable that around 50 % of the interviewed owners, who were not registered, did not have any knowledge of the scheme. – • There are also large variations in the degree of coverage for the different categories of buildings. Residence buildings, schools, hospitals and institutions have the highest representation, while trade and service companies, hotels and summer houses do not have a high degree of coverage. – It is evident that a larger part of the buildings registered in the Scheme has implemented saving initiatives compared to buildings not taking part. – The evaluation shows that there is a high degree of contentment with the scheme, i.e. scope and set-up among both users and consultants.
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Germany	The EPBD requirements can be met to a large extent by the existing Energy Savings Ordinance. The certification is based on an approved calculation method that works well for residential buildings. The regional certificates have attracted some attention, especially when they were linked to regional subsidies. The future statutory obligation for certification of existing buildings will be one success factor for the scheme.
Netherlands	<p>EPA-W: As a result of a focused governmental effort in a relatively short term an elaborate EPA program, including tools, certification and an infrastructure of consultants has been created.</p> <p>Subsidy incentives can work effectively for stimulation the market and as incentive to boost the build-up of an expert infrastructure (however subsidy schemes should be well considered and abstain from stop and go characteristics).</p> <p>EPC: Because it is mandatory, it must be done. The link to the building permit ensures a high penetration. Quality control however remains a point of attention.</p>

3.2 Planned certification schemes

Country	Abbreviation	Name
France	DPE	Diagnostic de Performance Energétique
Spain	CALENER	Calificación energética de edificios.

The planned energy certification scheme in **Spain** will cover both new and existing buildings and will be introduced in the beginning of 2006. Most of the details regarding the scheme are not known at the moment (April 2005), but the known or anticipated details are listed below.

It is expected that the scheme will be promoted by the national government (probably IDAE - Instituto para la Diversificación y Ahorro de la Energía) in co-operation with regional governments.

The type of information that will be communicated from the scheme will probably be only an energy label and the energy consumption.

More information is given in Appendix 1 - EPBD implementation status (April 2005).

The planned energy certification scheme in **France** will cover also both new and existing buildings.

The scheme should be promoted by the ministry of housing (DGHUC) and ADEME (Agence de l'environnement et de la maîtrise de l'énergie).

The information communicated to the end user should be: label + energy consumption + advises to reduce the energy consumption.

More information is given in Appendix 1 - EPBD implementation status (April 2005).

4 National IMPACT test procedures

In a second questionnaire survey, the plans for national tests of the implementation of new certification schemes were analysed. The questionnaire focussed on national tests regarding certification schemes to undertake in conjunction with the implementation of EPBD in the IMPACT member states. The questionnaire can be found in Appendix 3.

4.1 Reason for selecting the tests

– Fill in the reasons for selecting your specific test in the IMPACT project.

Country	Description
Belgium	The only existing tools are dealing with residential buildings. The test will therefore focus on residential buildings by using the EAP. Since not a lot of practical experience is available for the moment in Belgium, the tests focus on the multitude of aspects covered by the certification, many of which being also addressed in the EAP-procedure. The final aim is to formulate recommendations valid for the certification process based on the application of the EAP.
Denmark	It has proven from experiences from the existing schemes that energy certification of a flat in a block of flats cause special difficulties. Certification of flats in the case of renting out – as stated in EPBD – will dramatically increase the number of certification, compared to the current situation where Danish flats are labelled when they are sold.
France	There are 2 millions of dwellings sold or rent out every year in France, there will not be enough consulting engineers qualified on energy savings to deal with the number of certificates to deliver. About 1/3 of the dwellings are heated with electricity (more than 50 % in new buildings), a scale in primary energy is more pessimistic for electricity compared to gas while a scale in CO ₂ is more pessimistic for gas comparing to electricity.
Germany	The main goal of the field test is the evaluation of user acceptance and criteria for the certificate to become a valuable marketing instrument. To initiate energy saving measures and investments in the building stock is a key objective of the test. Therefore the main focus is laid on end-user and issuer inquiries to obtain information on market relevant aspects. Since the certification tools were mainly developed and used for new buildings, a second topic covers the correctness of the methods for existing buildings with spe-

	cial emphasis on simplifications for the building analysis.
Netherlands	The tools and instruments currently developed for existing dwellings for the EPBD introduction in 2006 will be tested in IMPACT. It is decided not to test draft or preliminary tools or instruments within IMPACT. The tools and instruments developed for the EPBD introduction in 2006 will be updated periodically. IMPACT recommendations will become input for this updating process.
Spain	The proposed tool (CALANER) in Spain is a dynamic simulation tool and it looks to be rather complex for certification. Note that final (simplified) version is not available yet. Therefore the selection of the test was focused on testing 2 existing tools (CALENER and one other, simpler tool in the same buildings in order to compare the whole process and results.

4.2 Purpose of the tests

– Fill in a description of the purpose for the WP2 test in your country.

Country	Description
Belgium	<p>The tests will be based on the available non-certification scheme for residential building (EAP) and the results will be used as input for the development of the final certification schemes.</p> <p>Given the current status of the implementation of the EPBD in Belgium, all elements of the certification process could be tested (promotion / inspection / calculation / reports / presentation).</p> <p>One of the concerns in Belgium is how to guarantee the maximum level of coherence between procedures developed for new and existing buildings.</p> <ol style="list-style-type: none"> 1. The procedure for new buildings is a calculation procedure as defined in the regulation. This procedure contains only calculation procedures. The data needed to realise these calculations have to be obtained via the data of the project (area measured on the plans, product data obtained via the suppliers, etc...). The procedure for new buildings does not contain any information on how to collect the requested data in neither existing building nor suggestions to improve the building. 2. The EAP contains a calculation procedure slightly different from the procedure for new building. All technologies covered by the procedure for new buildings are not covered. It also contains a procedure to collect the information on site as well as a specific part dedicated to advice delivered in order to improve the building. These two aspects are not covered by the procedure for new buildings. <p>Several actions are foreseen in the tests in Belgium in order to investigate the way to reduce the difference between these two pro-</p>

	<p>cedures:</p> <ol style="list-style-type: none"> 1. A theoretical comparison between both procedures will be realised. A checklist of the data necessary to apply the calculation for new buildings that are not collected within the procedure for existing building will be established. 2. The checklist will be used during the tests in order to evaluate if such data can be found in the existing buildings tested. 3. Both calculation procedures will be applied on a limited set of building and the results will be compared. <p>A sensitivity analysis on the impact of the input data on the results will be realised. This will allow to identify the simplification possibilities and will help to formulate recommendations regarding the on site measurement accuracy.</p>
Denmark	<p><i>Energy certification of flats</i></p> <p>From the beginning of 2006, Denmark will have different certifications for different building types:</p> <ul style="list-style-type: none"> - One family houses - Buildings with flats - Buildings with public service, trade and service <p>Concerning the flats, it will be a certification based on the whole block combined with labels on typical flats. These certificates will then be used for all flats. For blocks of flats with more than 1000 m² floor area there will be a regular certification, repeated at least every 10 years. For buildings less than 1000 m², the certification must be done by the owner when a flat is for sale or rented out (if a certificate does not exist with an age less than 10 years).</p> <p>In the existing scheme the certification can either be an individual certification or a supplementary certification if - for small buildings a certificate for the whole building exist less than 3 years old or – for larger buildings an energy management report for the whole building exist.</p> <p>The advantages of the new certification scheme compared to the existing one are:</p> <ul style="list-style-type: none"> – the consumption and savings will always be calculated for the whole building, – there will always be a dependency between the flat and the whole building and the cost for the certification in total should be lower (as some typical flats are chosen to represent all the flats in the building). <p>When certifying a building with flats, the owner is responsible for doing this. In buildings with owner-occupied flats it will be owner association and for flats under a multi ownership scheme it is the housing co-operative who must require the certification.</p>

	<p>The test in WP2.4 shall include:</p> <ul style="list-style-type: none"> - 2.4.1 Developing promotion strategies, - 2.4.2 Testing of the adapted certification scheme and promotion strategies, - 2.4.3 Making quality control of the certificates, - 2.4.4 Making interview/enquiry with building owners and tenants and consultants, - 2.4.5 Writing final recommendations for the certifications processes of different kind of flats. <p>Expected results:</p> <ul style="list-style-type: none"> - Report: National evaluation report (in English), - Report: Recommendations to improve the implementation of the EPBD concerning flats (report in Danish with an English summary), - Workshop: Recommendations to improve the implementation of the EPBD concerning flats, - Input to the training of certification consultants.
France	<p><i>National tests in France: 100 DPE (Diagnostic de Performance Energétique) to deliver and analyse.</i></p> <p>The purpose of the tests in France is to check :</p> <ul style="list-style-type: none"> - work with the Ministry of Housing on the form of the DPE, - create a direct link between the tool 3CL and the form of the DPE chosen, - contact the different housing associations ; potential experts ; and to inform them of the existence of IMPACT in order to ask them to participate to the project, - develop a training program and train issuers, - organise workshops with those experts, they will be given the tool + training program documents at the end, - create a platform on the web with the different questions and answers of the experts, - deliver the DPE to the final end-users, - check the most suitable experts, by analysing the DPE delivered and by double checking 10 % of them, - check if the form of the DPE suits the end-users, by interviewing them, - Analyse the results - Communicate the results of the tests to the Ministry of housing in order to improve the implementation, - Communicate the results of the tests to the building actors, - Develop a brochure about the driving force of the DPE.

Germany	<p><i>"Energiepass für Gebäude"</i></p> <p>The EU building directive is conform to the German Energy Savings Ordinance (EnEV) to a large extent. However, some aspects like the development of a uniform energy performance certificate including methods for data collection and calculation a method for existing buildings still have to be implemented.</p> <p>In order to overcome existing barriers dena has been assigned by the Ministry of Transport, Building and Housing to develop a uniform, simple and user-friendly energy performance certificate for buildings as a marketing instrument and a third column besides regulatory law and subsidy programmes towards a sustainable development in the construction sector. Energy efficiency ought to be established as an attribute of quality in the housing market and a decision support for consumers. The form was developed on the basis of a market research study carried out in 2003, which lead to a prototype being tested in a field test in 2004.</p> <p>Barriers should be cleared out in advance as far as possible by the integration of all relevant market-partners such as representatives of building owners, housing companies, construction industry, craftsmen, chimney-sweepers, architects and civil engineers, consumers and tenants associations who have been brought together in an advisory board organised and moderated by dena. The next steps are the improvement of the prototype energy certificate based on the experiences generated in the field test and the integration of the results into the preparation of a national legislation (amendment of Energy Savings Ordinance - EnEV). Special emphasis is focused on the link between theory and practice in the whole process.</p>
Netherlands	<p><i>Energy performance certification testing for existing single-family houses and apartments buildings in the Netherlands</i></p> <p>The purpose is to test and analyse the new certification system, the new certificate format and the certification criteria for the experts. The test results and recommendations have the goal to create effective instruments to stimulate RUE and RES as part of the Dutch national translation process of the EPBD.</p> <p>Based on the existing energy performance advice (EPA) for existing dwellings and the energy performance certification (EPC) for new dwellings, at the end of 2005 updated calculation tools, energy label certificates and a process quality certification system will be become available that meet the EPBD requirements and CEN standards. The standard certificate will only give a short list of standard measures for improving the energy performance of the building. An extended advice conform a process quality certification system will be introduced as a voluntary tool. These new instruments (currently</p>

	<p>under development) will be tested in practice. It should be noted that this certification scheme still has to go through a formal legislation process. Therefore the test set-up has a draft character and will be adapted to final legislation.</p> <p>The test will probably be embedded in an ongoing regional RUE and RES campaign carried out with a group of local authorities. Within this campaign the test will be conducted in co-operation with a housing association and real estate agencies (as intermediary to the homeowner). Tests will at least comprise 100 new certificates.</p> <p>The certification process in general, the communicational aspects of the new certificate format, the certification and the effect on the implementation of energy saving measures will be evaluated based on user surveys (enquiries).</p> <p>During the tests the quality of the involved experts will be monitored closely. At least 10 % of the certificates will be randomly checked to assess the effect of the certification criteria.</p> <p>The test consists of the following phases:</p> <ol style="list-style-type: none"> 1. Prepare tests in co-operation with local authorities, housing association and real estate agents, 2. Information/training session test experts, 3. Test execution, 4. Quality checks, 5. User enquiries, 6. Analysis, formulation of recommendations for improvements, 7. Implementation of improvements in certification set-up, standard certificate and expert certification. <p>In phase 1 various housing associations and real estate agents are addressed to participate in this pilot project. With the selected participants SenterNovem and Ecofys will work out the project approach and the planning. Together with the housing association apartment blocks are selected for this test. We aim at selecting apartment blocks with mixed ownership (partly housing association, partly private).</p> <p>In phase 2 an information session will be held for test experts introducing them to the new instruments and explaining the goal of the IMPACT project.</p>
Spain	<p><i>Selecting, testing and evaluation of 2 existing tools for certification of energy performance of existing buildings in Spain.</i></p> <p>The purpose of the Spanish test is to select, test and evaluate two existing (EU) tools for certification of energy performance of existing buildings. These two tools should be applicable and adapted to Spanish building characteristics, and should be also a real example to evaluate the results, quality and applicability. The 2 selected tools will be tested on 16 existing buildings.</p>

4.3 Description of the tests

- Describe the WP2 test including eventual phases, and the time schedule.

4.3.1 Promotion and selection of buildings

- How will the buildings in the test be selected?
- What are the criteria for selection?
- Will the test be promoted in order to find buildings for certification testing?

Country	Description
Belgium	<p>Only residential buildings will be selected, mainly single family houses, and maybe a few individual apartments will be tested. There will be houses from the three regions.</p> <ul style="list-style-type: none"> – Meetings with market actors will be organised. Actors as building promoters, housing companies or real estate agents will be involved. Some of the buildings tested will be selected via these market actors in order to increase their involvement within the project. – Feedback from the building owners will be asked in order to tests elements as the format of the report or their global impression about the applied procedure. <p>Promotion / information to the public of this testing procedure will happen at the same time as the execution of the national tests. The national newsletter and website will also be tools within the communication strategy.</p>
Denmark	<p>There will be apartment buildings with different ownership's and different numbers of flats. The scheme will be promoted in order to find the buildings.</p>
France	<p>In France an infrastructure of experts exists that assess the occurrence of moulds, termites and lead in dwelling. They inspect buildings regularly. The idea is to add the DPE as an extra assessment to these building inspections.</p> <p>If it were possible, it would be interesting if the dwellings DPE were around 55 houses / 45 apartments with the different types of energy mostly used in France.</p>
Germany	<p>In the first period of the field test regional partners all over Germany were contacted and informed about the project and application procedure. Many of those regional partners, such as local and regional authorities, housing companies or regional energy-agencies, then served as opinion makers and introduced further partners to the project. Afterwards each interested party had to apply as participant. Out of 60 applications dena selected 33 participants representing local and regional authorities, housing companies, local rep-</p>

	<p>representatives of homeowners but also co-operations of local actors (e.g. power-supply companies, craftsmen and planner-associations, regional consumer associations or energy agencies).</p> <p>The participants all signed target specifications where the requirements for participation were defined. Accordingly every participant had to issue a minimum number of 100 energy certificates for a variety of different types and ages of residential buildings within the field test group. The user profile included homeowners, tenants, landlords and housing societies. The selection should represent a cross-section of the German building stock and structure of ownership.</p>
Netherlands	<p>The test will probably be embedded in an ongoing regional RUE and RES campaign carried out with a group of local authorities. As part of this campaign the test will be communicated and promoted.</p> <p>Together with the housing association apartment blocks are selected for this test. With the housing association we aim at selecting apartment blocks with mixed ownership (partly housing association, partly private).</p> <p>The selection of single-family houses will depend on the response of private homeowners to the 'campaign offer for certification' and on the response from real estate agents. However it will be tried to get a good mix of representative dwelling types. The test size however is too limited to cover all different dwelling types in a statistically reliable way. The results will therefore have a more qualitative nature.</p>
Spain	<p>The buildings in the tests will be selected together with ADIGSA and Generalitat de Catalunya. These buildings chosen will be divided into big and small buildings and old and new buildings. In total 16 buildings will be selected for the tests (12 apartment buildings and 4 office buildings).</p> <p>Criteria will concern technical (climate and building related issues) and non-technical issues (degree of complexity, situation, etc.). The test will try to show different kind of buildings in different kind of climates, although the test size is too small to show all different dwelling types in a statically way.</p>

4.3.2 Inspection

- How will the building inspection be organised?
- What kind of actors will perform the inspections (certified consultants; specially trained experts, other)?

Country	Description
Belgium	<p>The EAP will be used for the tests. According to the complexity of the building analysed, the application of the complete procedure could require 6 hours. The inspection will in first instance be realised by the 3E, Belgian partner in the project.</p> <p>Since the EAP is launched at large scale in Belgium by the end of 2005, it will be tried to involve external energy auditors within the project.</p>
Denmark	<p>The whole building will be inspected and calculated by an accredited energy consultant. The inspection of especially the boiler-room and the chosen flats will be described in detail.</p>
France	<p>The experts will be trained and they will add the DPE energy certification to their usual missions when they inspect a dwelling.</p> <p>The experts who will perform the inspections for these tests will be consulting engineers as well as the current mould, termite, and lead experts. The experts will be trained before the beginning the tests.</p>
Germany	<p>In the field test two methods of data acquisition were introduced. A more specific method – “individual” method – and a simpler approach – “standardised” method – were used. Which one of the two methods had to be applied was decided by the inspector according to available data and complexity of the building. Also master craftsmen and chimneysweepers were supposed to only use the standardised method whereas architects and engineers could choose which method to apply. The inspections were organised locally by the participants. The participants kept contact to their inspectors. Dena provided subordinate support for participants and issuers.</p> <p>The inspections of the field test were performed by energy-consultants but also architects and engineers with the permission to make building applications and specially trained master craftsmen and chimneysweepers. Dena did not scrutinise the skills of each issuer.</p>
Netherlands	<p>Certified experts will be contracted to perform the inspections. The expert will make an appointment with the dwelling owner.</p> <p>Certified consultants will do the inspections. The possible role of real estate agents in the inspection process will be studied as well.</p>

Spain	<p>The inspections will be organised by ECOFYS in co-operation with ADIGSA and Generalitat de Medi Ambient. The technicians will make an appointment with the dwelling owner.</p> <p>For data acquisition the buildings will be visited (if needed more than ones) in order to be able to make the certification and the test. These inspections will be probably done together with the technicians from ECOFYS and ADIGSA.</p> <p>Other information source for data acquisition will be the drawing of the buildings and technical description of the buildings (if available).</p>
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4.3.3 Calculations

- What kind of calculation tool will be used (name, new/existing/updated version)?
- Will the calculations be done on the spot (during the inspection or afterwards)?
- Will the test also be used for verification of the tool?

Country	Description
Belgium	<p><i>Two tools will be used during the tests:</i></p> <ol style="list-style-type: none"> 1. Software tool implementing the EAP. 2. Software tool implementing the Energy Performance Regulation for New buildings. <p><i>Calculations on the spot or afterwards:</i></p> <p>For existing buildings, it is recommended to realise the calculation on the spot in order to be able to present the results to the owner without supporting the costs related to two travels on the site (one to analyse the building and one to present the results of the audit). Each expert will probably have his own way to work.</p> <p>No specific actions are foreseen in order to verify the tool. However, if errors are demonstrated, they will be taken into account.</p>
Denmark	<p>A new developed method for calculation of the energy performance to fulfil the building regulation will be used. The calculation will be done after the inspection and not used as a verification of the method.</p>
France	<p>The tool will be 3CL (Calcul des Consommations Conventionnelles dans les logements).</p> <p>The calculations will be done afterwards, the expert will have a questionnaire to fill in during the inspection.</p> <p>The test could be used for the tool verification if the energy bills are available, but it is not the main purpose. The results of the tool have already been compared to hundreds of dwellings and it was rather satisfactory.</p>

Germany	<p>For the field test the issuers could use eight different software tools (free usage for field test). For this purpose dena started a co-operation with eight software companies who agreed to provide adapted software for the issuers. The calculation method is based on standardised algorithms (EN / DIN standards) that are already established and broadly tested since the implementation of EnEV. In addition to the calculation method the issuers could use the standardised data provided by dena containing common construction materials (u-values) and technical systems (heating systems) found in the building stock.</p> <p>The software tools are comfortable enough to do the calculation on the spot.</p> <p>The goal is to use the results of the field test especially concerning handling, comprehensibility to improve the tools.</p>
Netherlands	<p>The updated version of the EPA software tool will be used. This tool is currently being revised to embed the energy label in the calculation and to produce a standard certificate.</p> <p>The inspections are to gather input data for the calculation, which is done elsewhere.</p> <p>The tests will not be used to validate the calculation. However bugs and inconveniences in tools and procedures will be reported. Furthermore the accuracy of the calculation as a function of input data will be tested, as the draft quality certificate requires a reproducibility of 5 %.</p>
Spain	<p>The tools used will be:</p> <ul style="list-style-type: none"> – The first tool to be used is CALENER from Universidad de Ingenieros Industriales de Sevilla (Engineering University from Sevilla). There's a draft version on the net, it exists but it has not been used yet as a Certification tool. This tool is a dynamic simulation tool; it seems to be rather complicated and demands a lot of time for the implementation. At the moment CALENER is updated for the use of certification. This version is not yet available and it is not clear how it will look like. The version is expected to be available in the second half of 2005. – The second tool used will be EPA-ED, a European tool from a European project. This tool seems to be easy and fast to use. This tool does also meet the selection criteria, which were set for the Spanish test (cooling, different climate files, solar energy). <p>Data entry and calculations will be done afterwards, at the office.</p> <p>The test will not be used for verification of the tool, although the inconveniences and problems will be reported. The outcome of the results from both tools will be evaluated.</p>

4.3.4 Report

- *What kind of report/certificate will be tested?*
- *Which topics are covered in the report/certificate?*
- *Will the report/certificate be automatically generated by software or will it be custom adapted?*
- *Who will provide the report/certificate (expert or certification institute)?*

Country	Description
Belgium	<p>The documents delivered by the EAP – attest + advice and technical documents will be tested. These have been described under the point related to communication to end-users.</p> <p>The draft version of the certificates for new buildings elaborated by the regions could also be tested if available. In the Flemish region, it includes the main results of the calculation realised in the scope of the EPR.</p> <p>As well for new as for existing buildings, the documents are automatically generated by the software tools.</p> <ul style="list-style-type: none"> – For existing buildings, the energy expert analysing the building will issue the report. For new building, the energy reporter would issue the certificate.
Denmark	<p>A new layout and design for the certification scheme will be tested. Energy, electricity and water consumption and the possible energy savings will be included.</p> <p>The first test will serve as input for the work to be able to have an energy-certification scheme ready January 1. 2006. These tests will include a limited number of apartments and cover the layout of the new labels and the survey procedure. The second phase of the tests will include a larger number of apartments and be conducted on the full scheme by certified consultants on real building cases in the beginning of 2006.</p> <p>On a longer term a report will be automatically generated and an accredited energy consultant will provide the certificate.</p>
France	<p>The DGUHC is working on the future DPE form.</p> <p>As soon as the form is ready, it will be implemented in the tool 3CL in order for the expert to deliver a certificate automatically generated by the software.</p> <p>The topics covered in the certificate might be: a scale for heating and hot water (kWh primary energy / m²) (+CO₂) + detailed results + bills indicator + advises from the expert + general advises on energy savings.</p>
Germany	<p>During the field test two slightly different prototypes of energy certificates were tested. The difference concerns the illustration of the buildings' energy consumption. The illustration is either presented as a stepped hierarchy aligned with the certification of home appli-</p>

	<p>ances or with a colour gradient strip. The complete certificate consists of 10 pages and contains a summary about the acquired data and the most important results. The evaluation is differentiated into the sector energy-loss over building surface due to transmission, energy-loss over heating system and CO₂ -emission. Another important aspect of the certificate is the suggestions made for modernisation and technical upgrades. There is also a sheet included where the actual energy consumption of the building/apartment may be documented. There are also extensive comments and explanations included to provide solid information for the user.</p> <p>The software automatically generates the certificate after the data input is completed.</p> <p>The certificate is provided by the issuer/expert.</p>
Netherlands	<p>The standard certificate. It is considered to cover the extended energy advice (report) as well in the test.</p> <p>The standard certificate is still under development; it will be concise and contain only the minimum element required for CEN standard.</p> <p>The certificate will be produced automatically. The voluntary advice can be custom adapted.</p> <p>The experts will deliver the certificate.</p>
Spain	<p>It is not known at the moment how the outcome (report/certificate) of CALENER will be.</p> <p>The EPA-ED tool does not generate a standard report or a certificate. We will develop a summary report ourselves based upon the experiences and examples known from the EPA-ED project.</p>

4.3.5 Presentation to end-user

- In what stage and how will the report/certificate be presented to the customer (sent by mail; personal presentation/advice, other)?

Country	Description
Belgium	<p>For existing building, it is strongly recommended to personally present the advice instead of sending it afterwards. In practice, the procedure will only be applied on a large scale by the end of 2005.</p> <p>The details of the way certificates for new buildings will be communicated are not known yet.</p>
Denmark	<p>In the future it will probably be sent by mail, but in this project the consultant will present it for the homeowner etc and in that way get a response on the new scheme and layout.</p>
France	<p>The DPE will be sent by e-mail, fax or mail to the customer in the week following the visit by the expert.</p>
Germany	<p>The customer receives the certificate in a print version by the issuer; personal presentation/advice is therefore included.</p>

Netherlands	<p>It is considered to test both ways. Certificate by mail and the extended voluntary advice with a personal presentation.</p> <p>In the end user enquiries attention will be given to this aspect. Furthermore the test will be embedded in an ongoing RUE/RES camping in which energy saving measures (insulation, double glass, high efficiency boilers etc.) and renewable energy systems (solar water heaters, PV panels) are offered for special prices and with local subsidies. These enables also to check to some extend the impact of the certification and the energy advice.</p>
Spain	<p>The report will be presented to the customer once it has been completed. The way to show it to the customer will be probably sent by mail, by e-mail and when necessary, with a personal presentation and visit.</p>

4.3.6 Quality control

- *In which way are quality control aspects embedded in the tests (in all process steps)?*
- *Will the experts be trained specially; will the test be used to test or develop training materials/manuals?*
- *How is the quality check of the certificates issued incorporated (minimum 10/country)?*
- *Will (part of) the inspections and calculation be executed double to check quality?*
- *Will new or existing expert certification protocols be tested? And how?*

Country	Description
Belgium	<p>The use of a common software tool for all energy experts makes that the main quality problems should be situated at the level of the data acquisition. The documents are automatically generated by the software:</p> <p>With similar input data, no major differences should be observed between different experts at the level of the attest. However, differences could be observed in the part of the document dealing with recommendations since the advice is tailor-made by the experts. Some could recommend specific refurbishment and some not, or suggested renovation techniques suggested could be different. This point is however not directly related to the energy certificate but more related to energy advice.</p> <p>The experts are all following at least the part of the formation dealing with the practical test. This should ensure a certain level of coherence between the experts at the level of the data acquisition. Analysing the same building several times by different auditors is one of the main actions that will be realised in Belgium. The aim is afterwards to compare the results. Meetings between the experts</p>

	<p>having realised the audits could be organised in order to identify the differences and to suggest way to uniform the procedure.</p> <p>The results of the tests realised within the project could afterwards be used to improve the training material. The idea is to analyse several times the same building by different experts.</p> <p>Finally, with the agreement of the regions, data coming from the central databases, are set up at the regional level, collecting all the delivered advises could be used to realise some quality checks.</p>
Denmark	<p>Two consultants will check the test (inspection and calculation) and furthermore SBi and the Danish Energy Authority will follow up and participate in all the stages of the test.</p> <p>A draft handbook for helping the consultants in the field survey will be made.</p> <p>Two professional consultants will be checking the test schemes. SBi and the Danish Energy Authority will check the calculations. There will be a few double inspections.</p> <p>The new scheme and handbook with inspection advises will be tested.</p>
France	<p>Quality control embedded in the tests: inspections and calculation will be executed double to check the quality.</p> <p>TRIBU Energy will develop a training manual + slides for the training periods. The training materials will depend on the level of knowledge of the experts. 4-6 training sessions will be proposed to the experts around France (Paris, Lyon,...)</p> <p>10 % of the inspections and calculation will be executed double to check the quality. TRIBU Energy will go with some experts for the inspection in order to verify the input data + advises given by the experts.</p> <p>There is no existing expert certification protocols in France.</p>
Germany	<p>The results of the recently executed field test are continuously evaluated by dena staff members as the results come in from the field test participants. The final evaluation is assigned to an independent external scientific institute. The members of the expert committee are being informed regularly. The results of the field test are summarised into a detailed report that will be presented to the committee for discussion.</p> <p>The experts taking part in the field test are already authorised to issue the certificate for new buildings introduced in 2002. These are architects and building engineers, approved energy consultants or experts with a (approved) corresponding qualification. During the field test there will be an evaluation of the qualification of the experts and the quality of the issued certificates. In that way insufficient expertise of the experts shall be identified.</p>

	<p>There is no general quality check of the issued certificates. Some of the regional partners implement quality checks for the certificates issued in their region. Additionally the calculation method is checked by a sensitivity analysis.</p> <p>The results of the two different calculation methods permitted for certification are tested by a sensitivity analysis mainly focussed on the simplifications for the data acquisition. In the field test two methods of data acquisition are introduced. A more elaborate method – “individual” method – and a simpler approach – “standardised” method – are being used. Which one is applied is decided when inspections start and depends on the data available for the evaluated building.</p> <p>The sensitivity analysis is supposed to evaluate the effects of the different simplifications in the standardised method. The building data for the sensitivity analysis is derived from the IKARUS-data base (Reiß, J. et al, 1994) and included seven types of residential buildings.</p> <p>No new or existing certification protocols will be tested.</p>
Netherlands	<p>The quality of the promotion, report and presentation phases will be assessed by user surveys (homeowners, lessees and real estate agents, housing association).</p> <p>The quality of the inspection, calculation and reporting phase will be randomly checked for at least 10 % of the certificates issued. Other experts will perform in parallel the inspections, calculations and the reporting for 10 % of the dwellings.</p> <p>Short information session will be organised for test experts introducing them to the new instruments and explaining the goal of the IMPACT project.</p> <p>In the Netherlands the new certification protocols and tools (currently under development) will be tested.</p>
Spain	<p>The quality of the promotion, the report and presentation phases will be included the tests, controlled by the homeowners, ADIGSA and Generalitat de Catalunya, and ECOFYS.</p> <p>The quality of the inspection will not be tested specifically, because it will be carried out by ECOFYS.</p> <p>The experts will not be trained specially; anyway they will have to learn how the tools work and how to use them.</p> <p>If needed, some of inspections will be double-checked by ECOFYS experts to check the quality and way of doing the tests.</p>

4.3.7 End user feed back

- How will end-users be involved in the test?
- How is end-user feedback organised (enquiry afterwards/personal interviews)?
- What aspects will be subject to end-user feedback (promotion/communication strategy; understandability and acceptance of the certificate, costs, impact on taking RUE/RE measures, other)?
- How will national stakeholders, experts/expert organisations and end-user organisations be involved in the test set-up and during execution?
- How is the national test embedded in the EPBD implementation process?
- Inputs from the national EPBD implementation process?
- Feedback to national EPBD implementation process?
- Please add quantitative information to the test description like: number of certificates that will issued, no. of quality checks, no. of experts involved; no of enquiries that will be send, specification of certification costs etc.;

Country	Description
Belgium	<p>Social housing companies, private house-owners and tenants, and possibly real estate agents will be asked to participate by providing houses for testing and will therefore be involved in the tests.</p> <p>Documents will be presented. Their general opinion about the procedure shall also be asked.</p> <p>--Enquiry afterwards and some interviews of market actors will be realised.</p> <p>The strategy of communication within the project is to inform the market actors about the EPBD and the certification in general via national workshops before entering into the details of the tests realised in Belgium during specific meetings.</p> <p>The tests realised during the project occur in parallel with the implement of the EPBD by the regions. The regions are supporting the project and are kept informed of the actions undertaken in this project. The content of the tests is discussed with the regions in order to maximise the interaction. The close co-operation with the regions should at the end result in effective implementation of the recommendations formulated. Both developments occur at the same time. The regions currently implement the EPBD and the project is ongoing.</p> <p>The regions have given their support to this project and are kept informed of the actions undertaken in this project. The content of the tests is discussed with the regions in order to maximise the interaction and to test only useful elements in the Belgian context. The final way on how to implement the results is not known for the moment. The close co-operation with the regions should result in effective implementation of the recommendations formulated.</p> <p>There are a lot of inputs from the national EPBD implementation</p>

	process. Plans of the regions are communicated - close co-operation with the regions. See above.
Denmark	<p>End-users will be interviewed and fill-in a questionnaire after the test.</p> <p>In general: understand-ability and acceptance of the certification. Do they trust it? Does it inspire to do some energy savings? Did they know about the certification scheme beforehand? Will be evaluated by the end-user feedback.</p> <p>The end-users are involved in the whole process as we have meetings all the way except with the end-users (the owners) who will be part of the process during the tests.</p> <p>The Danish Energy Authority is preparing a revision of the Danish schemes to adopt the requirements of the Building Directive and adjust the design of the schemes to benefit from findings and experiences obtained through the past years. As the Directive is a framework directive with minimum requirements, the implications for the existing Danish schemes are at this stage uncertain. The new law has been presented in parliament and the political statements on the future set-up of energy certification schemes were positive.</p> <p>The most important areas where revision is considered or required include:</p> <ul style="list-style-type: none"> - Limits on 1000 m² net area in EU Directive and 1500 m² total area in Danish Scheme, - Energy Management in Large Buildings - different requirements concerning certification frequency; 10 years in EU Directive and yearly or every three years in present Danish Scheme - The present energy certification in Denmark includes heating, electricity and water consumption. <p>According to the EU Directive, only energy consumption should be covered</p> <ul style="list-style-type: none"> - Less types of buildings covered by compulsory regular inspection in EU directive compared to existing Danish requirements, - New requirements EU Directive - Energy certification required of flats or buildings being renting out, - New requirements EU Directive – Energy certification of all new buildings in EPBD and not only by sale as in the existing Danish Scheme, - New requirements EU Directive - Regular inspection of gas boilers and air-conditioning, - New requirements EU Directive - Inspection of boilers and heating installation after 15 years. <p>The Danish Energy Authority are the responsible for the implementation plans in Denmark and also directly involved in the working group in which the planning of the test take place.</p>

	<p>The test results will have a direct influence on the new Danish certification scheme for flats.</p> <p>At first 5-10 test will be carried out to see how the new scheme works. The test will include performing the certification schemes (inspection and calculation), making interview/enquiry with consultants and with building owners and tenants. Furthermore to develop promotion strategies. The second phase of the tests will include a larger number of apartments (at least 100) and be conducted on the full scheme by certified consultants on real building cases in the beginning of 2006.</p>
France	<p>The end-users will be interviewed 1 month after they received the DPE.</p> <p>Tribu Energy will develop an enquiry questionnaire and will call the end-user.</p> <p>The aspects that will be subjected to the end-user feed-back :</p> <ul style="list-style-type: none"> - Their opinion on the form of the DPE - Was all the information given understandable? - Did or will they take energy savings measures thanks to the DPE? - How much would they be ready to pay to get this document? <p>Tribu Energy will regularly write a newsletter to national Stakeholders + experts organisations + end user organisations to inform them.</p> <p>The results of the national tests will be given to the DGUHC, who is ruling the EPBD implementation process.</p> <p>Number of DPE : 100</p> <p>Quality check : 10</p> <p>Number of experts involved : 20-30</p> <p>Number of enquiries : 100</p>
Germany	<p>The end-users were the target figures in the field test to whom the certificates were handed and who played a mayor role in the evaluation of comprehensibility and usability of the certificate.</p> <p>The inquiry of owners (end-users) was accomplished on three levels. First there were detailed personal interviews held with a number of owners. All owners who took part in the field test were then asked to answer a mail questionnaire (complete enquiry). More detailed questions were then again analysed by further personal interviews. The experts were interviewed in a similar way.</p> <p>One focal point of the evaluation was the end-user acceptance and the effect on the building market. In this context the following questions were being investigated:</p> <ul style="list-style-type: none"> - Are the tested labels self-explanatory, are there difficulties in comprehension? - Are they appropriate for buildings?

	<ul style="list-style-type: none"> - How is the judgement of the classification? - Are the reference values comprehensible and significant? - Is the information provided in the certificate comprehensive and does it accord to the expectations of the end-user? - Should there be data included only for the user of the building (e.g. electricity demand)? - What does the user expect as a holistic efficiency criterion? - Is primary and/or final energy data relevant for the end-user? - Are the suggestions for refurbishment comprehensible and realisable? - Under what conditions do the certificates lead to capital investment for refurbishment or other actions and what players are involved in the process (e.g. architects, engineers, experts, and institutions)? - What conflicts are due to the certificate (e.g. among owner, tenant and caretaker etc. or when apartment or building is sold)? - What other factors influence the market acceptance (e.g. social structural criteria such as age, financial circumstances etc.)? <p>An advisory board with an expert committee was established to achieve an intense coordination of the project among all relevant market partners (industry, craft, architects and engineers, housing industry, local authorities, federal states, environmental, consumer and tenant organisations).</p> <p>Dena has developed the prototype of a voluntary standardised building certificate, which ought to be tested and optimised during the field test. The results of the field test are incorporated into the further development of the building certificate and serves as a basis for the launch of the certificate later on. The field test serves the Federal Government as a source of experience, that is then used for the implementation of the EPBD. On the other hand the field test does not antedate any upcoming decisions concerning the national implementation of the EPBD.</p> <p>There will be no input from the national implementation process, since field-tests took place in advance of the implementation process. The preparatory work on DIN 4701-12 was incorporated in the field test.</p> <p>During the field test there were 4100 issued certificates by the experts of 33 regional partners. The number of experts per partner differed. There was no regulation made concerning the price of the certification. By this means results about a reliable market price should be obtained.</p>
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Netherlands	<p>Within the ongoing campaign private homeowners and housing associations will be asked to participate in the project.</p> <p>The means of receiving end-user feedback will be through a questionnaire. Housing association and real estate agents will be interviewed to get their feedback on the certification test.</p> <p>The following aspects: Promotion/communication strategy; understand-ability and acceptance of the certificate, costs, impact on taking RUE/RE measures will be evaluated by the end-user feedback.</p> <p>Expert organisations and end user organisations will be informed on the test and given the opportunity to give feedback. Results and recommendation will be distributed to the different stakeholders' at national implementation level as well as on a market actor level.</p> <p>Certificates issued: 100 (goal) Quality checks: 10 % No. experts: unknown yet No. enquiries sent: 100 (goal) Certification cost: Unknown yet; it is anticipated that the certificates will be supplied for free or at reduced cost; so the IMPACT test will not specifically test this issue.</p> <p>Of course in end-user questionnaire acceptable costs will be a topic.</p>
Spain	<p>The end-users will be informed of the results of the tests of their dwelling or building. They will follow the whole process from the beginning.</p> <p>Enquiries after the test will be performed, if needed, in some cases, personal interviews will be held.</p> <p>The end-user feedback will be focused on the knowledge extracted from the test. Communication strategy and acceptance of the certificate will be also the two other main subjects.</p> <p>The test set-up and execution will be organised by ECOFYS, ADIGSA and Generalitat de Catalunya (the main responsible for the EPBD at the executive level). Expert organisations and end user organisations will be informed on the test and given the opportunity to give feedback.</p> <p>The comments and results from the test will be given to the different stakeholders' implementation level as well as to the organisations of the market actor level.</p>

	<p>In Spain it is not clear yet who will be in charge of the implementation process, although it will be probably transferred to the Comunitats Autonomes (local governments) as in Catalonia it will be done by the Generalitat de Catalunya.</p> <p>The inputs from the national EPBD implementation process will be extracted from the two tools chosen: CALENER and EPA-ED. There's not much knowledge in Spain, Catalonia about the certification tools to be used.</p> <p>IMPACT will be used for drawing up recommendations to update the tools chosen and the process of certification.</p> <p>Number of certificates: 16 buildings (4 office buildings and 12 apartment buildings (in total more than 100 dwellings))</p> <p>Number of quality checks: unknown yet</p> <p>Number of experts involved: 3</p> <p>Number of enquiries will be sent: 16</p> <p>Specification of certification costs: not known yet</p>
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4.3.8 Building types included in the tests

– Mark which building types are included in your national WP2.

Country	Description
Belgium	Only residential buildings will be considered - mainly single family houses and possibly some apartment buildings.
Denmark	Residential multifamily houses.
France	Residential single and multifamily houses.
Germany	Residential single and multifamily houses.
Netherlands	Residential single and multifamily houses.
Spain	Multifamily buildings (12), Rural agents buildings and office buildings (4).

4.4 Connection to existing schemes

– Describe the connection between the barriers and success factors reported in the first questionnaire WP1 – Status (Building certification scheme questionnaire - Status, WP1) and the tests to be carried out in WP2.

Country	Description
Belgium	Not a lot of experience is available in Belgium. The tests will be done on the basis of the EAP-method. All the elements of the certification process within the EAP-method can be tested.

Denmark	<p>The new scheme will be revised according to the experience with the current schemes. A barrier is e.g. that there is a lack of public campaigns and advertisement, so the communication aspect will be taken better care of in the new certification scheme. The communication between the owner, the administrator and the boiler-man or janitor also has to be improved. Furthermore it will not be the selling part of a flat that has to pay for the certificate. In that way there will be a link between the user and the consultant.</p> <p>One of the success factors was that a huge potential e.g. for energy savings was found. The follow-up on this is important and if only the consultant has to visit a building e.g. every 5 year it is necessary for the owner to have an yearly follow up of the measured data e.g. on the Internet.</p>
France	No existing scheme in France.
Germany	<p>One of the main barriers hampering the national introduction of the building certificate is the un-clarity about the calculation method and simplifications. This concerns mainly useful and mathematically correct simplifications for the data acquisition and the definition of default values. The requirements and suggestions of different market actors, such as the housing industry, caused some uncertainty about the correct procedures and methods. The field test serves as a basis for constructive discussion in the upcoming implementation process. The nation-wide field test and the launch campaign in 2005 help to bring the building certificate into focus. The attention drawn to the implementation process and the integration of all market actors is an important success factor for the building certificate in Germany.</p>
Netherlands	<p>The relation to the existing schemes are directly linked to the experienced barriers in the existing schemes:</p> <p><i>Final report not appealing to end-users:</i> The new certificate and the voluntary extended report will be tested.</p> <p><i>Quality of the EPA expert and of the advice:</i> The new expert quality certification scheme will be tested.</p> <p><i>Temporary shortage of EPA experts due to hype demands as a result of linking the EPA to a (stop-and-go) subsidy leading to low quality:</i> Hypes due to stop-and-go subsidy less an issue with the obliged introduction of energy performance certification. However large numbers of certificates will need to be issued with the EPBD introduction. Sales of new dwellings amount to approx. 150000 yearly and some 250000 rental dwelling change from lessee yearly. From 2000 to 2004 some 600000 EPA's have been conducted, or a capacity of 125000 yearly.</p> <p>Some 100 of EPA expert companies are active. With a roughly estimated yearly demand of 400.000 certificates and the current in-</p>

	<p>frastructure, each expert company should be able on average to handle 4000 certificates yearly or 11 per day. With a time per certificate of 4 hours each of these companies need on average 5 experts. These rough calculations do not indicate an alarming capacity situation for 2006 in which certification will be introduced gradually and expert capacity will probably be able to grow with the market.</p> <p><i>The personal advice to the homeowner and its potential to boost the impact of the certification on taking measures has been limited:</i> The obliged certification will be executed 'lean and mean' and contain only the minimum element required for the CEN standards. The personal 'tough' will be limited.</p> <p>The additional voluntary energy advice however enables more personal attention for homeowners. The way the market for this voluntary advice will develop (price driven or quality driven market) will determine the impact of this advice. Partly this development will depend on the (boundary) conditions the government and local/regional authorities create for this advice.</p>
Spain	No existing scheme is available in Spain.

4.5 Expected results

- Describe the expected test results from WP2 on national level.
- Describe the expected test results from WP2 from an international point-of-view, e.g. what are the benefits for Europe.

Country	Description
Belgium	<p>At the <i>national level</i>, it is expected that experience related to energy certification of buildings will be developed. Therefore the available experience in the partner countries of the project will be used.</p> <p>The tests as described in this document will be realised. Based on the tests, recommendations to the regions in charge of the implementation of the EPBD will be formulated. The tests will among others serve to look for simplification into the existing procedure, to evaluate the elements related to the quality of the certification process and to tests the documents delivered.</p> <p>In parallel, awareness of the different market actors in relation with the EPBD and the requirements relative to the energy certification of buildings will be developed.</p> <p>At the level of the project, it is expected that the Belgian experience developed within this project will contribute to elaborate the best practice model valid at the European level. Some specific elements of the existing procedures could also be seen as examples for other countries.</p>

	<p>The Belgian building stock is very differentiated and oriented towards the individual, mostly private, house-owner. Promoter activity and grouped family housing remains quite small-scale. The expected barriers/constraints and related results/methods therefore can be quite different, often more detailed, as in the more experienced participating countries such as Denmark, the Netherlands and Germany. This experience will be relevant to other European member states with comparable building stock.</p>
Denmark	<p><i>National:</i> A draft, new certification scheme for flats and a new chapter for a handbook for use for the consultants.</p> <p><i>International:</i> The draft for a new Danish certification scheme for flats and a new chapter for a handbook for use for the consultants could be used as a basis for rest of the countries in Europe for their certification schemes.</p>
France	<p><i>National:</i></p> <ul style="list-style-type: none"> - Verify that the experts selected are ready, after a training period, to deliver the DPE in France. - Verify that the form of the DPE suits the end-user and incites him to take energy savings actions. <p><i>International:</i> To give another example in an EU country before the EPBD implementation.</p>
Germany	<p><i>National:</i> All issued energy performance certificates of the field test are collected, documented and evaluated with the aid of standardised procedures. Standardised questionnaires were used to raise evaluation data from the end-consumers, the issuers and the participants. All results will flow into the database and will be analysed to derive recommendations to improve the certification scheme.</p> <p>Furthermore preparation of construction-market to introduction of the EPBD is an important goal. Therefore dena develops:</p> <ul style="list-style-type: none"> - Guidelines and technical support tools for issuers of energy certificates. - Workshops for issuers with little experience with energy certification of buildings. - Strategies for introducing the energy certificates onto different stakeholder markets (like the apartment building market). <p>All results flow into the national legislation with the goal to effectively implement the EPBD in Germany and to prepare the construction market for the EPBD introduction by developing guidelines, tools and market strategies.</p> <p><i>International:</i> Broad market experience in the residential building sector.</p>

Netherlands	<p><i>National:</i> Insight in the performance and potential of the (currently developed) Dutch certification schemes. Recommendations for improvement of the certification instruments.</p> <p><i>International:</i> The experiences, results and approaches used in The Netherlands (and the other IMPACT countries) will be used to draft guidelines on energy performance certification that will be used for dissemination in other countries.</p>
Spain	<p><i>National:</i> The experiences, results and information from the tests will be used to draw up recommendations for the implementation of the certification scheme in Spain.. At national and regional level the results from the IMPACT project will be very useful for the stakeholders to implement the EPBD.</p> <p><i>International:</i> The benefits for Europe from the WP2 in Spain will be specially interesting for countries similar to it, like Portugal, Italy, and Greece.</p>

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Appendix 1, EPBD implementation status (April 2005)

Methods and tools

Which methods and tools will be used?	
Belgium	<p>For the moment, in Belgium, a lot of efforts have been done for residential buildings. The extension of the existing EAP procedure to existing apartment building is evaluated in 2005.</p> <p>No procedure, accepted at the national level, is available for other type of existing buildings. Procedures coming from European projects as Europrosper are available. Others like in EP LABEL are under development.</p> <p>For new buildings, at least in the Flemish Region, the introduction of the Energy Performance Regulation will offer a solution for the energy certification of new buildings. The compliance with the energy performance regulation has indeed to be shown at the end of the works and a precise description of all the work done has to be realised. This declaration will contain all the information needed to establish the energy certificate. The energy certificate will automatically be generated by the software tool with the introduction of the file. The new regulation covers residential building as well as offices and schools. For the moment no solution is in view for other type of buildings (hotel, hospitals, swimming pools, sport centre, etc...)</p> <p>In the two other regions, the development of the new regulations is ongoing (July 2005).</p>
Denmark	<p>A new calculation method for building regulation will be used as the engine for all certification purposes also.</p>
France	<p>For residential buildings the method should be 3CL (Calcul des Consommations Conventionnelles dans les Logements), a working group is dealing with the subject since 1998 at the Minister of Housing. A tool is available and the results have been tested on a large scale of dwellings.</p> <p>For non-residential buildings, the CSTB and Tribu énergie have a mission to develop a method before the end of 2005.</p>
Germany	<p>For new buildings the scheme is based on a proved and tested calculation method including heating and hot water, which gives a good approach for residential buildings. To meet all the requirements of the EPBD for non-residential buildings a new calculation</p>

	<p>method has been developed and published as a national standard (DIN 18599). Currently a certification scheme is being developed that will cover the requirements of the EPBD. The results of the field test carried out in 2004 serve as a basis for the further development of labelling.</p>
Netherlands	<p>The current EPA schemes will be transformed to an energy performance certification scheme for existing buildings conform to the EPBD. For new dwellings the EPBD certification will be based on the current EPC scheme.</p> <p>Currently a new national energy certificate with energy label is developed conform the CEN standards for new as well as for existing dwellings. Therefore the energy indexes generated in both procedures (EPA and EPC) need to be adapted in one, logical energy label scale. This new energy certificate needs to be integrated in the existing software tools. According to the planning the tools will become available at the start of 2006.</p>
Spain	<p>At the moment Spain is preparing for the national implementation of the European EPBD. The preparation can be differentiate in 2 lines: 1) preparation of the CTE (Código Técnico de la edificación = new building code) and 2) preparation of a calculation method and certification method (CALENER). The implementation of the EPBD in Spain will have a major impact on the current building process for 2 reasons: 1) The current building code is already more than 25 years old and 2) energetic qualification of buildings in not known yet.</p> <p>The CTE includes 5 basic elements: HE1: Limitation of energy demand for buildings, HE2: Efficiencies climate installation (heating and cooling), HE3: Energy efficient lighting, HE4: Minimum contribution solar thermal energy and HE5: Minimum contribution solar PV. With the implementation of the CTE the overall goal of the national government is to save 25 % primary energy saving in 2012 in de building sector compared to the business an usual scenario.</p> <p>The CALENER software tool is proposed to be the tool for the standardised calculation method for energy performance of building and for energy certificates.</p>

Time schedule

Time schedule for the implementation?	
Belgium	<p>The actual plans of the Flemish region related to the energy certification of buildings are:</p> <ul style="list-style-type: none"> – For new building, energy certificate based on the energy performance regulation will be available in 2006. – For public building, the certification based on calculated energy

	<p>consumption from 2007.</p> <ul style="list-style-type: none"> – In case of sales or rent of existing residential building, the certification will be introduced in 2008. – In case of sales or rent of all kind of buildings, the certification will be introduced in 2009. <p>The time schedule for implementation of the energy certification is under discussion in the two other regions. Similar strategies could be adopted in the rest of Belgium.</p>
Denmark	January 2006.
France	<p>For sold houses: 07/2006</p> <p>For rented houses: 07/2007.</p> <p>It is stated in a law n° 2004-1343 (9/12/2004)</p>
Germany	Implementation until January 2006.
Netherlands	<p>EPA-W: adaptation of certification schemes, software and implementation of certification 2005, introduction in 2006.</p> <p>EPC and EPA-U: certificate and label in 2005, introduction in 2006, mandatory in 2007.</p>
Spain	On 8 March 2005 it was reported by IDAE (Instituto para la Diversificación y Ahorro de la Energía: responsible for the preparation of the implementation of the EPBD in Spain) that the documents were send to the Spanish parliament for approval.

Comments on the implementation process

Comments on the implementation process	
Belgium	A lot of questions are still open like quality control of the energy certification of existing buildings, etc.
Denmark	<p>The Danish Administration is currently preparing a revision of the Danish schemes to adopt the requirements of the Building Directive and adjust the design of the schemes to benefit from findings and experiences obtained through the past six years. As the Directive is a framework directive with minimum requirements, the implications for the existing Danish Schemes are at this stage uncertain, and there have not yet been any political statements on the future set-up of energy certification schemes.</p> <ul style="list-style-type: none"> – The most important areas where revision is considered or required include: Limits on 1000 m² net area in EU Directive and 1500 m² total area in Danish Scheme. – Energy Management in Large Buildings - different requirements concerning certification frequency; 10 years in EU Directive and yearly or every three years in present Danish Schemes. – The present energy certification in Denmark includes heating, electricity and water consumption. According to the EU Directive, only energy consumption should be covered. – Fewer types of buildings covered by compulsory regular inspection

	<p>tion in EU directive compared to existing Danish requirements.</p> <ul style="list-style-type: none"> – New requirements EU Directive - Energy certification required of flats or buildings being renting out. – New requirements EU Directive - Energy certification of all new buildings in EPD and not only by sale as in the existing Danish Scheme. – A few more certification components have to be included according to the EU Directive, e.g. energy performance. – New requirements EU Directive - Regular inspection of gas boilers and air-conditioning. – New requirements EU Directive - Inspection of boilers and heating installation after 15 years.
France	<p>Problems and difficulties:</p> <ol style="list-style-type: none"> 1. The form of the certificate is not ready, problem with the benchmark in order to find a compromise between electrical and combustible heating. 2. Who will be the experts? There are not enough qualified consulting engineers for residential buildings at the moment. <p>At the moment in France, there is no existing certification scheme. The only thing that is mandatory is for all new buildings (heated over 12 °C except swimming pool, skating rink,..) to respect the French thermal building code, published in 11/2000, called "Réglementation thermiques des bâtiments" (RT2000). The energy consultants make the calculations. It is hardly presented to the final users. These calculations based on the EN13790 are said to be complicated, not very useful and expensive. No mandatory training is required for the energy consultants.</p>
Germany	-
Netherlands	-
Spain	<p>It was stated by IDAE that the regional governments (17 autonomous regions) are proposed for the further implementation in their own region, therefore the regional governments will play an key role in the successful implementation of the national implementation of the EPBD.</p>

Appendix 2, Existing schemes questionnaire

The aim of this questionnaire is to collect information about existing certification schemes, reported barriers, and success factors. Furthermore to give a short status of implementation of the new directive EPBD concerning certification schemes.

General information

Country:

Filled in by:

- Name:
- Company:
- e-mail:

Overview of the existing certification scheme

Number of schemes in your country:

Title and acronym of the existing certification scheme

- Title:
- Acronym:
- Year of introduction:

The existing certification scheme includes:

- **New buildings:**
 - All buildings ☐
 - Dependant on size ☐
 - over m² or less than m².
 - Dependant on building type ☐
- Inspection of building ☐
- Evaluating of building drawings ☐
- Calculations made by:
 - consulting engineer ☐
 - energy consultants ☐
- Presentation of information to the users ☐

- **Existing buildings:**
 - All buildings ☐
 - Dependant on size ☐
 - over ☐ m² or less than ☐ m².
 - Dependant on building type ☐
 - Dependant on building age ☐ built before ☐
 - Inspection of building ☐
 - Evaluating building drawings ☐
 - Collection of energy data:
 - based on calculations ☐
 - based on registered (metering) data ☐
 - Presentation of information to the users ☐

Describe short how the scheme is functioning

Describe short the scheme e.g. when it is in force (sale, rent, construction etc):

Numbers and type of buildings with existing certification scheme

<i>Type, residential and non-residential e.g. offices, schools, hospitals, etc.</i>	<i>Number of certificates in total per type and the period</i>	<i>Number of certifi- cates per year per type</i>	<i>Number of total building stock of type</i>

Financing of the existing certification scheme

How is the financing of the certification dealt with:

- Mainly paid by individual home-owners ☐
- Subsidise the certification survey; from governmental or regional bodies ☐
- Reduce the cost e.g. link with a package of service offered by home sellers ☐
- Subsidise the energy savings measures identified by the certification ☐
- Link subsidised loans to the certification ☐
- Other: ☐

Legal status of existing certification scheme

New buildings

- Mandatory ☐
 - All building ☐

- Dependent on building type ☐
- Voluntary ☐
- Other:

Existing buildings

- Mandatory ☐
 - All building ☐
 - Dependent on building type ☐
- Voluntary ☐
- Other:

Training energy consultants in existing certification scheme

- Mandatory ☐
- Voluntary ☐

Describe training courses, scheduled time and content .

Other:

Quality control in existing certification scheme

Describe quality control e.g. of the collected data, random check of certificates etc:

Barriers in existing certification scheme

Describe problems and difficulties in the existing certification scheme:

Information

- | | |
|--|------------------------------------|
| Insufficient legislation | <input type="checkbox"/> Comments: |
| Bad or non-existing information material to the user | <input type="checkbox"/> Comments: |
| Information material not directed to all types of building | <input type="checkbox"/> Comments: |
| Lack of public campaigns | <input type="checkbox"/> Comments: |
| Lack of public/private advertisement | <input type="checkbox"/> Comments: |
| Difficult to find information's of approved consultants | <input type="checkbox"/> Comments: |
| Other: | |

Penetration on the market

- Lack of authority support ☐ Comments
- Lack of interests among house owners ☐ Comments
- Different wishes between house owners and tenants ☐ Comments
- Lack of (economic) sanctions ☐ Comments
- Too much bureaucracy ☐ Comments
- The scheme has a bad reputation ☐ Comments
- Other:

Assessment

- The scheme is too simple ☐ Comments:
- The scheme is too extensive ☐ Comments:
- Lack of consultants ☐ Comments:
- Lack of professionalism among consultants ☐ Comments:
- Discrepancies between measured and calculated consumption ☐ Comments:
- Bad or non-existing drawings ☐ Comments:
- Bad functioning or non-existing meters ☐ Comments:
- Bad functioning or non-existing calculation tools ☐ Comments:
- Other:

Executing phase

- House owners/administrators do not reflect on the schemes ☐ Comments:
- Disagreement between tenants ☐ Comments:
- Lack of profitability ☐ Comments:
- Mistrust to workmen ☐ Comments:
- Worries of architecture damage ☐ Comments:
- Energy savings are not visible ☐ Comments:
- General comments to barriers:

Success factors in existing certification scheme

Describe factors that work successfully in your existing certification scheme:

Other comments to existing certification scheme

Elaborate:

Status for implementation of new energy certification schemes related to EPBD

Describe problems and difficulties in the implementation of the new certification scheme.

Do you have missing information in your country before the implementation can take place? ☐

Please comment:

.

Time schedule for the implementation:

Appendix 3, National tests questionnaire

The aim of this questionnaire is to collect information about the national tests to be carried out within the framework of WP2 and make it possible to improve the tests.

General information

Country: Select

Filled in by:

- Name:
- Company:
- e-mail:
- Phone:

Title of the WP2 test:

Purpose of the WP2 test

Fill in a description of the purpose for the WP2 test in your country:

Description of the WP2 test

Describe the WP2 test including eventual phases, and the time schedule.

Please distinguish the following process phases:

- How will the buildings in the test be selected?
- What are the criteria for selection?
- Will the test be promoted in order to find buildings for certification testing?
- How will the building inspection be organised?
- What kind of actors will perform the inspections (certified consultants; specially trained experts, other)?
- What kind of calculation tool will be used (name, new/existing/updated version)?
- Will the calculations be done on the spot (during the inspection or afterwards)?
- Will the test also be used for verification of the tool?
- What kind of report/certificate will be tested?
- Which topics are covered in the report/certificate?
- Will the report/certificate be automatically generated by software or will it be custom adapted?
- Who will provide the report/certificate (expert or certification institute)?
- In what stage and how will the report/certificate be presented to the customer (sent by mail; personal presentation/advice, other)?

promotion

inspection

calculation

report

presentation

action to improve
energy
performance

Quality control

In which way are quality control aspects embedded in the tests (in all process steps)?

Will the experts be trained specially; will the test be used to test or develop training materials/manuals?

How is the quality check of the certificates issued incorporated (minimum 10/country)?

Will (part of) the inspections and calculation be executed double to check quality?

Will new or existing expert certification protocols be tested? And how?

End user feed back

How will end-users be involved in the test?

How is end-user feedback organised (enquiry afterwards/personal interviews)?

What aspects will be subject to end-user feedback (promotion/communication strategy; understandability and acceptance of the certificate, costs, and impact on taking RUE/RE measures, other)?

How will national stakeholders, experts/expert organisations and end-user organisations be involved in the test set-up and during execution?

How is the national test embedded in the EPBD implementation process?

Inputs from the national EPBD implementation process?

Feedback to national EPBD implementation process?

Please add quantitative information to the test description like number of certificates that will be issued, no. of quality checks, no. of experts involved; no of enquiries that will be sent, specification of certification costs etc.;

Feel free to elaborate on special topics in your national tests not covered in this questionnaire.

Building types included in your national test

Mark which building types are included in your national WP2 test (check all that applies and include division into sub-categories):

- ☐ Residential buildings
- ☐ Single family buildings,
 - ☐ Multifamily buildings,
 - ☐ Student hostels
 - ☐ Hotels,
 - ☐ Cottages,
 - ☐ Other, please specify:

- ☐ Public buildings
- ☐ Educational buildings,
 - ☐ Hospitals,
 - ☐ Other, please specify:

- ☐ Non-residential buildings
- ☐ Offices,
 - ☐ Ware houses,
 - ☐ Production buildings,
 - ☐ Department stores,
 - ☐ Other, please specify:

- ☐ Other, please specify:

Other considerations regarding the selection of building types:

Connection to existing certification/certification schemes

Describe the connection between the barriers and success factors reported in the first questionnaire WP1 – Status (Building certification scheme questionnaire - Status, WP1) and the tests to be carried out in WP2:

Expected results of WP2 test

Describe the expected test results from WP2 on national level:

Describe the expected test results from WP2 from an international point-of-view, e.g. what are the benefits for Europe:

Appendix 4, WP1 Test preparation cross country partner feed back

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
.nl	Quality control and certification of experts can be improved	Extensive network of (certified) experts available	Learn from testing of 'simple methods' in other countries (DE, FR), as certification now is seen as too expensive	Depends on position of government regarding EPBD, now on hold because too expensive		How will quality control be tackled? What can we learn from your database experiences? interested in final results of sensitivity test	Quality control on certificates issued needs attention; certainly when using laymen as issuers; it is good that repeatability is tested in the French test.			Please try to cover whole certification process in Spanish test. E.g. try to assess also how training and quality control could be solved in Spain.
.nl		Certification as tool for building asset management and communication to tenants tested	Danish test for flats may provide useful input for Dutch approach.							

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
		(change EPBD from burden to added value opportunity for housing associations).								
.nl	The communication (EPA report and process) can be improved		.dk: Explaining the difference between asset rating for average behaviour and actual consumption needs attention	Probably yes, because in our test probably also owners will participate that do not sell there house and that go for an advice as well						
.nl			.dk: Central quality control on issued certificates	.dk: Can only be recommendation for the government (probably too expensive)						
.nl			.dk: Mandatory does not mean 100% penetration. We need to							

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
			think how to effectively promote or enforce certification.							
.de	Large number of certificates to be issued in the first years. Low number of experts for non-res. buildings.	Calculation methods for residential buildings is introduced and tested. Plenty of software available. Calculation method for non-res. buildings is available but has to be tested.			Establish a national (regional) database with issuers to ensure a quick access to potential issuers for the end-user. Make sure the issuers registered in the database also provide their certificates for the national results database (see below)		Establish a national (regional) database with issuers to ensure a quick access to potential issuers for the end-user. Make sure the issuers registered in the database also provide their certificates for the national results database (see below)	Establish a national (regional) database with issuers to ensure a quick access to potential issuers for the end-user. Make sure the issuers registered in the database also provide their certificates for the national results database (see below)	Establish a national (regional) database with issuers to ensure a quick access to potential issuers for the end-user. Make sure the issuers registered in the database also provide their certificates for the national results database (see below)	Establish a national (regional) database with issuers to ensure a quick access to potential issuers for the end-user. Make sure the issuers registered in the database also provide their certificates for the national results database (see below)

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
.de		Database for issuers and certificates has been established by dena, return of information by issuers has to be improved								
.de	Certification is treated with reserve by many housing companies	High interest in certification from homeowners and tenants								
.de	Unclear political situation	Assessor data base with search function by postal code			Data base for end-users to search for assessors (implement different qualification for building types and information about experiences, like e-bay power-sellers?)		Data base for end-users to search for assessors (implement different qualification for building types and information about experiences, like e-bay power-sellers?)	Data base for end-users to search for assessors (implement different qualification for building types and information about experiences, like e-bay power-sellers?)	Data base for end-users to search for assessors (implement different qualification for building types and information about experiences, like e-bay power-sellers?)	Data base for end-users to search for assessors (implement different qualification for building types and information about experiences, like e-bay power-sellers?)

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
.de	Will have to improve return of issued certificates for certificate data base	High public interest, many regional initiatives	Denmark: registered number for certificates	Will be difficult (impossible) to implement in ordinance	Data base for certificates to obtain benchmark values (how can refurbishment be registered to obtain information on success?)		Data base for certificates to obtain benchmark values (how can refurbishment be registered to obtain information on success?)	Data base for certificates to obtain benchmark values (how can refurbishment be registered to obtain information on success?)	Data base for certificates to obtain benchmark values (how can refurbishment be registered to obtain information on success?)	Data base for certificates to obtain benchmark values (how can refurbishment be registered to obtain information on success?)
.de	Unclear situation about assessor qualification	Large number of voluntarily registered assessors for res. buildings	National registration of assessors	National registration / qualification regulation is not implemented in law, therefore it is responsibility of federal states (conflicts)						
.de		Regional initiatives (regional energy agencies) are regional competence centres			Establish corporation between national and regional contact persons / agen-		Establish corporation between national and regional contact persons / agen-	Establish corporation between national and regional contact persons / agen-	Establish corporation between national and regional contact persons / agen-	Establish corporation between national and regional contact persons / agen-

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
					cies to share responsibilities		cies to share responsibilities	cies to share responsibilities	cies to share responsibilities	cies to share responsibilities
.fr	Number of certificates to deliver : 2 millions/year at the beginning	the tool 3CL can estimate the dwellings consumption with 10 questions : quick and easy	Germany : many different types of experts	yes	Is wood considered as a renewable energy, if yes, how is it taken into account in the energy primary scale?	Is wood considered as a renewable energy, if yes, how is it taken into account in the energy primary scale?		Is wood considered as a renewable energy, if yes, how is it taken into account in the energy primary scale?	Is wood considered as a renewable energy, if yes, how is it taken into account in the energy primary scale?	Is wood considered as a renewable energy, if yes, how is it taken into account in the energy primary scale?
	Electricity heating in more than 1/3 of the dwellings		DK: Very qualified expert: key to get a good certificate. Maybe it will be possible in a few years in France	Yes, we will compare the work of consulting engineers to other experts not very qualified on energy savings.	Independent expert? In new buildings : same or different experts : building regulation & certificate	Independent expert? In new buildings : same or different experts : building regulation & certificate		Independent expert? In new buildings : same or different experts : building regulation & certificate	Independent expert? In new buildings : same or different experts : building regulation & certificate	Independent expert? In new buildings : same or different experts : building regulation & certificate
.fr					How and who will do some advertisement about the certifi-	How and who will do some advertisement about the certifi-		How and who will do some advertisement about the certifi-	How and who will do some advertisement about the certifi-	How and who will do some advertisement about the certifi-

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
					cate?	cate?		cate?	cate?	cate?
.dk	Energy savings are not visible and do thus only give marginal "social" status - in contrast to kitchens and bathrooms	Creation of knowledge db with information about building standard			Establish a national (regional) database with results from building audits to gain knowledge about the building standard, being able to analyse possible energy saving measures on a broad scale	Establish a national (regional) database with results from building audits to gain knowledge about the building standard, being able to analyse possible energy saving measures on a broad scale	Establish a national (regional) database with results from building audits to gain knowledge about the building standard, being able to analyse possible energy saving measures on a broad scale		Establish a national (regional) database with results from building audits to gain knowledge about the building standard, being able to analyse possible energy saving measures on a broad scale	Establish a national (regional) database with results from building audits to gain knowledge about the building standard, being able to analyse possible energy saving measures on a broad scale
.dk	Only one paper among many others when a house is sold	Energy plan is made, focussing on the profitable measures								
.dk	Market penetration									
.dk	Present schemes are not connected									

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
	to a building permit									
.dk	No penalty if no certification has been made									
.be	Federal state - Implementation in each region possibly with different solutions in different national languages	EAP currently launched. Practical experience will be available in the coming months	.nl: 1) Quality checks. 2) Tests realised by external experts. 3) Attention to pay on the good/bad interaction with subsidies mechanisms.	.nl: 1) YES 2) Could be, begin 2006 PAE experts will be formed and working in Belgium 3) NO						
.be	How to guarantee coherence between new and existing buildings		.de: 1) Sensitivity analysis 2) Large consultation at national level 3) Tests realised by external experts 4) Schemes with several levels of complexity in	.de: 1) YES 2) NO/YES. More limited consultation as those applied in G 3) Could be, begin 2006 PAE experts will be formed and working in Bel-						

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
			function of the case 5) Enquiry to end users on several levels 6) Example of enquiry to end-users 7) Several type of certificates tested.	gium 4) NO 5) Possibly 6) YES 7) NO.						
.be			.fr: Example of enquiry to end-users	.fr: YES						
.be			.dk: 1) Test on flats. Interested into the adopted solution in DK 2) Info about formation of experts.	.dk: 1) NO but well in the final recommendations 2) NO - country related solution.						
.es	Final officially calculation tool not available yet, the existing version is quite complicated	As Spain doesn't have any experience in labelling buildings, it would be possible to do it	.fr: Try to find an easy, cheap and fast method to calculate the certificate labelling	No, in principle. Maybe after some tests we'll have to test an easier tool yes, the second						

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
		In a right way from the beginning	With an acceptable error	Tool chosen for Spain is a more simple tool than the current tool CALENER						
.es	Type of experts for certification of buildings is not clear yet, neither the training program.		.dk: testing only some of the apartments from a whole building, extrapolate the results	Yes, trying to find a method in order to not evaluate the whole multi-family building						
.es	Process of quality control not clear yet		.dk, .de: example of enquiry for end users.	No						
.es	No mass information or dissemination activities from the government (yet)									
.es	Not clear what will be the final role of different actors (na-									

	Own country experience		Learning from other countries		Tips, comments for other countries					
	Main barriers	Good points	Useful ideas for my country	Use in our test approach (yes/no, how?)	The Netherlands	Germany	France	Denmark	Belgium	Spain
	tional, regional and local authorities) in the EPBD implementation process									
.es	No special interest by involved actors (architects, property developers, owners, tenants...) due to a lack of information									
.es	No final certification scheme prepared yet		.dk, .de: these examples can be used							