

# **European Directive on the Energy Performance of Buildings: Energy Policies in Europe – Examples of Best Practice**

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## **ABSTRACT**

The Directive on Energy Performance of Buildings (EPBD, 2002) is the most important legislative tool in Europe to address energy consumption in buildings. The directive was implemented from 2006 to 2009 and is currently being recasted. The scope of this paper is to highlight some examples of best practice resulting from the implementation in EU Member States where it appears that several Member States have gone much further in the implementation than prescribed in the EPBD.

The examples of best practice are based on the impact of the implementation as seen by Industry and consultants as well as a Concerted Action project launched by the EU Commission. Concerted Action is a knowledge-sharing project with the aim to assist the implementation in EU Member States.

The EPBD's two main areas are energy performance of new and existing buildings and Energy Certificate Scheme for buildings. One important effect of implementing the EPBD was the strengthening of energy requirements for Europe by 25% in average. Another very important element is the request for a regular update of energy requirements. One third of the EU Member States have now published their planned development of energy requirements up to year 2020 when the requirements will be “nearly zero energy buildings”. However, there is still an urgent need to plan for the needed upgrading of the existing building stock. The necessary technology is available and proven but more workable/practical pathways need to be developed to promote systematic upgrades in many Member States to achieve the agreed goal setting for 2050.

## **Introduction**

Energy use in buildings in EU represents about 40% of the EU's total final energy consumption and CO<sub>2</sub> emissions. Activities related to buildings represent a large part of the EU economy, about 9% of EU GDP, and 7-8% of EU employment (EPBD IA, 2008). The building sector therefore plays a key role in achieving the energy and climate policy objectives. The potential for cost-effective energy savings is about 30% of the whole sector's expected energy consumption by 2020. This potential can be realized at very low or even negative CO<sub>2</sub> abatement costs because of the relatively low cost of energy relevant investments (when combined with other construction and renovation work in a building) and the very high value of energy savings compared to the other sectors, making energy saving a very attractive approach for tackling the climate change challenge.

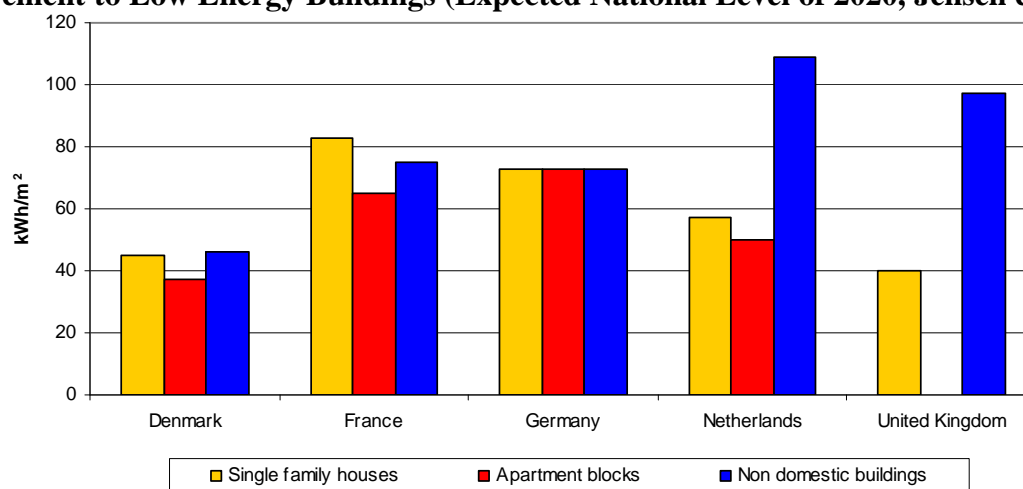
The EPBD is the main legislative tool in Europe addressing energy performance in buildings. The Directive is a framework directive and the main requirements in the original directive from 2002 were for Member States to:

- Set their national energy performance requirements for buildings (new and existing buildings in case of major renovation) based on kWh/m<sup>2</sup>
- Review these requirements each five years and
- Establish an Energy Performance Certificate for buildings to be issued when a building is constructed, rented out or sold.
- Carry out inspections of boiler- and air-conditioning systems

It is not possible directly to compare the national energy performance requirement in EU as the assumptions and basis are different from country to country. Energy performance can be calculated by heated floor area, habitable area, or gross floor area, and this can easily result in deviations of 10 - 20 %. Further, it differs what energy consuming processes are included in the different calculations of the energy performance.

An estimate of the potential energy savings when moving from current requirements to very low energy buildings is shown in figure 1 for a selected number of countries, but also here the figures for the individual countries are not directly comparable. The energy performance requirements have been strengthened stepwise in Denmark during the last decades which means that the potential for energy savings by strengthening energy requirements for new buildings are relative higher in other parts of Europe.

**Figure 1: Estimated Energy Savings in kWh/m<sup>2</sup> if Moving from Current National Energy Requirement to Low Energy Buildings (Expected National Level of 2020, Jensen et al, 2009)**



This paper aims at presenting some of the best practice cases and lessons learned from the implementation of the EPBD seen from the industry point of view, as well as highlighting the content in the newly agreed text for the EPBD recast.

## Member States' Strategy Towards Very Low Energy Buildings

When the EPBD was implemented in 2006 the energy requirement in some of the building codes (mainly southern countries) had not been revised for more than 25 years. Most of the requirements from before 2006 were based on U-values for individual components or had no minimum requirement at all to the technical systems. The implementation of the EPBD caused the Member States to redefine their requirements in order to be expressed as kWh/m<sup>2</sup> and to

include the total energy demand for a building taking into account the energy needed for e.g. hot water, heating/cooling, ventilation as defined in an annex to the directive.

Many Member States therefore used the opportunity to review the level of their energy requirement when implementing the EPBD. Country improvements ranged from 0% to 50% with an overall of 25% average increase in energy efficiency requirements in the 27 countries (Maldonado 2009). A natural next step for many Member States was to announce how they planned to develop their requirements up to year 2020. This announcement of future requirements has been very positive received by the industry because it allows the industry to prepare for this development and thereby cooperate with the officials to achieve the overall target instead of being presented to new requirements only a year in advance, which until now has been the typical approach.

At the current stage, approx. one third of the Member States has announced their plans for the development in energy requirements (Thomsen et al 2008) and a number of Member States has started the discussion. Although expressed in different ways the 2020 target for the requirements to new buildings in the announced plans was similar: buildings to operate without fossil fuels, energy positive buildings, zero energy buildings etc. This development leads to the requirement in the EPBD recast where the Member States now will have to develop their requirements to the level of “nearly zero energy buildings” from 2021 as described in next section.

**Figure 2. Planned Introduction of Low Energy Standards as Minimum Requirements in Building Regulations**

Country /year	2009	2010	2012	2013	2015	2016	2020
Denmark		- 25 %			- 50 %		- 75 %
Finland		-30-40%		-20%	LEB - PB (PH)		
France			LEB 2)				E+
Germany	- 30 %		- 30 % 3)				NFFB
Ireland		-60%		NZEB			
Netherlands		- 25 %			- 50 % (PH)		ENB
Norway	20-25%						LEB (PH)
United Kingdom		-25 %		(PH) - 44 %		NZEB	

1) Percentage of the 2006 minimum level, 2) Effinergie standard, 3) Percentage of the 2009 minimum level, 4) Passive House level. LEB: Low Energy Buildings. E+: Energy positive buildings. NFFB: Buildings to operate without fossil fuels. ENB: Energy Neutral Buildings. NZEB: 0 net. CO<sub>2</sub>, incl. heating, lighting domestic hot water and all appliances.

## EPBD Recast

On 17 November 2009 a new text for the EPBD recast was agreed between the three institutions in Brussels (Commission, Parliament and Council). The new text recognizes that we

in Europe will not achieve our 2020 target (20% reduction of CO<sub>2</sub> emission, 20% share of renewable, and 20% improvement in energy efficiency) with our current energy policy. Therefore, the text recognizes the development in the Member States who have already gone beyond the requirements in the current directive with the aim to reduce their energy consumption within the building sector. The new text also seeks to improve the current directive where it has proven to be difficult in the implementation phase mainly regarding quality and use of the Energy Performance Certificate as well as requirements for inspection of technical systems.

The requirements in the EPBD recast for new buildings request that:

- By 31 December 2020 all new buildings shall be “nearly zero energy buildings” and by 31 December 2018 public authorities that occupy and own a new building shall ensure that the building is a nearly zero energy building. As there was no common approach in the Member States to very low energy buildings, “nearly zero energy building” was introduced as a new concept, which means a building that has a very high energy performance. The nearly zero or very low amount of energy required should to a very significant extent be covered by energy from renewable sources, including renewable energy produced on-site or nearby.
- Member States are requested to set intermediate targets for 2015 for improving the energy performance requirements of new buildings to achieve the level of nearly zero energy buildings as of 2021.

On existing buildings, the new text is not as strong as for new buildings; however, the important requests for national regulation addressing existing buildings are:

- Minimum requirements on the energy performance of existing buildings, building units and building elements that are subject to major renovation<sup>1</sup>
- Minimum requirements for building elements and technical systems (e.g. wall, roof, floor, heating-, hot water-, air-con and large ventilation systems) when retrofitted or replaced
- Minimum requirements to be set for building elements with a view to achieving cost-optimal level (methodology to be developed by 30 June 2011) – Member States are requested to report on this
- Develop National Plans (including targets) to stimulate the transformation of buildings that are renovated into “nearly zero energy buildings”
- Member States shall establish penalties for non-compliance of national provisions (this covers both new and existing buildings)

The EPBD recast is expected to come into force during 2012-2013 depending on article. However, certain reporting requests to Member States are expected to take place already from 2011.

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<sup>1</sup> By major renovation means: the total cost of the renovation related to the building envelope or the technical building systems is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated, or (b) more than 25 % of the surface of the building envelope undergoes renovation;

## Example of Best Practice Energy Policy in Europe

### France

One of the countries in Europe that must be highlighted as a case of best practice for its energy policy is France with its environmental law “Grenelle I” (Roger 2010). The objective for the law was to create a road map for ecology and sustainability. The law focuses on buildings where reduction of energy consumption in buildings has been identified as a very important way to reduce the whole energy consumption and CO<sub>2</sub> emissions of the country. The overall goal of the law is to achieve a 38% reduction of the energy consumption in existing buildings stock by 2020.

The process behind developing the law involved a number of stakeholders with different perspectives: non-governmental organizations, environmental- and industrial associations, unions, government representatives and local authorities. They managed to find a common ground, and the high involvement early in the process is expected to make the implementation phase easier. With “Grenelle I”, objectives have been fixed for both new and existing buildings.

The consultation process took place from July 2007 to March 2008 through round table discussions, consultation, and working sessions etc. The law has been approved in Parliament and is now in the process of being implemented.

**Objectives, new buildings.** The strategy towards zero energy buildings in year 2020:

- RT2012: A target for primary energy use of 50 kWh/m<sup>2</sup> to be in force from December 2012 for residential buildings and from December 2010 for non-residential buildings and social housing
- TR 2020: Zero energy buildings from 2020 and onwards

In France, approx. 300,000 dwellings are built each year which means, that by 2020 three million low energy dwellings are built. The French building stock is consisting of approx. 30 million dwellings.

**Objectives, existing building stock.**

- Primary energy consumption shall be reduced by 38% before 2020 (from an average primary energy use of 240kWh/m<sup>2</sup> to 150kWh/m<sup>2</sup>)
- Renovation of social dwellings with the highest consumption (800,000 social housing dwellings have been identified as those with the highest energy consumption). The renovation has to be undertaken before 2020, at a level of 150kWh/m<sup>2</sup>
- Doubling the number of homes to be renovated every year to 400,000. However, currently two billion Euro (Nov. 2009 – from “city of tomorrow”) has been allocated to accelerate the speed of renovation even further. The aim is now to achieve 700,000 homes to be renovated per year among the homes with the largest energy consumption (annual consumption larger than 230kWh/m<sup>2</sup>) and the intention is to perform the work in 5 years (2010-2015) instead of 10 years (2010-2020) as originally planned by the Grenelle I

- Important renovation plan for the Government buildings (combining energy and access for disabled people in priority). Government and national public institutions must act as a leading example by reduction of at least 40 % of their building consumption and 50 % of their greenhouse gas emissions before 2020
- Programme will start with the 800,000 public housing units. All public buildings to be renovated by 2012 (~12% of the existing stock of buildings)

#### **Actions to increase efficiency and meet the 38% reduction goal.**

- Professional training and research are encouraged to reach objectives
- New thermal regulation for all existing buildings, residential and non residential
- Energy performance diagnostic for all buildings
- Low energy label procedure available also for existing building

**Financial incentives in order to meet the 38% reduction goal.** For private housings that undergo renovations:

- “Sustainable development” tax credit - re-enforcement of the tax credit for high-performance equipments and insulation materials when renovated and diagnosed
- Incentives per component for energy saving works: Materials for wall/roof insulation, glazing and windows, heating/hot water system, renewable energy system: performing characteristics are required
- Interest-free loan for private housing:
  - A pragmatic tool to encourage ambitious renovations: Either the owner combines a minimum of two or three performing energy reducing actions to be chosen among a list - or he has to prove by a calculation that after renovation, the estimated consumption of his house will be inferior to a target
  - Loan amount : 20,000 or 30,000 € depending on the work's type and grants for the new low energy buildings
- Loan with 1.9% of interest for social housing - objective to meet 150kWh/m<sup>2</sup>/year
- Loan amount average : 12,000 € per housing

Many activities are going on in other countries as well, but the reason for highlighting France as the best practice example regarding design of energy efficiency policy is the holistic approach in the policy where all identified barriers have been addressed. However, we still need to see the evaluation of the impact from the implementation.

#### **Germany**

Germany, as another example of best practice, has designed a very successful incentive scheme (KfW-scheme<sup>2</sup>) which supports “ambitious renovation” (introducing low energy renovation classes going far beyond the minimum requirements for new buildings (EnEV)). The further the EnEV requirements are exceeded the better the funding conditions are. Generally, the scheme is based on the calculated annual primary energy demand (as the German EnEV as well).

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<sup>2</sup> see <http://www.kfw-foerderbank.de/DE/Home/BauenWohnen/Privatpersonen/index.jsp> for detail

Nevertheless, the scheme also contains a program consisting of several measures with respective minimum requirements to be implemented in a project.

The German subsidy scheme is well known in Europe and is seen as “best practice” within financing schemes. Different variations of the German KfW scheme have been replicated in other countries. The scheme was designed with the main aim to create jobs but has proven to be very successful to stimulate the renovation market in Germany. However, even that the scheme has proved to deliver both on jobs and on energy efficiency, it is now in discussion to cut the budget.

**Facts on the impact from the KfW-scheme in Germany**

- 1.65 million buildings and building units erected and/or renovated
- 7.5 billion Euro funded between 2006 and 2010
- 300,000 jobs created per year
- Greenhouse gas emissions reduced by 4.2 million tonnes per year

## **UK**

UK is one of the countries having a detailed plan for the development of energy requirements up to 2016-2020 (depending on building type). However, the level of ambition in the planned development in energy requirements in UK is modest when compared to the countries having the strongest energy requirements like e.g. DK.

UK has a number of different support schemes where schemes such as the CERT<sup>3</sup> have been extremely effective in delivering low cost measures to upgrade existing homes such as cavity wall insulation, loft insulation and low energy lighting. But the UK will from 2014-2016 be in a situation where most low cost energy efficiency measures will be completed and the cost of the remaining 7 million “hard-to-treat” homes is too high to be financed by a CERT type levy (CERT costs households £41/year - it would need to be £100-300/year to fund the hard-to-treat homes). After the period 2014-2016, UK will still have a huge saving potential in the existing building stock but it will be relative expensive to realise as all the cheap measures have now been implemented.

A new financing model is currently being tested in UK (the PAYS<sup>4</sup> scheme) in order to provide householders with access to finance upgrading of the energy efficiency of their homes. In the PAYS scheme money is provided by a third party finance company, the loan is linked to the property (not the individual - at change of ownership the benefit and charge will be transferred to the new householder). The loan repayments plus interest are collected on behalf of the financing company using an existing payment mechanism such as local authority council taxes, water rates, or energy bills.

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<sup>3</sup> [http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/consumers/saving\\_energy/cert/cert.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/consumers/saving_energy/cert/cert.aspx)

<sup>4</sup> PAYS – Pay As You Save scheme (<http://www.energysavingtrust.org.uk/Home-improvements-and-products/Pay-As-You-Save-Pilots>)

UK is one of the few country actively identifying “fuel poverty” as a social problem in relation to energy efficiency (fuel poverty is according to the UK definition when a household needs to spend more than the 10% of its income on energy). Due to rising energy prices, UK has not reached its goal setting to eliminate fuel poverty before 2016<sup>5</sup> but they continue to focus on the problem.

## Norway

In Norway, a new voluntary standard<sup>6</sup> for low energy and passive houses was launched in April 2010. A similar standard for non-residential buildings are being developed and is expected to be launched in 2011. The main requirement in the standard is related to energy use for heating. For low energy houses, the annual energy use for heating has to be lower than half of that of a new standard house (max. 30 kWh/m<sup>2</sup>). For passive houses, the net energy use for heating must be less than ¼ of that of a new standard house (max. 15 kWh/m<sup>2</sup>/yr).

The Norwegian State Housing Bank has a number of instruments at its disposal to promote sustainable environmental quality in buildings; loans, grants, information and advice. Almost half of all new homes financed with the Norwegian State Housing Bank's (NSHB) basic loan have a special environmental quality. Nearly all of these have implemented energy savings. With regard to new homes, the energy saving is 40% or more, and for renovations 20–40%. Test and pilot projects with a particularly high ambition-level may receive grants covering up to 80-90% of costs. Development projects of national importance for the construction industry can apply to the NSHB for grants to cover development and information campaigns. Up to now the NSHB has focused on increasing the construction industry's competence with respect to building low-energy homes by arranging courses, seminars and meetings for master builders, civil engineers, architects, estate agents, and sellers of standard house types all over the country. An important area of focus will be to raise homebuyers' awareness of the advantages of investing in low-energy homes.

Enova's<sup>7</sup> support program for the built environment aims to contribute to lasting changes within the built environment market sector. The projects covered under the program include both existing and new commercial and residential buildings. In April 2010, Enova launched a new incentive program for projects meeting a passive house standard or lower (pilot projects). For such projects, Enova offer a fixed support rate of 450 NOK/m<sup>2</sup> for new dwellings, 600 NOK/m<sup>2</sup> for renovation of dwellings, 350 NOK/m<sup>2</sup> for new non-residential buildings, and 450 NOK/m<sup>2</sup> for renovation of non-residential buildings.

## Energy Performance Certificate

A main objective of the EPBD is to improve the energy performance in the European building stock. To achieve this, energy certificate scheme has become a central element in the Directive, and this is compulsory for all European Member States from 2009 at the latest. At the same time, the Certification offers a unique opportunity to obtain valuable knowledge about the building stock for e.g. policy making, surveys of energy saving potentials, benchmarking, and

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<sup>5</sup> <http://www.consumerfocus.org.uk/assets/1/files/2010/03/Fuel-Poverty-Charter.pdf>

<sup>6</sup> (“NS 3700 Criteria for low energy and passive houses – Residential buildings”, <http://www.standard.no/no/Sok-og-kjop/produktkatalogen/Produktpresentasjon/?ProductId=422901>)

<sup>7</sup> Enova SF is owned by the Ministry of Petroleum and Energy.



compilation of energy saving measures. However, the knowledge attained will always depend on the quality of the energy certification scheme. Thus, developing energy certificate schemes deserves very careful consideration.

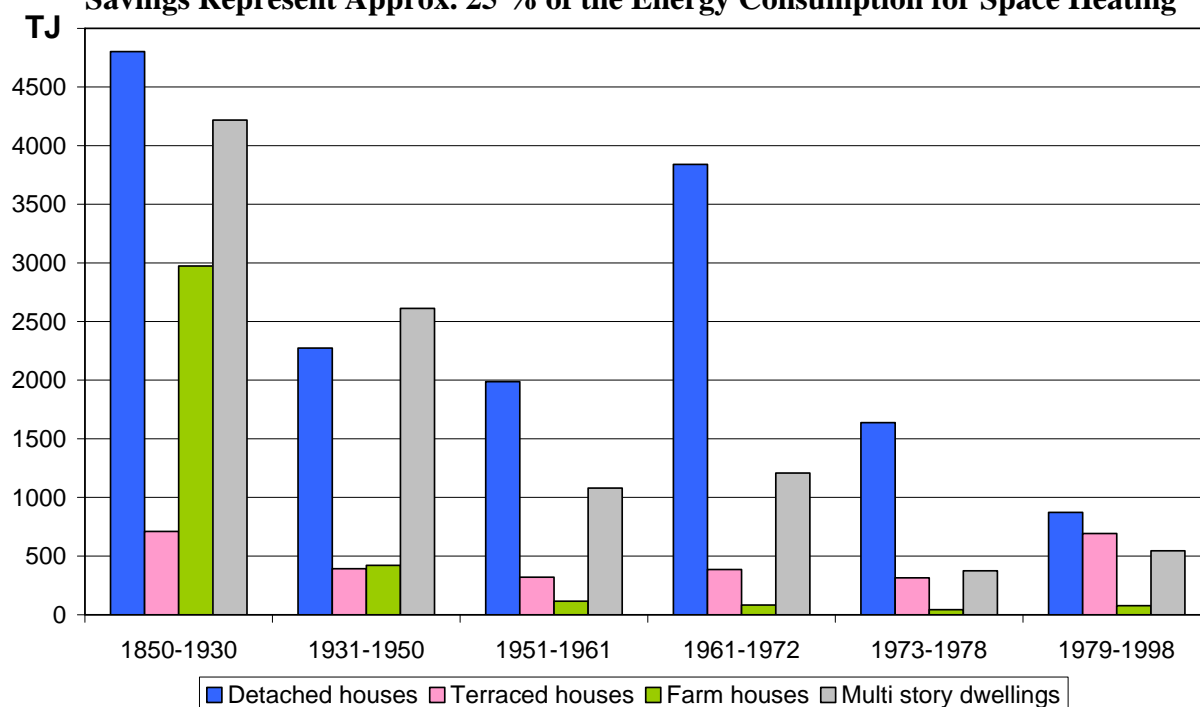
The knowledge from the certificates should be made available to the building construction and property sectors to promote the energy performance of the buildings. In a Danish study more than 200,000 (Wittchen, 2004) energy certificates from small buildings were analyzed and categorized according to the energy performance requirements in the various Danish building codes and recognized changes in the building tradition, starting from 1900 and ending with the building code from 1995. The buildings were divided into seven time-typical periods, each with their typical energy performance. The certificates included information about individual parts of the buildings, their U-value and area, and it was thus possible to identify those constructions with the highest energy saving potential, figure 3.

The study only looked at space heating<sup>8</sup> and showed that at least 30 % of the energy consumption for space heating in Danish residential houses could be saved. Moreover, the study revealed that there is a large energy saving potential in Danish detached houses built in the period from 1960 to 1972. This is not due to the poor insulation level of these buildings, but rather to the fact that many houses were built in this period. Naturally, the largest energy saving potential is found in the oldest buildings, but it was also clear that some old buildings have been updated and show a relatively good energy performance. A key question therefore is how to activate incentives to stimulate energy savings in existing buildings.

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<sup>8</sup> Another study (IEA 2005) shows a savings potential in the area of 70% in all regions of Europe when including the heating systems as well, all measures having a simple pay back time at a maximum of 10 years.

**Figure 3. Potential Heating Savings in Danish Residential Houses (Wittchen 2009); the Savings Represent Approx. 25 % of the Energy Consumption for Space Heating**



Even that the EPBD recast has addressed the quality of the Certificate by e.g. introducing requirement for control etc. the new text has not solved the real problem – to make the Certificate “bankable”. In several Member States like e.g. Germany and Austria, financial support schemes use the principle of Certificate to approve application for financial support, but still no Member State has developed the link where the Energy Certificate is used as documentation when applying for funding through national or regional support schemes.

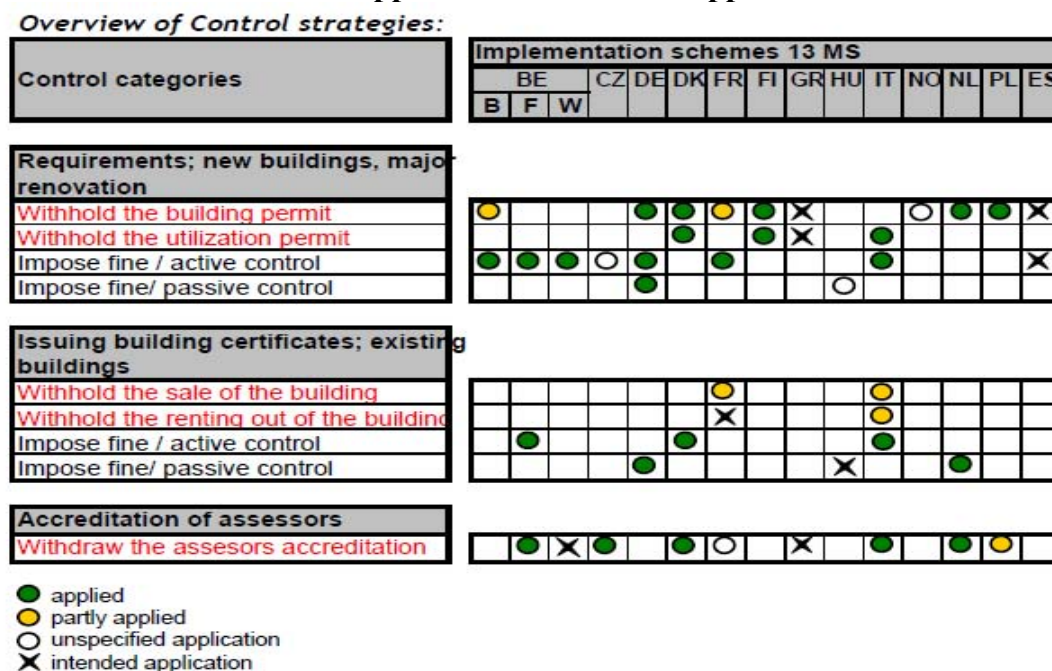
## Compliance and Control

The original EPBD does not deal with the issue of compliance and control. The new text reinforces the objective of the EPBD “to deliver real improvements of the European building stock” by recognizing that the directive needs to be implemented in practice to deliver. A new article addresses the issue of compliance and control by requesting Member States to establish rules on penalties applicable to infringements of national provisions as well as to ensure all measures necessary are taken to ensure that they are implemented.

The Member States deal with the subject of compliance and control in very different ways. One of the EU projects, which look at the national implementation of the EPBD, is the “ASEIPI”<sup>9</sup> project in (ASEIPE 2008). Here it is shown how the Member States have chosen different methods for obtaining compliance and have different levels of control (passive or active). Typical ways to ensure compliance are either by withholding building permits or by withdrawing accreditation, or by issuing fines or similar, see figure 4.

<sup>9</sup> ASIEPI: Assessment and improvement of the EPBD impact, [www.asiepe.eu](http://www.asiepe.eu)

**Figure 4: Example of Control Strategies in a Number of Member States (ASIEPI 2008)  
either Applied or Intended for Application**



#### **ECEEE Case Study: Successful Energy Performance Certification (EPC) Schemes in Two Member States (ecee 2009)**

**Portugal.** The Portuguese Energy Agency ADENE is responsible for administering the energy performance certificates in Portugal. The scheme itself is a success with more than 100,000 certificates issued since the launch in 2007. ADENE has focused on the need for all market stakeholders to be aware of the importance of the certificates and of the legislation itself. Due to this, and a well functioning penalty system, compliance on this issue is high in Portugal. 90% of all buildings erected or sold have EPCs issued. ADENE makes checks of parts of the issued EPCs to ensure their quality. All EPCs are registered in a central database; monitoring and checks are therefore easy to perform. If an EPS is found to be faulty, the responsible expert will be asked to correct the EPC. Depending on the cases, the experts might be presented with a penalty.

**Ireland.** Ireland's EPCs are named Building Energy Rating (BER). The scheme is developed by the National Energy Agency "Sustainable Energy Ireland" ([www.sei.ie](http://www.sei.ie)). In Ireland, the BERs are registered in a central database. The database system makes it possible to perform random quality control checks as well as enabling statistical analysis. All assessors are audited once per year; also a number of in-depth audits involving site visits are undertaken. All assessors must undergo accredited training as well as pass an exam and sign up to the "code of practice".

The EPBD recast has much more emphasis on ensuring the quality of both the auditors and the EPC issued. A new annex II has been added the EPBD text specifying how the Member States shall set up independent control systems for energy performance certificates as well as inspection reports.

It is still to be seen when the directive is put into force if these improvements of the directive will make the Member States more inclined to perform compliance controls.

## **Concerted Action**

The EPBD Concerted Action project (CA) was approved within the scope of the 2003 Intelligent Energy Work programme (EU funded programme), following a proposal by a large majority of the Member States in face of the major technical and administrative difficulties posed by the transposition of the EPBD. The CA project provides a platform for exchanging ideas and information to experts from Member States involved in preparation of transposition of the EPBD in their countries. The first part CA1 started in January 2005 and completed by June 2007. Right after, a second part started CA2, which will be completed by November 2010. Due to the major success of this approach – facilitate the Member States to share knowledge - it is the goal of the EU Commission to start a CA3 in December 2010 which will last for another 4-5 years.

The CA involves the national authorities and experts involved in implementing the EPBD. The task of implementing the directive in all Member States has been quite challenging, and the Member States found it very desirable to share their experiences and to assist one another. The money from the EU programme funded the participation of 3 persons from each country to attend a number of meetings as well as a core group preparing the content and organizing each meeting. The meetings are held as closed meetings. Normally also the EU Commission responsible for the implementation is invited to attend the meetings; this gives the EU Commission an easy access to discuss the actual situation with the people responsible for the national implementation. In the CA are 27 Member States, and furthermore one Member State candidate (Croatia) and one EFTA Country (Norway).

Within the first global objective, and always within the framework of the European standards prepared by CEN under the mandate for the implementation of the EPBD, the CA1 had the following specific objectives:

- To discuss and prepare, to as large an extent as possible, a structure for the Energy Certification of Buildings that maximizes similarities and reduces the range of different options selected by Member States
- To discuss and prepare, to as large an extent as possible, a coherent basis for the methodologies for inspection of heating boilers and air-conditioning equipment, including unitary air-conditioners, desirably with part-load efficiency accounted for
- To discuss and prepare ways to implement adequate schemes for accreditation of energy audit and inspection experts in Member States
- To discuss criteria for implementation of the Common Methodology for calculation of the Energy Performance of Buildings with as similar criteria for simplifications as possible and desirable

The CA2 covers five core themes, related to the main articles of the EPBD:

- Certification procedures
- Inspection of boilers and air-conditioning systems
- Specifications and training requirements for experts and inspectors
- Methods and procedural aspects for energy performance characterisation

- Information campaigns

National Summary Reports (epbd-ca 2009), detailing how the EPBD is being implemented in the Member States, are for public dissemination through an EU web portal called BUILD UP ([www.buildup.eu](http://www.buildup.eu)). The first public summary conclusions from CA2 will be publicly released in spring 2010. However, conclusions from the first Concerted Action (2005-2007) are available and they are the best illustration of the type of results that are expected.

CA has offered a structured forum free of exchange of ideas and critical exploration of options for implementation of the complex requirements of the EPBD at Member State level in a manner that is both efficient in terms of resources and systems, and effective in achieving market change in individual Member States contexts. Participation in the CA of officials in charge of preparations at national level has been a process of cumulative discovery, focussed on practical application and reflected in a substantial body of information resources developed or gathered through the project. Notwithstanding the tight time constraints on participants, it has given everyone involved a much higher level of understanding, and a more confident and robust basis for implementation, which has certainly led to progress.

## **The Challenge of a 2050 Strategy for Buildings**

The agreed goal setting in Europe for 2050 is to reduce the GHG emission with 80-95% in year 2050<sup>10</sup>. The building sector has been identified as the sector having the largest potential for greenhouse gas reduction (IPCC, 2007).

The size of the challenge to achieve this level of GHG emission reduction within the existing buildings stock in Europe can be illustrated by two factors – the renovation rate, and the level of improvements when renovating.

The average renovation rate in Europe is around 1.2-1.4% per year (Bowie 2010). In order to achieve the agreed goal setting for 2050 aiming for a GHG emission reduction of 80-95%, the total building stock needs to be renovated to a very high level of energy efficiency before 2050. To ensure that the total building stock is renovated will require a renovation rate of 2.5%. This is a doubling of the current renovation rate. A renovation rate of 2.5% is a realistic but challenging scenario; only UK is currently aiming for a renovation rate of 3%.

The typical energy performance improvement in a renovation is today between 15-20% where the improvement needed to tackle the 2050 challenge is an improvement of 80-95% which is now being described as “deep renovation” (Ürge-Vorsatz 2009). It will be a huge task to realize this improvement in the existing building sector and it will not happen without legislation and financial support coming from the EU Commission. However, one of the main challenges in the near future will be to avoid the “lock in” effect (Ürge-Vorsatz 2009). Where a lot of renovations will be carried out to an average improvement rate only implementing the “low hanging fruits” with a short pay back time, this will result in a situation where it will be very expensive to come back later for a deep renovation like the situation in UK.

There is a wide variation between the actions taken in each Member State to address the existing building stock. Countries like France, UK and Germany are very active targeting the

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<sup>10</sup> European Council Conclusions (29/30 October 2009). Preceding the Copenhagen COP15 meeting, the EU set its political ambitions for deep GHG reductions towards 2050: ....'It supports an EU objective, in the context of necessary reductions according to the IPCC by developed countries as a group, to reduce emissions by 80-95% by 2050 compared to 1990 levels.

existing buildings with both legislation and financial support schemes, and experience from those countries can be very useful in the coming years. The new Member States on the other hand are more reluctant to prioritize the upgrade of the building stock even that the need is highest here.

## Conclusion

With the EPBD recast, we have in Europe got a new very ambitious legislation for new buildings, but we still have an urgent need to develop a strong legislation addressing the challenge of the existing building stock in order to meet the 2050 goal. However, we do have several good examples from Member States showing how energy policies and support mechanisms can be designed towards achieving the 2050 goal. But we need urgently to start evaluating the existing legislation and re-designing support mechanisms mainly to stimulate deep renovation, and not subsidizing measures which are only fulfilling minimum requirements, to avoid locking in a huge saving potential for the future.

In order for the industry to help meeting the 2050 challenge it is equally important to have a clear roadmap with intermediate and operational targets for the development of legislation up to 2020 – as well as being actively involved in the development of national policy and goal setting as the French example demonstrated. On the national level a more segmented roadmap should be developed, providing guidance on which buildings (by age and type) deep renovations could start with. Newer buildings for example would not always need a renovation as early or as deep, and there may even be instances where low hanging fruits could be a larger share of the renovation. The 8 countries mentioned in figure 2 have demonstrated how striking a national roadmap for new buildings can be; now we just need to see this replicated for the existing buildings.

Regarding Energy Certificate, Europe still needs to develop this further in the implementing phase to find the right way to make the Certificate “bankable” and to use it actively in the financing structure.

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