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Clean Energy Cooperation with India (CECI): Legal and policy support to the development and implementation of energy efficiency legislation for the building sector in India (ACE: E^2)

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The EU Energy Performance of Buildings Directive: A continuing journey

EU EXPERIENCE ON EPBD - POSITION PAPER

ACE:E² Adaptation, Compliance, Enforcement for Energy Efficiency

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FOREWORD

This position paper has been developed by the project "Clean Energy Cooperation with India (CECI): Legal and policy support to the development and implementation of energy efficiency legislation for the building sector in India ("ACE:E²"[1])".

The ACE: E² project is financed by the European Union and managed by the Delegation of the European Union to India. It is carried out as part of the Framework Contract COM 2011 Lot 1 (Europeaid/129783) by EXERGIA S.A., member of SACO Consortium, in collaboration with PricewaterhouseCoopers (PwC) India, under the Specific Contract: FWC No. PI / 2015 / 368-474 signed between the Delegation of the European Union to India (EUD) and SACO on December 18th 2015.

The contents of this paper are, however, the sole responsibility of the contractor and can in no way be taken to reflect the views of any particular individual or institution, including the European Union, the Delegation of the European Union to India, and the Bureau of Energy Efficiency (BEE) in India.

[1] ACE: E² – Adoption, Compliance, Enforcement – Energy Efficiency

ABBREVIATIONS

ACE: E^2	Acronym of the project (Adoption, Compliance, Enforcement – Energy Efficiency)
BIM	**B**uilding Information Modelling
BPIE	Building Performance Institute Europe
EC	European Commission
ECBC	Energy Conservation Building Code
EED	Energy Efficiency Directive
EPC	Energy Performance Certificate
IEE	Intelligent Energy for Europe'
NZEB	Nearly Zero Energy Buildings'

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1 SUMMARY

The EU Energy Performance of Buildings Directive[2], or EPBD is now in its third phase of evolution. It first came into force in 2003 and was implemented across Europe between 2006 and 2008. It mandated national authorities to set minimum energy performance standards in their codes for new buildings and renovations and encouraged the deployment of renewable energy. It introduced the concept of an energy performance certificate (EPC) or label, required when a building is constructed, sold or rented out. It also required many public buildings to display energy performance certificates in an accessible location. And it introduced regular inspections of heating and air conditioning systems.

The Directive was 'recast' in 2010[3], with various amendments which were implemented since 2011. This strengthened a number of the detailed requirements of the EPBD, aimed at improving the effectiveness of its implementation, including mandatory use of EPCs in property advertisements, a 'cost optimal' methodology for revising energy codes, a requirement to establish roadmaps to 'nearly zero energy buildings' (NZEB), and stronger enforcement systems. This was followed by a requirement within the associated EU Energy Efficiency Directive (EED)[4] to establish national strategies for mobilising investment in energy efficient renovation. As part of the energy and climate policy focus on 2030 targets, the EPBD is now being reviewed again, with a three-way process of negotiation involving the European Commission, European Parliament and Council of Ministers in order to finalise the text of 'EPBD 3'.

This paper outlines the rather complex journey of the EPBD and its evolution to date as a key policy instrument for driving market change in the construction sector and delivering on EU energy efficiency policy targets. It looks at the key aspects and implementation experience to date across the EU, which has been diverse, but there are many good practice case examples. And its highlights the EPBD role in paving the path to a future built environment that combines high energy efficiency with strong renewable energy deployment. In particular, its implementation has resulted in step changes in the ambition level of national building codes in Europe and is driving real improvements in the energy performance, environmental quality and long term economic sustainability of the building stock. It is making energy performance an increasingly visible feature in the construction and property market, and its impact on building specification has begun to extend from the newbuild sector into the renovation sector.

This position paper does not address all aspects of the EPBD. Its aim is to cover aspects of the EPBD most relevant to implementation of the ECBC in India. And fuller details on the various aspects of implementation (e.g. training, compliance, certification, role of product and service suppliers, finance, etc.) will be given in the later position papers to follow in this series.

[2] Directive 2002/91/EC of the European Parliament and Council, on the energy performance of buildings.

[3] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast)

[4] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency

2 BACKGROUND AND ORIGIN

From the 1970s onwards, energy efficiency had begun to gain recognition as a key pillar of national energy policy in most EU countries, contributing to energy security, competitiveness and environmental goals.

The EPBD is almost 20 years old in concept. In 2000 the EU adopted an Energy Efficiency Action Plan, which led to a call for specific measures to address the energy efficiency of Europe's 200 million buildings. Buildings are responsible for around 40% of total energy consumption and associated carbon dioxide emissions. The European Commission had estimated that a savings potential of around 22% of consumption in buildings in 2000 was achievable by 2010.

3 LEGAL CONTEXT: EPBD PROCESS

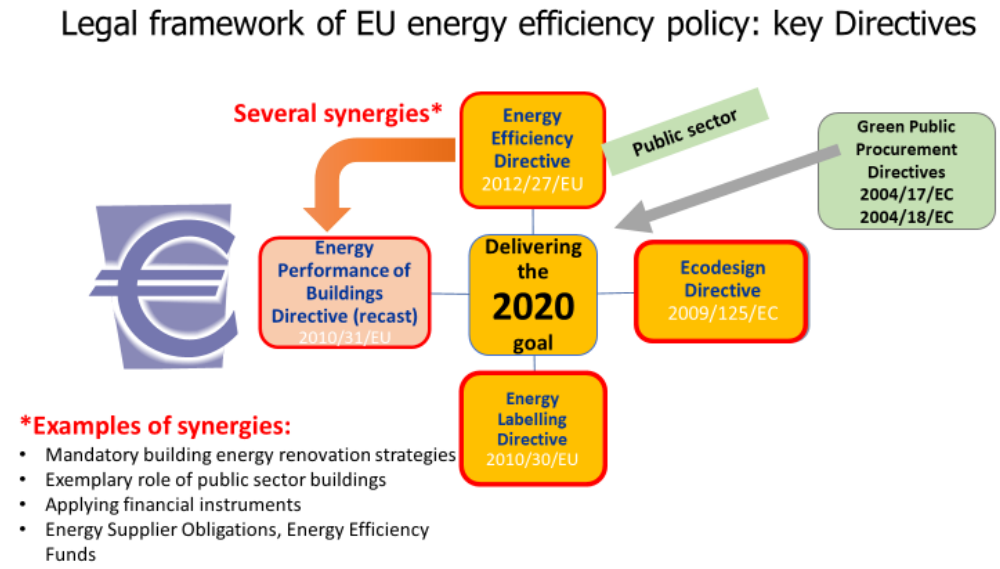
A complex institutional consultation process is involved in proposing, negotiating and adopting an EU Directive, typically over a two to three year period. Once adopted, a Directive is required to become law in all Member States, by a process called legal 'transposition' (which is similar to the 'notification' process applicable to the ECBC in India). However, many of the Articles within a Directive can be open to flexible interpretation, so that the form of legal transposition can vary between Member States. This is the case with aspects of the EPBD, which leaves detailed implementation and adaptation to Member States, taking account of national and local conditions. Indeed, it is important to note that a strong 'principle of subsidiarity' applies to all *Directives*, according to which generally the EU does not take action (in this case the detailed technical transposition) unless it is more effective than action taken at national, regional or local level. (In contrast, EU *Regulations* inherently become identical national law operating in all Member States).

4 CONTEXT AND POSITIONING OF EPBD WITHIN EU ENERGY EFFICIENCY POLICY

A number of EU Directives promoting energy efficiency in elements of the building sector have been adopted in the periods before and since the EPBD, all with the common goal of driving positive market change. Since the 1970s, most Member States had also adopted progressively improving energy efficiency codes for buildings. However, the format and ambition levels in such codes still varied considerably. In a small number of countries, the concept of energy certification of buildings had also been introduced on a voluntary or mandatory basis. The EPBD sought to provide a common framework that would enable more ambitious, and more harmonised, approaches by Member States in relation to energy efficient buildings.

Figure 4-1 illustrates the positioning of the EPBD in relation to a number of complementary EU Directives. The Energy Efficiency Directive (EED) can be seen as highest in the hierarchy, as it covers all energy using sectors and sets an energy saving target of 20% by year 2020. It also reinforces a number of EPBD aims, for example through demanding an exemplary role from the public sector (which is also subject to Green Energy Procurement Directives) and through encouraging the use of financial instruments to support investment in the energy efficient renovation of buildings. The EPBD itself is holistic in addressing the building sector, while the Ecodesign and Energy Labelling Directives[5] stimulate the drive for ever more efficient energy using equipment. Together, these Directives constitute a strong and cohesive set of policy instruments applicable across all EU Member States.

Figure 4-1 The EPBD and allied EU Directives

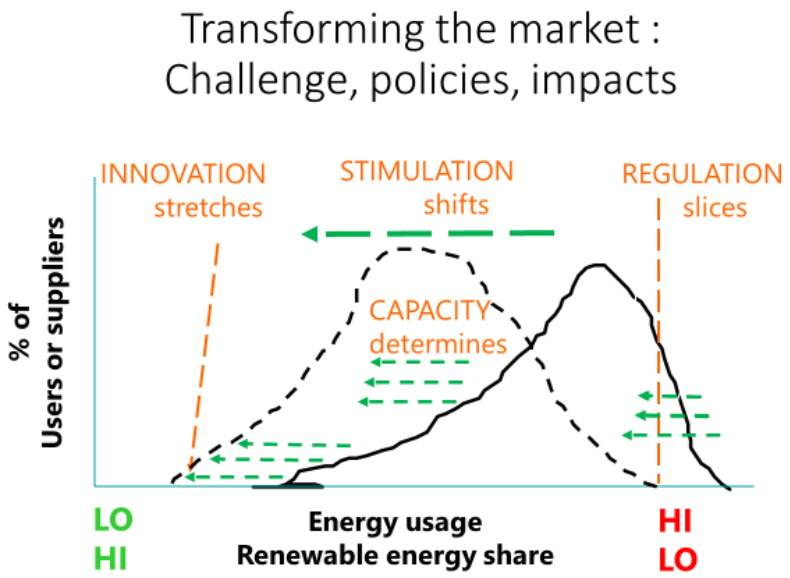


[5] Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (recast)
Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products (recast)

EU Member States published their first National Energy Efficiency Action Plans in the 2009-2011 period, which have been successively updated since then. These Plans placed a significant requirement on the buildings sector to deliver on national and EU energy targets for 2020.

The goal of energy efficiency (and associated renewable energy) policies for buildings is shown schematically in Figure 4-2. It illustrates the nature of the market impacts of different policy instruments. *Regulation* sets a minimum performance level, eliminating the poorest performers. *Innovation* generates new solutions which extend the previous boundaries of excellence. Financial *incentives* and *promotional* activities stimulate a general market shift towards improved performance, while the *capacity* of the industry supply chain determines the speed at which the overall market change can take place.

Figure 4-2 Schematic of the role of energy efficiency policies in improving performance



5 KEY REQUIREMENTS OF THE ORIGINAL EPBD (2002)

The primary aims of the EPBD were to raise awareness of energy use in buildings, encourage the building sector towards more ambitious energy efficiency standards and increase the use of renewable energy sources. A key requirement was for Member States to review their energy performance standards for buildings and to take steps to make energy use in buildings more transparent and widely understood.

The original EPBD had three key requirements, whereby each Member State must:

1. Adopt an official energy performance calculation methodology that accords with the common general framework methodology specified in the Directive; this is aimed at encouraging a common and consistent 'language'.
   The parameters to be covered within the methodology are set out in an Annex to the directive. This still allows flexibility regarding the detail of the methodology. In support of this requirement, and in order to encourage a more harmonised approach across Member States, the EU Commission mandated the European Standards Body CEN to develop a stream of EN standards.

2. Set mandatory minimum requirements for the energy performance of new buildings and major renovations, using the above methodology; this is aimed towards driving more ambitious standards and substantial lifetime savings.
   Member States must also review these requirements at least every five years. Energy efficiency requirements must be formulated as an overall energy performance criterion, covering the main thermal and electrical energy uses, expressed in terms of - normally primary (fossil fuel) - energy consumption (and possibly CO_2 emissions) per annum per m^2 of gross floor area.

3. Establish and implement a system of energy performance certification (EPC) mandatory for all[6] buildings at the point of construction, offer for sale or rental, and also using the above methodology; this is aimed at making energy performance a visible market factor influencing purchase and rental choices.
   This system involves publishing an energy label for each applicable building, typically on a scale from 'A' to 'G'. It applies to both new and existing buildings.

The Directive also required larger public buildings to display energy performance certificates in an accessible location. And it introduced regular inspections of heating and air conditioning systems. EPCs and inspections were required to be carried out by independent qualified assessors and inspectors.

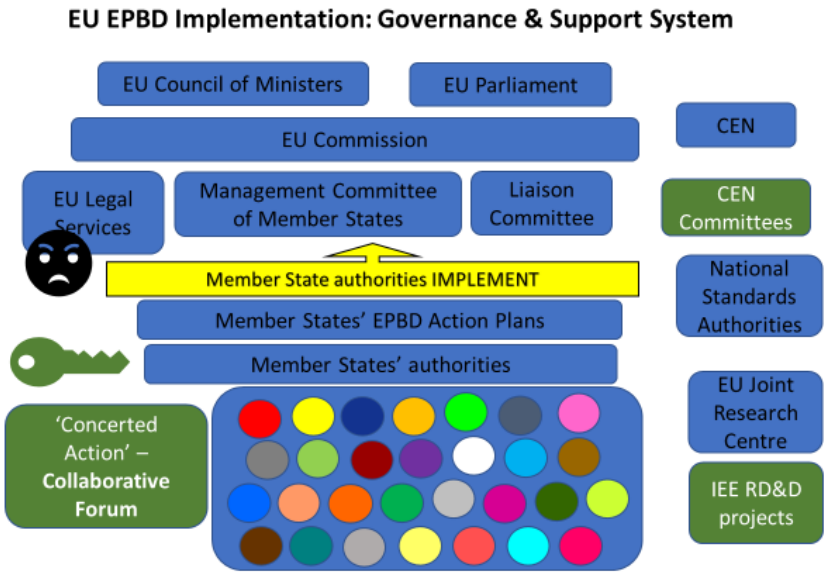
The Directive permitted Member States to phase in the requirements, particularly for EPCs, over a period of up to 3 years in order to allow time for sufficient number of qualified assessors to be trained and available.

[6] Except special cases, such as heritage buildings, religious buildings and buildings with very low energy use.

Institutional arrangements

A schematic summary of the institutional and governance arrangements for implementing the EPBD is given in Figure 5-1.

Figure 5-1 Institutional and governance structures to enable EPBD implementation



The respective bodies and their roles are as follows:

- As indicated above, a three-way development, consultation and negotiation process involving the EU Commission, the EU Parliament and the Council of Ministers/ Member State authorities determined the content and adoption of the Directive.
- The EU legal services are responsible to receiving periodic progress reports from Member States on transposition and implementation of the Directive, and for taking infringement proceedings against non-compliant States.
- A Management Committee of the Member States, chaired by the EU Commission, provided a mechanism for communication on progress and consultation on challenges and approaches to implementation, typically meeting two times per year.
- The relevant Member State authorities – typically a combination of Ministries responsible for Construction, for Energy and a supporting national energy agency – responsible for developing and overseeing an action plan for implementing the Directive and enforcing its requirements. (This can potentially form part of the National Energy Efficiency Action Plan separately required by the Energy Efficiency Directive). These authorities also participate in the above Management Committee, and typically have established their own national coordinating committee/s and consultative fora for stakeholders.
- The European Standards body, CEN, was mandated by the EU Commission to develop or update a suite of approximately 50 standards to support implementation of the Directive and encourage harmonised technical requirements. These standards ranged from the holistic calculation of energy performance, to requirements for energy certification and inspection of technical systems, to the specification and performance

of building elements, components and equipment. Several technical committees were involved.

- A liaison subgroup from the above Management Committee of Member States provided a means of consultation and progress reporting to, and feedback from, national EPBD authorities.
- The National Standards Authorities are members of CEN and responsible for the process of adopting EN standards as national standards. Many of these standards allow for 'localisation' of requirements to take account of national and/or regional climate and technical conditions. While EN standards automatically become national standards and are aimed at encouraging legal adoption for the purposes of the EPBD, the resultant national standards are not obligatory on the national authorities.
- A collaborative project supported by the EU Commission, entitled the EPBD Concerted Action, has played an important role in assisting Member States implementation of the Directive. It has provided a confidential forum (and confidential website) through which representatives from Member State authorities could systematically explore options for implementing the various requirements, sharing approaches, challenges, achievements and best practices. These forums typically met three to four times per year and also included working groups, study tours and webinars.
- In addition to operating a competitive research, development, demonstration (RD&D) programme, the EU Commission operated a support programme entitled 'Intelligent Energy for Europe' (IEE) to tackle barriers and assist market deployment. These programmes supported projects in the fields of improving technologies, tools, skills development, market analysis, databases, market awareness initiatives and financial initiatives, and generated useful insights, findings and case examples.

Figure 5-1 highlights three sets of resources and activities (in green boxes) which played a key role in assisting good implementation of the EPBD: the collaborative Concerted Action, the development of EN standards and RD&D projects.

6 IMPLEMENTATION OF THE ORIGINAL EPBD

The early focus was on legal transposition, planning for implementation, and on engaging and consulting with stakeholders. Almost all EU Member States proceeded to transpose the legal requirements of the EPBD into national laws between 2006 and 2010. A small number of Member States had not done so and were threatened with infringement proceedings.

There were already established traditions of building energy codes being under the aegis of Ministries of Construction (or similar). So in general, the enactment of legal requirements in relation to building energy codes tended to be the responsibility of Ministries of Construction (or similar), while new types of requirements such as inspections of technical systems tended to be the responsibility of Ministries of Energy (or similar). The situation with requirements in relation to EPCs was variable, with such requirements being enacted by either of these Ministries. In the majority of Member States, the development and administration of calculation software and EPCs was assigned to national energy efficiency agencies, who were assigned the necessary functions and powers under the new legislation.

The assignment of responsibilities for legal enforcement of compliance with the building codes did not usually change relative to the previously established systems for building codes in general – which were often local authorities. The role of such authorities was sometimes confined to clerical type review of documentation plus sample inspections, and the training of their personnel did not always extend to the technical methodologies.

Several Member States established co-ordination or steering committees from the above Ministries and agencies. In a number of cases, these committees developed and published national implementation plans.

An early step was to update the energy calculation methodologies and minimum performance requirements. Traditionally, there have been variations between EU countries in the technical scope of coverage (of energy use for heating, cooling, lighting etc.) and the form or grade of energy used in the performance criterion (useful, delivered or primary). However, the EPBD and associated development of EN Standards led to the most comprehensive coverage, namely all major energy end uses and primary (fossil fuel) energy use, normally expressed in term of kWh per m^2 (and possibly also kg of CO_2 per m^2).

The newly adopted methodologies varied in complexity across Member States. In general, different methodologies were used for residential buildings and for other buildings, but in a small number of countries a common universal methodology was used. All calculation methodologies used an overall energy performance indicator, covering the main thermal and electrical uses, and expressed as annual kWh of either final energy or primary energy per m^2 of gross floor area. These methodologies tended to align with the European Standards (EN) that were under development, but delays in the latter meant that national authorities proceeded to finalise their methodologies in advance of the new EN standards being formally adopted.

Associated with the methodologies, officially recognised software tools were developed or adapted from existing tools. These also served as an important medium for training of designers, specifiers and EPC assessors in order to meet the relevant professional service delivery requirements to comply with the Directive. Training delivery was sometimes preceded by a 'train the trainers' course given by the national energy agency, software

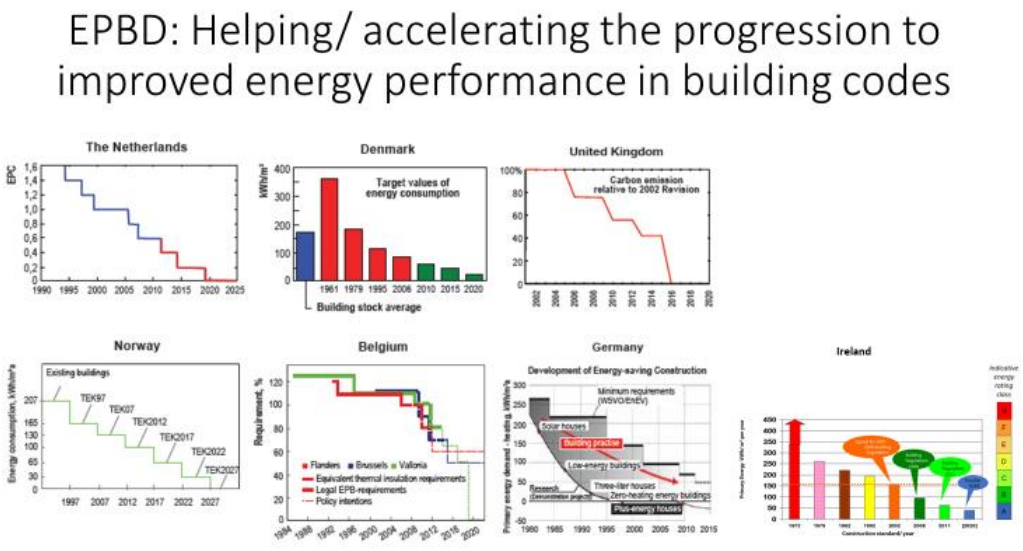
developer, academic or other specialists. Providers of such training delivery to building professionals (architects, engineers, surveyors, architectural technicians) varied between different Member States, but included a mix of academic institutions, professional bodies, software providers and commercial training providers. These providers were typically subject to national training accreditation authorities. Training was frequently concluded with an examination in order to qualify for registration as a 'competent person'.

Some Member States also published Codes of Practice to which technically qualified persons were required to commit before being registered by the relevant registration body (architectural, engineering or surveying institutions, or national energy agency).

In relation to setting of improved energy performance requirements, the majority of Member States reviewed their existing requirements and, in most cases, introduced more stringent requirements. In all cases a format of requirement was adopted whereby a maximum permissible energy intensity, was specified for different categories of building, expressed as kWh/m^2 per year of either final energy or primary energy. In a number of countries, a maximum permissible carbon or CO_2 intensity was also adopted. For non-residential buildings and sometimes for residential buildings, determination of compliance involved such an energy or carbon indicator being compared with that of a notional or 'reference' building of the same geometry and an appropriate technical specification.

A selection of examples of the progression in energy performance requirements being accelerated by the EPBD in building codes across a number of EU Member States is shown in Figure 6-1.

Figure 6-1 Examples of improvements in building energy codes being accelerated by the EPBD.

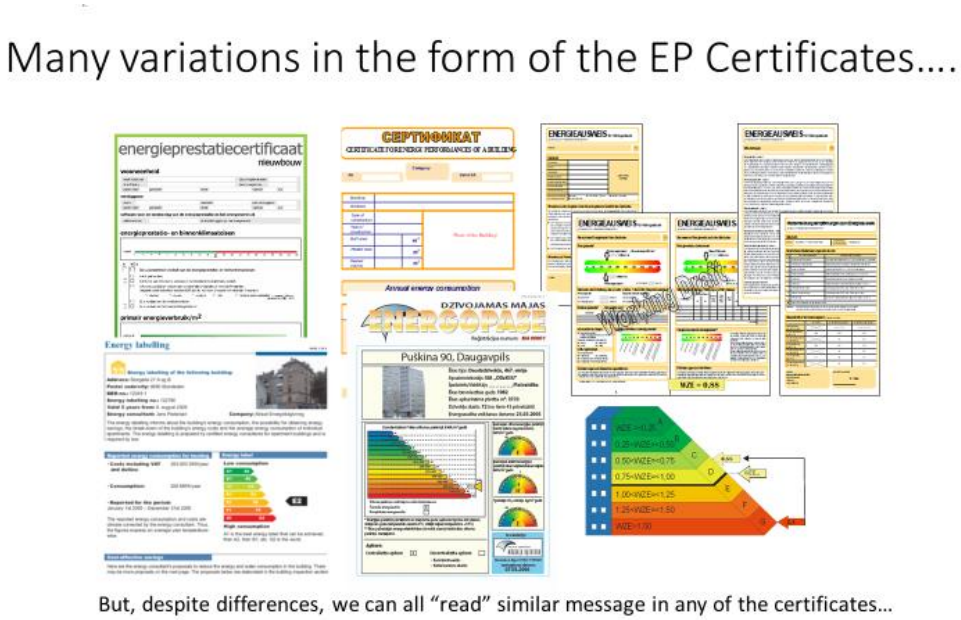


In relation to the accompanying design of the EPC system, a process of development was pursued by the Member States. In the small number of best practice cases, this was an extensive process which typically included the following:

- Development of the format and design of the EPC label.
- Specification and organisation of training as described above, with timelines to ensure adequate numbers of qualified design professionals and EPC assessors.
- Development of Codes of Practice or Codes of Conduct.
- Establishment of registers of EPC assessors.
- Design and establishment of EPC databases/ registers for on-line lodgement of EPCs.
- Development of a quality assurance regime with associated disciplinary and complaints procedures.
- Website development.
- A major communication and promotional campaign for the construction industry, politicians and the general public.
- Ongoing helpdesks for EPC assessors, building owners and the general public.

In general, for new buildings and buildings for sale or rental, the EPC was based on a calculated 'asset rating' rather than an 'operational' or measured energy use rating, to allow like-with-like comparison between competing properties. While the fundamental concept of an EPC with a scale from A to G was commonly applied across the EU, individual Member States took different aesthetic and functional approaches to the design of the EPC, as is shown in Figure 5. These may work well within the individual States but do not facilitate interpretation between different States.

Figure 6-2 Examples of the variety of design formats for Energy Performance Certificates (EPCs) in Europe



A small number of Member States established a mandatory register of EPCs whereby EPC assessors were required to lodge their EPCs (certificates) to this central database. This has brought considerable strategic benefit and provided a monitoring resource and a basis for systematic quality assurance. Importantly, in the case of new buildings in particular, it also has had the potential to serve as a compliance monitoring resource to the enforcement authorities in relation to the energy performance requirements.

7 FURTHER REQUIREMENTS OF THE RECAST EPBD (2010)

Following its early years of implementation, the Directive was reviewed, and areas of implementation weakness and potential improvement were identified. This led to a 'recast' of its provisions in 2010. In essence, the recast EPBD reinforced or augmented a number of the provisions in the original Directive, aimed at strengthening its effectiveness. The new provisions included:

- A requirement to apply a specified 'cost optimal' method (a form of life cycle assessment) in reviewing and setting energy performance requirements for both new and existing buildings[7];
- A requirement to define and achieve 'nearly zero energy buildings' as the energy performance standard by 2019-2021, and to publish national roadmaps to reach this target;
- An obligation for EPC rating information to be included in advertisements of buildings offered for sale or rental;
- A requirement to establish independent recording and control systems for energy performance certificates and inspection reports.

The NZEB target includes a requirement that indoor air quality is not adversely affected.

The recast EPBD also placed a greater emphasis on enforcement, requiring that 'penalties provided for [infringements against national provisions] must be effective, proportionate and dissuasive.'

[7] (i) existing buildings, building units and building elements that are subject to major renovation; (ii) building elements that form part of the building envelope and that have a significant impact on the energy performance of the building envelope when they are retrofitted or replaced; and
(iii) technical building systems whenever they are installed, replaced or upgraded

8 FURTHER IMPLEMENTATION OF THE RECAST EPBD

The cost optimal methodology introduced a long-term life cycle (c. 30 years) approach to assessing the appropriate standards of performance to be set in the building code both for buildings as a whole and for their individual elements. The concept is schematically shown in Figure 8-1, with energy intensity on the X axis and cost intensity (life cycle cost) shown on the Y axis. The EU Commission issued guidelines in 2011 which were to be applied by Member States in their first new reviews of energy performance standards on the basis of this methodology, to be completed by 2013. In applying this process, different construction traditions, materials, climates and economic conditions have led to a rather variable set of energy performance standards across EU Member States. However, overall this new framework methodology has provided a new impetus to the significant improvement of energy performance standards across Europe.

Figure 8-1 Concept of cost optimal methodology for assessing energy performance requirements

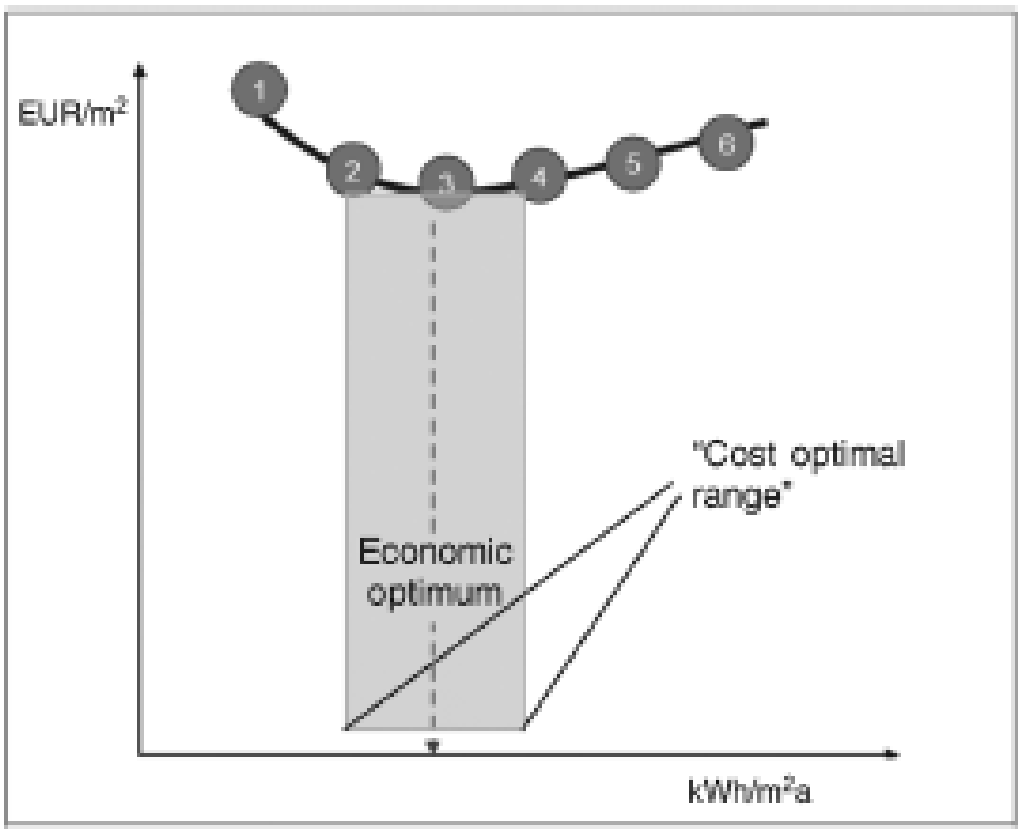
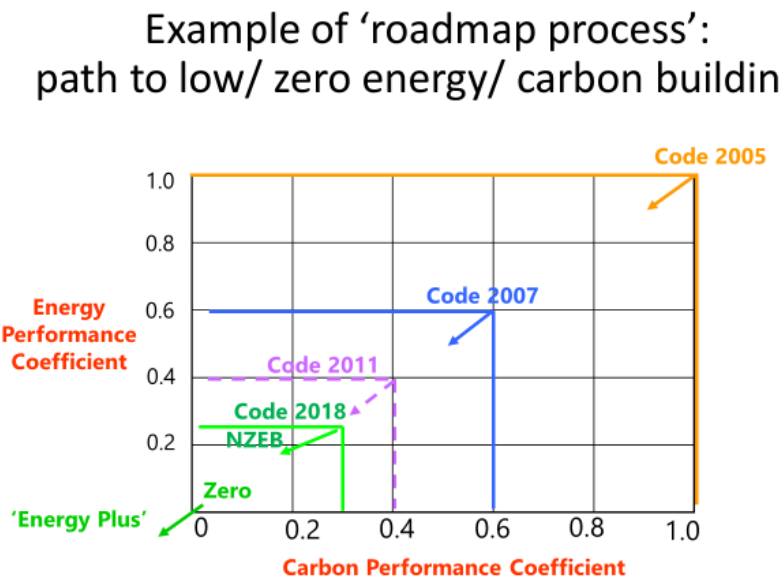


Figure 8-2 illustrates the progressive improvement process in energy and carbon performance standards for new buildings in one EU Member State, leading to NZEB. By 2016, 26 of the 28 Member States had prepared a definition of NZEB and 27 of them had introduced measures to promote energy efficiency renovation to 'deep' or NZEB levels.

Figure 8-2 Example of graduated 'roadmap' process to NZEB for one EU Member State



Progress was made on including EPCs in property advertisements, an example of which is shown in Figure 8-2. However, only 3 Member States issued guidelines for the use of EPCs in such advertisements, in collaboration with real estate agents, and enforcement to date across different States appears to have been inconsistent.

Figure 8-3 Example of a property advertisement containing an EPC rating

Similarly, while a growing number of Member States have taken the step of establishing central databases for EPCs, not all have strong functionality, but the best examples allow access for enforcement authorities, researchers and policy makers, on an anonymised basis, to enable quality assurance strategies and inform national and regional plans for energy efficient renovation of the existing building stock. EU guidelines have been produced in relation to sampling of EPCs for quality assurance and associated enforcement purposes, and

there appears to be a growing adoption of these guidelines, but significant progress still remains to be made in this regard.

9 IMPACT: WHAT HAS THE EPBD ACHIEVED TO DATE?

The EPBD has been changing the way that energy use in buildings in across EU Member States is regulated and perceived by market players, both for new buildings and refurbishments. It has been successful in improving energy efficiency, especially in new buildings, a result documented in several independent studies. It is contributing to a market transformation which is positive for the EU and its citizens, economically, socially and environmentally. Its impact has been strongly felt in a number of areas:

Mandatory minimum standards of energy performance

Whilst all EU countries previously had their own building regulations and standards, each was significantly changed in format and content in response to their adoption of the EPBD. The common framework of obligations - to set energy performance standards according to a more comprehensive primary energy intensity indicator, to review these standards at least every five years using a cost optimal method, and the drive to achieve NZEB performance standards by 2021 - is continuing to accelerate the adoption of more ambitious energy efficiency standards. This drive is also being reinforced by the provisions in the allied Directive on Energy Efficiency regarding renovation strategies and the Directive on Ecodesign regarding energy using equipment (heating, cooling, lighting, motors etc.).

The performance approach in the methodology and the compliance criteria can possibly entail more complexity in the software and in preparing the input data parameters but has important advantages in terms of maximising design flexibility, consequent scope for cost-efficient trade-offs between different features, and of similarly encouraging the development and deployment of innovative energy efficiency products and systems. It can be expected that this will integrate well with building information modelling (BIM) in the case of more complex buildings in particular.

In several EU countries, the performance requirement is supplemented by minimum requirements (or backstop values or criteria) for individual elements or components of the building. This encourages a 'fabric first' approach to building design and specification, rather than for example relying on renewable energy to compensate for inappropriate design of the building envelope.

9.1 Mandatory energy certification with market visibility

The introduction of EPCs for construction, sale or rental of a building is playing a prominent role in informing potential buyers and tenants about the energy performance of building units, such as an apartment or office space, or of entire buildings. They allow comparisons in terms of their energy efficiency which, with the obligations in relation to their inclusion in property advertisements, is making energy efficiency a visible market factor. In theory they should influence the demand for buildings with better energy performance and using a high proportion of energy from renewable sources. This is expected to increase their market value,

on which there is already encouraging research evidence emerging, and to provide a market driver to stimulate building owners to renovate their buildings.

It has also stimulated the creation of a new or improved set of skills dedicated to the provision of energy performance certificates and the training, certification and management of energy assessors. In the case of non-domestic buildings it was primarily an augmentation to the services of architects and building services engineers.

9.2 New concepts, tools, skills and innovation

In the process of establishing the mandatory performance standards and EPCs, the EPBD has succeeded in creating a much stronger focus on the potential for improving the energy performance of buildings. In several countries this triggered interest among progressive investors in the construction and property sector in going beyond the minimum standards or seeking to undertake energy-saving refurbishment of the existing building stock including. This has been happening in both the commercial and apartment housing sectors.

The Directive has also promoted new tools and concepts (e.g. a common methodology to calculate the energy performance of buildings, common CEN standards, EPCs, NZEBs, cost-optimality) to drive forward improvements in the energy performance of the building stock. This is accompanied by the stimulation of new or improved professional, trade and industry skills in these fields.

The EPBD has been particularly helpful in giving clarity about the level of future energy requirements in regulatory building codes, notably in establishing a clear policy pathway for adopting NZEBs. The improvement in standards and associated tools as a result of the mandatory requirements in the EPBD has been a strong driver in many Member States for innovation as well as the learning curve in the construction sector, which has traditionally been slow to evolve. Such innovation can help not only to improve the energy efficiency and quality of buildings but can also help to bring down costs.

9.3 Contribution to energy savings in Europe

The evaluation of the recast EPBD in 2016 shows clear progress in improving the efficiency of the buildings sector as the fall in energy consumption per unit floor area accelerated markedly after 2006 when the original EPBD came into force. This was further reinforced by the effect of the recast EPBD in 2013 and 2014. There is evidence of around 37 million tonnes of oil equivalent (Mtoe) in additional final energy savings in 2013 compared to the 2007 baseline of the recast EPBD. This would indicate that the Directive is likely to deliver its projected impacts by 2020.

This was despite initial observations about delayed uptake, inadequate compliance and enforcement procedures in many Member States, and insufficient rates of energy renovation of buildings.

10 EARLY AND CONTINUING CHALLENGES

Early implementation efforts from 2005 to 2010 had concentrated on the legal transposition of the EPBD, development of calculation methodologies and software, setting of energy performance requirements, and the new concept of an EPC - its form, contents, who could issue them, what skills and training were required, how to keep track of them after they were issued, planning and delivery of communication campaigns, and how to take advantage of them for better informed policymaking. How to recognise and train suitable qualified professionals and how to gain support and acceptance for EPCs from the general public, the professionals and the building industry as a new feature (and cost) of building transactions, were also among the first challenges.

Few countries implemented central EPC databases from the beginning, and this was an early lesson learned, later included as a mandatory requirement in the recast EPBD of 2010. Similarly, the recast EPBD provision for mandatory inclusion of the EPC energy rating in property advertisements, ensuring that the information is available to consumers, is having an important visibility impact and growing influence. It also posed new challenges in applying cost-optimal calculation methods for setting minimum requirements and in establishing national roadmaps to achieve NZEBs by 2020.

While the overall picture is positive, it should be appreciated that implementation and enforcement have not been uniformly effective across Europe. Implementation of the Directive has coincided with a difficult economic downturn in almost all EU Member States. This has led to some initial delays in implementation and, in some cases, less ambitious implementation. But overall, there has been significant momentum in improving energy performance of new buildings in Europe.

Probably the single greatest challenge today is the transformative renovation of the huge stock of existing buildings to become as close to NZEB as possible. The current rate of building renovation is low, with 1-2 % of the building stock renovated each year and it appears that the vast majority of these renovations do not use the full potential energy savings that could be achieved on a cost optimal basis. Energy efficiency renovation has begun to take place in all Member States, usually with financial incentives, but not yet on a sufficiently large scale (in breadth or depth). However, despite the slow uptake of NZEB renovation projects, the NZEB solutions and standards developed for new buildings will be an important driver and benchmark to increase the ambition level for future renovations.

Allied to the EPBD, the Energy Efficiency Directive requires Member State authorities to develop and publish their long-term strategies for mobilising investment in the energy efficiency renovation of their existing building stocks. All Member States have prepared two cycles of such strategies, typically with a timescale that extends to years 2040 or 2050. This is a formidable but vital challenge for energy policy in Europe. A key ingredient in this process is the mobilisation of the banking and investment community to make finance available in a form suitable to the needs of building owners on an individual or collective scale. Substantial central EU wholesale finance (‘Cohesion Funding’) is available for this purpose. Associated with both the EPBD and EED, a structured dialogue has been ongoing between EU financial institutions with the support of the EU authorities aimed at unlocking this field of opportunity. The ‘smart finance for smart buildings’ initiative (below) in relation to the third phase of the EPBD is an important part of this process.

Finally, while the overall evaluation of the EPBD[8] was positive, there are areas which could be further strengthened, notably in relation to more effective enforcement and quality control systems and procedures. In this regard, there are good practice examples in a number of Member States and steady progress is being made but there still remains much room for improvement.

[8] http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1486739109595&uri=CELEX:52016SC0408

11 DIVERSITY AND COLLABORATION

Energy performance improvement trends can vary significantly from Member State to Member State. This reflects differing historical experiences, institutional systems, climate, tools, skills and overall state of market development with regard to energy efficiency. For this reason, analysis and exchange of good practice is essential to deliver further energy savings by 2030, in line with proposed EU targets.

One excellent example of this is the collaborative forum of the EU Concerted Action for the EPBD, which started at the time of the first Directive and has continued to this day, bringing together experts and officials to share experiences and best practice examples. The Concerted Action has produced valuable information to Member State authorities, agencies, planners and market stakeholders on the practical implementation of the EPBD[9]. The common work in developing European technical standards has likewise been a useful reference source for Member States and facilitates more harmonised approaches to implementation of the technical aspects.

[9] https://www.epbd-ca.eu/

12 PROPOSED NEW REVISIONS TO THE EPBD (2015-18)

Following a wide consultation process commencing in 2015, the European Commission in 2016 announced a 'Clean energy for all Europeans' package, focussed on delivering to new proposed energy efficiency, renewable energy and climate goals and targets for 2030. A committee of the European Parliament is in agreement with most of the proposals and is recommending more ambitious requirements in some instances. The proposal is currently under negotiation with Member States and will also require approval by the Council of Ministers.

The package consists of eight legislative proposals and other actions, including a targeted revision of the EPBD. It proposes to retain the main features and implementation deadlines of the existing EPBD and to modernise and streamline other requirements. It specifies further and clearer requirements for national databases on EPCs.

It introduces new obligations for buildings to facilitate electro-mobility, through a new requirement for recharging points for electric vehicles in the parking spaces of non-residential buildings under construction or undergoing major renovation. The proposal also introduces a new 'smartness indicator' to indicate the technological capability or readiness of buildings for (renewable) energy self-production, consumption, measurement and facility to interact with its occupants and with the electricity grid. (Member States' Ministers are proposing that this be a voluntary scheme).

The proposal incorporates existing provisions on long-term renovation strategies (currently part of the EED) into the revised EPBD. It is proposed that these strategies should now introduce specific milestones for 2030, aim to deliver the long-term goal of a decarbonised building stock by 2050, specify measures to alleviate energy poverty, and guide investment decisions by aggregating projects, de-risking energy efficiency investments and using public funding to leverage private-sector investment.

Previous EPBD provisions on inspections of heating and air conditioning systems are proposed to be streamlined and simplified. This would seek to enhance the use of building automation to ensure continuous performance monitoring of energy efficiency, thereby limiting the need and frequency of physical inspections.

The legislative proposal was accompanied by a 'Smart finance for smart buildings initiative', which seeks to focus the use of existing EU funds, primarily regional development and cohesion funds, European Investment Bank loans and European Fund for Strategic Investments, to improve energy performance in buildings, and to increase use of renewables in self-generation and self-consumption. The major goal of this is to improve the investment climate for energy efficiency, de-risking investments and provide greater confidence for investors in these activities. This may involve deploying financial instruments and flexible energy efficiency and renewable financing platforms to make more effective use of public funds. This is a real opportunity for Member States to help drive their building energy renovation strategies.

13 CONCLUSION

Buildings account for 40% of Europe's energy consumption. The EPBD has been the principal policy driver of the energy efficient transformation of the building stock in Europe for more than a decade and is now entering its third phase of evolution. Its provisions have generated an overall uplift in the energy performance of new buildings in particular and have been implemented on the ground in all EU Member States. The strength of implementation has varied between different countries, but overall the Directive has been a powerful instrument for positive change in the performance, skills, innovation and visibility of energy efficiency as an integral factor in the construction and property sector and in contributing to the quality of life of society as a whole. A key success factor has been active collaboration and sharing of best practice implementation experiences among Member States.

The EPBD continues to be a work in progress, with more ambitious targets, the mobilisation of large scale renovation of the existing building stock, the use of innovative, smart and integrated technologies and effective enforcement being key areas of challenge and opportunity. These will all be actively addressed in the forthcoming third phase of evolution of this vital Directive.

Fuller details on the various aspects of implementation (e.g. training, compliance, energy performance certification, standards, role of product and service suppliers, finance, etc.) will be given in the later position papers in this series.

14 WEB RESOURCES

The following is a small selection of websites from which useful information can be obtained on EPBD implementation.

Website title	Description	Web address
Build Up	EU portal for energy efficiency in buildings. Extensive library of documents, webinars etc. relating to EPBD and related implementation	www.buildup.eu
Building Performance Institute Europe (BPIE)	A European 'think tank' providing policy research and advice on energy in buildings, with publications and monitoring of progress with EPBD implementation	www.bpie.eu
EU Commission – energy efficiency in buildings pages	Covering EPBD and allied Directives, independent reports, national reports, events	https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings
EPBD Concerted Action	Public website for collaborative forum of Member States to assist EPBD implementation	www.epbd-ca.eu