Market study for a voluntary common European Union certification scheme for the energy performance of non-residential buildings

Final Report

Contract details

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Abbreviations

BEAM	Building environmental assessment method
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method
CASBEE	Comprehensive Assessment System for Built Environment Efficiency
CEN	Comité Européen de Normalisation (European Committee for Standardisation)
CEN EPB	CEN Energy Performance of Buildings
CSH	Code for Sustainable Homes
CSR	Corporate Social Responsibility
DEC	Display Energy Certificates
DGNB	German Sustainable Building Council
EC	European Commission
EEFIG	Energy Efficiency Financial Institutions Groups
EPA	Environmental Protection Agency
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificates
EU	European Union
GBC	Green building Council
HERS	Home Energy Rating System
HQE	Haute Qualité Environnementale (High Environmental Quality)
ISA	International Sustainability Alliance
ISCC	International Sustainability & Carbon Certification
LCA	Life Cycle Assessment
LEED	Leadership in Energy and Environment Design
MIPIM	Le marché international des professionnels de l'immobilier (International Real Estate Show)
MS	Member State
NZEB	Nearly-zero energy building
SWOT	strengths, weaknesses, opportunities and threats
QA	Quality assurance

Executive Summary

The aim of this study was to undertake a thorough market analysis regarding a **voluntary common certification scheme for non-residential buildings in the European Union, with a focus on energy performance**. The results of this study will serve as a basis for the implementation of Article 11 (9) of the recast EPBD, which requires the Commission to adopt a voluntary common European Union certification scheme for the energy performance of non-residential buildings.

Our approach to this study involved three stages: (1) to undertake a market survey and an analysis of building certification schemes in EU MSs, (2) to identify the potential scope and positioning for a successful common EU certification scheme for the energy performance of non-residential buildings, and (3) to provide recommendations and a Roadmap for further development and implementation of such a scheme.

Analysis of building certification schemes

A Building Environmental Assessment Method (BEAM) evaluates the environmental performance of a building against an explicit set of criteria. BEAMs emerged in the early 1990s to provide a measure of the environmental performance of buildings, and over 20 such tools are now in use world-wide. Some of these assessment methods are well-established, such as BREEAM, LEED, CASBEE and Green Star. These schemes can be used on different types of buildings (new vs. existing; residential vs. non-residential; etc.); cover different stages (design, construction, upon completion or operation); and address different criteria (energy only vs. sustainability schemes).

In the absence of financial incentives, the take up of a voluntary building certification scheme depends on the benefits perceived by the client in terms of marketing advantage and/or enhancements to building performance. The main target group of such a certification scheme are real estate companies, investors or home owners. Their motivation is to have a label demonstrating both the greenness of their buildings and to have a credible assessment that their building has a low energy demand.

Building certification schemes in Europe

We have reviewed and ranked 22 voluntary building certification schemes (both energy only and wider sustainability schemes) that are used in Europe. These schemes are mainly developed and used for commercial buildings. The residential market for green sustainable schemes in Europe is immature due to a lack of incentives for home owners to certify their homes (e.g. high costs, lack of comparable data, and lack of knowledge). Public and private users of schemes for the residential market primarily rely on the mandatory Energy Performance Certificates (EPCs) required by the EPBD.

Most countries are able to use existing schemes from other countries (for commercial buildings). However, these international schemes, such as LEED and BREEAM, are used to a very limited extent due to a combination of factors, including the high costs of the schemes, low market demand (e.g. a small country, stagnating construction sector, etc.), and/ or a lack of resources at the national level to develop and run these schemes. Low awareness of the advantages of these schemes has also been mentioned as a potential reason for the low take up.

Our review indicates that there are six main voluntary certification schemes used in the EU as presented below.

Certification system	Developer	Key figures
LEED	US Green Building Council (1993)	• US + 30 countries • Over 7 000 projects, over 140 km^2 of building floor area • Sustainability rating
DGNB system	German Sustainable Building Council	• 25 countries • 13 different building types • Around 50 criteria assessed
PassivHaus	Germany (1988)	• Over 15 countries • Over 30 000 buildings
BREEAM	BRE (UK, 1988)	• Over 50 countries • 8 National Scheme Operators • Over 250 000 buildings
HQE	Association pour la Haute Qualité Environnementale (France, 2005)	• Primarily used in France • 14 targets for environmental quality • 4 different building types
Minergie	Switzerland	• Core markets: France, Italy, Germany and the USA (8 countries) • 13 building types, primarily used in residential sector • Energy and indoor comfort focused

BREEAM is the European market leader, accounting for more than 80% of all sustainable commercial building certifications in Europe, based on 2013 data on the number of certifications for commercial buildings. In total, the four major schemes (BREEAM, LEED, DGNB, HQE) reported 9,669 certifications in the EU28 between 2012 and 2013 (up to 31 March 2013).[1]

The main difference between these schemes is the environmental and energy aspects they cover and the weight they give to different environmental categories. These follow the main environmental and social issues for the scheme's region, resulting in rating systems tailored to account for climate and local culture. Some systems also give credits for compliance with building regulations. This makes benchmarking or comparison between schemes difficult as their baselines, scope and indicators differ. According to the EEFIG Interim Report "Energy Efficiency – The first fuel for the EU Economy" easier comparison across countries would facilitate the delivery of a single market for energy efficiency – which in turn would lower transaction costs for businesses[2]. The report adds that improvements and standardisation of energy performance certificates in terms of coherence, reliability, usefulness, ease of access and accuracy are on the "wish list" to drive investment in such energy efficient buildings.

Market analysis and demand

The analysis presented above and the conclusions related to the current experience of stakeholders in Europe with building certification schemes are based on interviews involving both open and multiple choice questions. Even though there are a limited number of interviewees, this analysis has proved

[1] RICS, "Going for Green, Sustainable Building Certification Statistics Europe", September 2013

[2] EEFIG (2014), "Energy Efficiency – the first fuel for the EU Economy", Interim Report, page 13

valuable for assessing the market and demand for an EU voluntary certification scheme for non-residential buildings.

The market for voluntary building certification schemes is young. However, it is important to note that there are differences between European regions. The Western EU countries, many of which have their own national voluntary leading schemes, e.g. BREEAM in the UK, DGNB in Germany or HQE in France, all report a steady rise in certification. Furthermore, it appears that in Western Europe certification of new buildings is considered more or less mandatory for certain types of development. In contrast, other parts of Europe have only recently started using the rating schemes.

We also looked at the factors influencing the selection of a scheme as well as the possible drawbacks in order to derive conclusions on what the market needs and wants in the future. Some of the key factors when choosing a certification scheme include reliability, cost and international acceptance.
As for market demand, 67% of scheme operators surveyed think that current and potential customers need and want schemes which include wider sustainability issues. In order to respond to this finding the proposed voluntary common EU certification scheme could be developed in a modular way, starting with the 'energy module' and (eventually) developing additional modules on other sustainability issues.

Scope and positioning for a successful voluntary common EU certification scheme

In order to determine the scoping and positioning of a new voluntary common EU building certification scheme we interviewed key stakeholders, including scheme operators, building owners and scheme users as well as finance providers across all EU Member States. The interviews were complemented by a comparison of what is available in the market based on in-depth analysis of the six leading voluntary schemes: BREEAM, DGNB, HQE, LEED, Minergie and PassivHaus.

This process resulted in the following key conclusions which are further discussed and elaborated in Chapter five of this report. The most significant added value a voluntary common EU scheme could provide is to allow for a consistent comparison between buildings across the 28 Member States while simultaneously offering high quality assessment and international acceptance. This aspect was identified as an advantage by the majority of interviewed stakeholders, often regardless of whether the stakeholders themselves acted on an international level.

Another commonly expressed concern (44% of the interviewees) was the need to avoid duplication of efforts and costs, between any new voluntary scheme and existing mandatory schemes (i.e. national Energy Performance Certificates required under EPBD). In this respect the majority (approx. 67%) of scheme users are in favour of integrating the EU common voluntary scheme within existing mandatory or voluntary schemes. This indicates the market's preference for avoiding an increase in the number of schemes in order to prevent further complexity and confusion among scheme users and small/individual building owners.

The main challenge in this regard, as identified by the majority of the interviewees, was to find a way in which a voluntary common EU scheme, with a focus on the non-residential sector, could function well and complement the existing national Energy Performance Certification systems. Member States have already put great effort into developing and implementing their national schemes (as required by the EPBD). As such, the introduction of a voluntary common EU scheme which could be linked to the existing national Energy Performance Certification systems and also provide a way of comparing

buildings throughout the EU was viewed by many as a very positive suggestion. Linking the new EU scheme with existing schemes like the EPCs could also help address issues such as low reliability (due to assessor quality and/or low compliance rates). During the design phase the possibility to use (parts of) the inputs to and results of national EPCs for receiving certification under the voluntary common EU scheme should be considered. This would form links between the two schemes. A similar approach is already followed by EC accredited certification schemes in other fields, e. g. in certain biofuel logos.

A voluntary common EU scheme could also help raise ambitions in countries with low standards of building certification and energy performance by providing a common methodology for assessment throughout the entire EU. Many see this as clear added value.

CEN and its calculation methodology

A key part of the technical development of a voluntary common EU scheme is the energy assessment method it uses. The basis of this scheme will be the updated CEN standards developed in relation to the EPBD (under mandate M 480) and the set of default CEN options. In this development process, the regular CEN procedures to build consensus, involving a wide range of stakeholders, are complemented by specific Member State consultation instruments. The aim of this is to maximise acceptability and usability. The CEN EPB method reflects the delicate balance in the requirements set by mandate M 480 on developing a harmonised methodology with flexibility at national/regional level. The method contains choices between options (e.g. simplified or more complex assessment methods), boundary conditions and input data that may differ per country (e.g. climate and user patterns). CEN will provide a CEN default for all the choices within the methodology. These defaults will make the voluntary common EU scheme operational. Periodic review and adaption of these default values based on practical experience will increase the utility of the scheme for the Member States. This makes these periodic reviews an essential part of the setting up and running of the voluntary common EU scheme. We would advise that CEN experts are given an active role in the developments of the scheme to ensure consistency between it and the CEN EPB method.

Recommendations for further development and implementation of the scheme

The study also presents a suggested scope and positioning for the voluntary common EU scheme. This takes stakeholder support and concerns into account in order to suggest solutions that will lead to a successful scheme. The legal basis of the proposed scheme, Directive 2010/31/EU (recast-EPBD) Article 11 (9), requires the Commission to adopt, in consultation with the relevant sectors, a voluntary common European Union certification scheme for the energy performance of non-residential buildings. The important points from this text are:

- The scheme is only intended to cover energy – there is no mention of wider sustainability issues.
- The scheme is intended to be voluntary – to be used in addition to the mandatory EPCs or taken up by Member States on a voluntary basis. The Directive encourages Member States to recognise or use the scheme (or parts of it) by adapting it to national circumstances.
- The main focus of the scheme is the non-residential property market, where voluntary sustainability certification (including an energy component) is already widespread.
- The aim of the voluntary common EU scheme would be to enhance the transparency of energy performance in the non-residential buildings market on the basis of uniform conditions across the EU (see recital 31 of the EPBD).

To achieve a system that best matches the intervention logic and market needs and demands we suggest the following:

- ✓ **Consider a pilot phase for initial launch focusing on a sub-sector of the non-residential building stock (e.g. offices, hotels)** – this approach makes it simple and MS comparable. After some time, it could be expanded to cover other building types in the future (if demand exists, or others want to adopt the approach).

- ✓ **Cover the public and private sector** – to maximise potential uptake and to allow public sector to 'lead by example'.

- ✓ **One single version to cover both new and existing buildings -** to create uniform and transparent conditions for the non-residential property market. The underlying benchmarks and methodology should be adapted accordingly.

- ✓ **Start with a module for energy only** – this avoids duplication of leading schemes but provides an option for scheme providers to us this as the "energy module" in their schemes. This would also be highly appreciated by multinational investors who have to deal with 28 non-comparable national schemes. If other schemes (including new sustainability schemes resulting from any future EU common approach to assess the environmental performance of buildings as suggested in the Commission Communication on resource efficiency opportunities in the building sector[3]) wish to use the benchmarks and methodology in their wider scope schemes this should be allowed and encouraged. It also allows the possibility of future expansion into other modules.

- ✓ **Needs to have energy in use and as designed** – make use of the CEN method for the 'as designed', and for a standardised 'as constructed' version; this meets the market need for benchmarking and the need in some MSs for an accepted mandatory EPC methodology. Mandatory disclosure of actual energy consumptions is in line with the EPBD-recast as mentioned above, with a possibility to generate a statistical benchmark, which could be used for communication purposes. The benchmarking of energy in use (i.e. taking into account correction factors and building type / use) requires in use benchmarks to be calculated/ collated, which could be achieved by inviting bids for scheme operation, including from existing benchmarking scheme operators. In use benchmarks appear key to offering added value in comparison to national mandatory EPCs and to achieving the objectives of the scheme, but could be challenging to develop. There may be a need to develop an operational rating methodology and benchmark in addition to the asset rating.

- ✓ **Low cost** – as compared to the currently available voluntary sustainability schemes, the default CEN options would provide data for energy assessment software tools more cheaply. Access to these tools would still need to imply some cost, in order to create a business case for e.g. software companies to develop such a tool, but it is expected to be less expensive than at present.

[3] COM(2014)445

- ✓ **Centralised registration system and disclosure** – this should help increase uptake and create a new market for businesses and international investors while making the system more efficient. Experience at Member State level indicates that national or regional databases enable the implementation of control mechanisms which are necessary to strengthen the trust in the certificate and prevent fraud. Lastly, if the data can be made public it will also be useful for research purposes.

- ✓ **Comparative label design** – allows for comparison of energy efficient building stock and provides an incentive for scheme users/ building owners to improve their performance beyond what is required. In other words, it gives visibility to the energy performance of buildings contributing to improving energy efficiency in the real estate sector.

Roadmap for the roll-out of the scheme

A roadmap to roll-out the voluntary common EU scheme has been proposed, including the technical development and the organisation and running of the scheme. We foresee the technical development of the scheme being led by a consultant/ technical adviser. This would assist the European Commission in designing the operation of the scheme with an active role for CEN, and in consultation with private and public stakeholders. The establishment of a 'working group/ round table' is proposed as one of the options to plan and/or oversee the implementation of the scheme and to enable the continued involvement of stakeholders throughout the implementation process as well as to guarantee consistency with the existing CEN EPB methodology. This working group could follow the IEA type of working group or a more open structure could be used, with dedicated stakeholder meeting(s) similar to the consultation workshops held during the course of this project. We suggest that the Commission should oversee the number and type of stakeholders who will be part of the group. This will help ensure the quality and effective functioning of the group.

A key part of the technical development is the energy assessment method used in the voluntary common EU scheme. The updated CEN standards and the set of default CEN options developed in relation to the EPBD can be the basis for this scheme. It is proposed that the technical development cost of the voluntary common EU scheme would be borne by the EU.

We suggest looking for synergies between the voluntary common EU scheme, and existing schemes (national voluntary schemes, EU level voluntary schemes and possibly national mandatory EPC schemes). We also suggest working closely with Member States' experts and coordinating with any process already in place at Member State level. The links to the issuing of existing sustainability schemes need to be further exploited. This will allow for quick implementation and uptake of the voluntary common EU scheme and will contribute to developing the market for energy services in the EU.

For the organisational roll- out of the voluntary common EU scheme we have developed a six step roadmap following the widely used policy cycle that divides developing a functioning policy or regulation into the necessary phases of *planning, implementation, monitoring* and *evaluation*. In order to set up an organisational structure for a certification scheme, several initial decisions need to be made, dealing with questions of ownership and management, the scheme management structure and the set up and organisation of the certification and labelling process.

Figure 1 presents the steps that need to be taken to set up the voluntary common EU certification scheme. Each step includes a recommendation for set up as well as a list of key tasks that are connected to the successful execution of the step.

Figure 1 Roadmap to roll out of scheme

After the initial planning phase is completed and the key decisions made we recommend launching an 18 month test phase to identify any challenges with running the scheme. In order to keep this test phase simple we recommend starting with the certification of a single sub-sector (e.g. hotels or offices) and to include other sub-sectors in a future step. Hotels and offices have been identified as the sectors that are most likely to benefit from a common scheme, as they both have high comparability across Member States, as well as relatively standard building services and needs. Buildings in both sectors are also often international assets or part of international portfolios, this attribute led interviewees to identify them as the most likely sectors to support the uptake of the voluntary common EU scheme.

The test phase will also give an opportunity to adjust the verification system to better fit the identified needs. Finally the roadmap also includes a step dealing with the periodic review and adoption of the technical method behind the voluntary common EU scheme. To support the design of the operation of the scheme as well as the scheme management, mechanisms to continue consulting stakeholders and scheme users in the non-residential property market will be needed (e.g. through a dedicated stakeholder meeting or a technical working group, as mentioned above, including national building sector experts that will advise on the technical side of the scheme).

1 Introduction

1.1 Context & Relevance of the Study

The results of this study are intended to serve as the basis for the implementation of Article 11 (9) of the recast EPBD, which requires the Commission to adopt a voluntary common European Union certification scheme for the energy performance of non-residential buildings.

This study is the first of a two part approach to developing a voluntary EU wide scheme on the energy performance of (non-residential) buildings. Central to the study is the need to explore the target market for this scheme and to investigate what the options for it are. The study also requires us to obtain a good understanding of the current market for building certification schemes and to investigate existing certification schemes (e.g. BREEAM, LEED, DGNB etc.) and their success factors. The study will then identify the scope and positioning of the proposed common EU certification scheme and provide realistic suggestions on how to successfully operate it. We will also make recommendations for the further development and implementation of the new scheme (e.g. who should do what, and should it compete with, or be built into existing schemes?). What the users of the existing schemes think of a future voluntary EU wide scheme require is also important. The second future part of the approach will focus on the detailed development and design of the scheme.

The aim of DG Energy is to achieve a pan European tool for calculating the energy performance of buildings and to build a (voluntary) certification scheme/system on this. There are three main long-term reasons for this:

1. To develop a tool to demonstrate the practical applicability of the EPBD-CEN standards;
2. To allow a better comparison of the energy performance of buildings on a common Europe wide basis; and
3. To create a tool that can link building ratings to European or National financial instruments, e.g. favourable loans/grants for highly rated buildings.

1.1.1 Previous Research

In 2011, as required by the recast EPBD, the EC explored ways in which to achieve a voluntary pan EU standard. This previous work considered the following potential options:

- To adopt an approach of a standard EU calculation method and label based on the CEN standards that are produced under the current mandate (like is being considered now);
- To create an EU "best-in-class"-label ranked according to the MS produced measurement approaches in terms of how well they matched a standard EC approved procedure; and
- A tool which could be built into existing certification schemes, e.g. the energy related part of an "Ecolabel" for buildings.

The Commission presented a draft proposal to Member States (MS) and a group of relevant stakeholders involving an approach based on current national standards and current CEN standards (as the new set of EPBD- standards under the second Mandate 480 to CEN would only be available by 2015). Most of the MSs and relevant stakeholders showed little enthusiasm for the further development of the draft proposal. Preference was given to the option to wait for a (high quality) common European Union

calculation method based on the new set of CEN standards rather than to risk a false start on the market that would be difficult, if not impossible, to reverse. Some smaller MSs expressed their interest and indicated that they could imagine using a common EU method based on CEN standards as their national method, even for residential buildings.

1.1.2 The CEN Methodology

CEN is now in the process of developing new standards on the calculation of the energy performance of buildings (effectively a default methodology for calculating the primary energy use of buildings under 'standard' conditions). This standard methodology will be available to all MSs and they may make use of the method and will have the possibility to adapt it to their own needs. CEN will also propose a "CEN preferred/default option" for calculating the energy performance of buildings. The CEN standards under the current mandate will be available by 2015, at which point the Commission wants to have the 'voluntary common EU scheme' ready for application.

The core of this study is to undertake all necessary work (that is not subject to the CEN mandate) for a market survey. However, to ensure smooth cooperation, the team have kept track of CEN developments regarding this methodology.

1.2 Objectives of this Study

The aim of this study was to provide a thorough market analysis for a **voluntary common certification scheme for non-residential buildings in the European Union (EU), with a focus on energy performance**. The main objectives were:

- To obtain a good understanding of the current market for building certification schemes (voluntary, mandatory, sustainable & energy), their success factors and failures;
- To identify the scope and positioning for a successful common EU certification scheme for the energy performance of non-residential buildings;
- To give recommendations for the development and implementation of such a scheme.

Specific objectives included exploring the following key issues:

- Undertake a market survey.
    - Collection, analysis and evaluation of the existing data, statistics and publications of certification schemes on the market (EU/non-EU).
    - Identification of all relevant market players on supply and demand side
- Run and monitor the market survey, analyse the data and report the results.
    - Definition of the target market(s) (who are the customers, market share, etc.).
    - Analysis (data on figures/findings).
- Scope (Market needs, wants and demands).
    - Market take up of the most relevant/ important schemes.
    - Needs of the users of existing schemes (scope, content, price, calculation method, quality insurance, overall management, costs, etc.) .
    - Market demand for a common EU scheme.
    - Distinguish: new/ existing buildings, public/ private, energy only/ other, etc.
- Positioning for a successful common EU scheme on the market.
    - Strength and weaknesses of the most relevant existing schemes.
    - Success factors.

    - Overlap with existing certification schemes.
    - Value added of a common EU scheme.
    - Distinguish: new/ existing buildings, public/ private, energy only/ other, etc.
- Marketing strategies.
    - Evaluation of marketing strategies & recommendations.
    - Design options available for a system (e.g. should the new scheme compete with, or be built into existing schemes?).
    - 'Defining the product'.
    - Risks.
- Organisation of Management.
    - Assessment of existing management schemes.
    - Responsibility allocation for operating a common EU scheme (e.g. who should do what? e.g. split of responsibility between the certifying industry and the EC).
    - Analysis and suggestions for training schemes and quality management.
- Distribution and communication concept.
    - Analysis of existing distribution and communication concepts and suggestion of proper concepts for the common EU scheme.
- Financing.
    - Assessment of existing financing schemes/ instruments.
    - Suggestion for financing schemes for the common EU scheme.
- Roadmap / Rollout concept.
    - Recommendations for the technical development of the scheme.
    - Concept of how to roll-out successfully such a new scheme on the market.

1.3 Our Approach

Our approach to this study involved three main steps: (1) to undertake a market survey and analysis of building certification schemes in EU MS, (2) to identify the scope and positioning for a successful common EU certification scheme for the energy performance of non-residential buildings, and (3) to provide recommendations and a Roadmap for further development and implementation of such a scheme. The methods used were desk research, extensive stakeholder consultation and expert meetings.

1.3.1 Market analysis

We prepared an inventory of building certification schemes used in each of the 27 EU Member States, focusing on the voluntary sustainable and energy schemes and identified the key players at the national and EU level. We completed a rating system ranking methodology and analysis which gave us a shortlist of six leading building/energy rating systems in Europe for a more in-depth analysis. We carried out 2-3 interviews with key national stakeholders from each EU Member State, including scheme operators/ green building councils, scheme users/ property developers, public bodies/ government and finance providers. These Member State stakeholders were engaged in order to e.g. get their views on whether a scheme in parallel or competing with existing schemes would be the best approach; what the scope of the scheme should be (e.g. energy vs. sustainability issues, new buildings vs existing buildings, etc.); the potential uptake of such a scheme, among others. We have qualitatively and quantitatively reviewed the results from the interviews. We have also organised an expert workshop in Brussels, which

was attended primarily by European associations and federations and representatives of the Member States.

1.3.2 Scope and positioning

The key findings from the review were used to investigate the current use of building certification schemes in Europe and the market needs and demands, to define the scope and positioning of a possible common EU scheme. We also carried out a detailed SWOT analysis and review of scoping and positioning of the leading schemes. The analysis identified market strengths, how the scheme is administered, reviewed, financing structure, costs and general revenues (when available) and engagement of stakeholders. We provided a synthesis of the optimal positioning of a European wide scheme. We also took part in another expert meeting, at the international real estate fair for professionals (MIPIM) in Cannes where we presented our study and engaged participants in voting on 9 key questions related to our study.

1.3.3 Recommendations and a Roadmap

Based on all the information collected from desk research, interviews and expert meetings, we drafted recommendations for the design and planning of an EU wide scheme and provided a Roadmap analysing different potential options on who and how to further develop and implement the EU common scheme.

1.4 Structure of the Report

This report is structured as follows:

- Chapter 2 presents a general survey on green building certification schemes
- Chapter 3 provides an overview and analysis of building certification schemes in Europe
- Chapter 4 discusses our findings with respect the market analysis of the current building certification schemes
- Chapter 5 presents our findings and analysis with respect to the scoping and positioning of an EU energy scheme
- Chapter 6 presents a section on the CEN EPB methodology and its link to the common EU scheme
- Chapter 7 gives an overview of preliminary suggestions and recommendations
- Chapter 8 provides a roadmap dealing with potential next steps and responsibilities
- Annex A: Use of Voluntary Building Certification Schemes across EU MS
- Annex B: Methodology for the Selection of Leading Schemes
- Annex C: Leading Scheme Fiches
- Annex D: CEN EPB Methodology.

2 Review of Green Building Certification Schemes

Voluntary environmental assessment and labelling programs are currently viewed as having the potential to create market demand for "green" buildings. Until the release of the Building Research Establishment Environmental Assessment Method (BREEAM) in 1990 little, if any, attempt had been made to establish an objective and comprehensive means of simultaneously assessing a broad range of environmental considerations against explicitly declared criteria to arrive at a summary of overall performance. The field of building environmental assessment has matured remarkably quickly over the past decade and many countries currently have systems in place or are actively exploring the possibility of introducing them. Moreover, a number of major international conferences since 1994 have allocated a significant portion of their programs to the descriptions and comparisons of these methods and "assessment" now represents an important focus for the building environmental design and performance debate.

A succinct definition for an environmentally conscious building design, or green building and one that is echoed in other texts, is provided by ASTM International (2001), i.e. "a building that provides the specified building performance requirements while minimising disturbance to, and improving the functioning of local, regional, and global ecosystems both during and after its construction and specified service life". Furthermore, "a green building optimises efficiencies in resource management and operational performance; and minimises risks to human health and the environment".[4]

Kilbert and Grosskopf (2005) argue that **the ideal green building** should have five major features;

- integration with local ecosystems,
- closed loop material systems,
- maximum use of passive design and renewable energy,
- optimised building hydrologic cycles, and
- full implementation of indoor environmental quality measures.

Kilbert and Grosskopf (2005) also provide a review of the current and emerging character of building environmental assessment methods.[5] These are discussed below.

2.1 Building Environment Assessment Methods and Certification Systems

A building environmental assessment method is a way to evaluate the environmental performance of a building against an explicit set of criteria and typically consists of three major components (Cole, 2003)[6]:

[4] ASTM International, 2001. E 2114-01, Standard Terminology for Sustainability Relative to the Performance of Buildings.

[5] Kilbert, C.J., Grosskopf, K., 2005. Radical sustainable construction: envisioning next-generation green buildings. http://www.treeo.ufl.edu/rsc06/WhitePaper-RSC06.pdf.

[6] Cole, R.J., 2003. Building environmental assessment methods: a measure of success. Int. Electr. J. Construct. Future Sustain. Construct., 1–8.

- A declared set of environmental performance criteria organised in a logical fashion – **the structure.**
- The assignment of a number of possible points or credits for each performance issue that can be earned by meeting a given level of performance – **the scoring.**
- A means of showing the overall score of the environmental performance of a building or facility – **the output.**

Building environmental assessment methods (BEAMs) emerged in the early 1990s to provide some measure of the environmental performance of buildings, and now some 20 or so such tools are in use world-wide. Of these assessment methods some are well-established, such as BREEAM[7], HK-BEAM (HK-BEAMSociety, 2004),[8] CET (CET, 1996[9]), LEED[10], CASBEE (Institute of Building Environment and Energy Conservation)[11], and Green Star (Green Building Council of Australia)[12].

The outcome of a BEAM assessment is a label, e.g. BREEAM-Excellent, HK-BEAM-Platinum, LEED-Gold, etc., based on the sum of points (e.g. BREEAM) or credits obtained (e.g. LEED), or on a more complex calculation incorporating weighting factors (e.g. CASBEE). The BEAMs referenced here have developed independently as voluntary instruments to provide a catalyst for market transformation (Cole, 2003). They can be differentiated by:

- the life cycle stage(s) covered by certification;
- the environmental aspects (performance issues) covered and their categorisation;
- the performance requirements (criteria, levels, standards, etc.);
- assessment methods demonstrating compliance; and
- the scoring system that determines the final grade (eco-label).

A method (see Figure 2-1) may include **one or more tools to assess new and/or existing buildings, and might target particular types of building**. BEAMs for new buildings and major refurbishments can provide for assessment and certification at different stages (e.g. CASBEE certifies pre-design, design and construction), at the completion of design and specification, or upon completion (e.g. HK-BEAM). BEAMs intended to assess existing buildings can be used at any time post-occupancy, and may cover the whole or just the core of a building. In addition to building performance emphasis will be placed on the **quality of management, operation and maintenance practices**. Climatic conditions and the environmental priorities in country of application influence what issues are included, **the performance criteria, assessment methods and the weighting (scoring)** of the issues.

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[7] Baldwin, R., Leach, S.J., Doggart, J., Attenborough, M., 1990. BREEAM 1/90: An Environmental Assessment for New Office Designs. Building Research Establishments, Garston.; Baldwin, R., Yates, A., Howard, N., Rao, S., 1998. BREEAM 98 for Offices. Building Research Establishment, Garston.

[8] HK-BEAM Society, 2004. HK-BEAM 4/04 "New Buildings". http://www.hkbeam.
org.hk/.

[9] Centre of Environmental Technology (CET), 1996. HK-BEAM Version 1/96: An Environmental Assessment for New Air-conditioned Office Premises, Hong Kong;

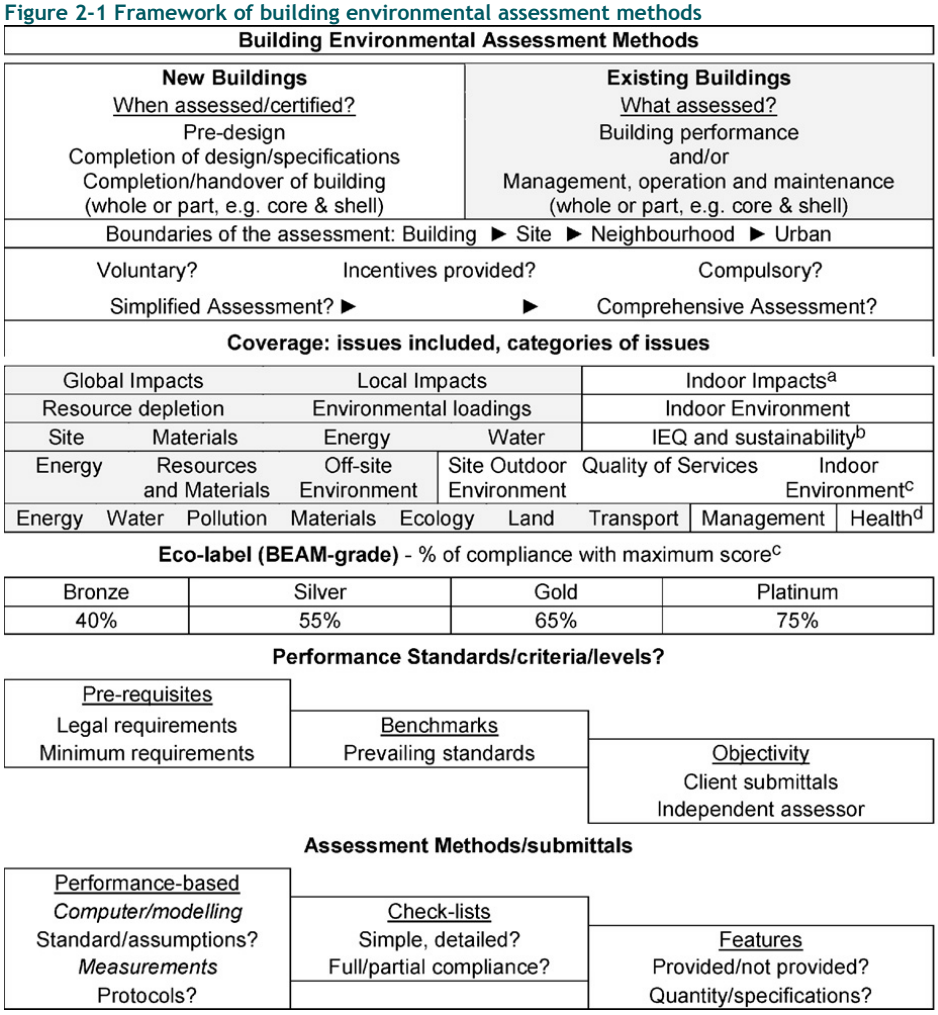
[10] U.S. Green Building Council, 1999. LEEDTM—Leadership in Energy and Environmental Design; U.S. Green Building Council, 2003. Green Building Rating System For New Construction & Major Renovations (LEED-NC) Version 2.1.

[11] Institute of Building Environment and Energy Conservation, 2003. CASBEE—Comprehensive Assessment System for Building Environmental Efficiency. Institute of Building Environment and Energy Conservation, Japan.

[12] Green Building Council of Australia, 2005. Green Star Environmental Rating System for Buildings.
http://www.gbcaus.org/greenstar/page.asp?id=117.

The environmental impacts covered may be grouped in different categories, such as global, local and indoor, but as Figure 2-1 illustrates issues that relate to the specified building performance (shaded) can be separated from issues that relate to the external environmental impacts. The boundaries of assessment are generally limited to the site and interactions with adjacent properties. **Assessments will focus on the appropriateness of a building and its engineering systems to meet the needs of users and operators, separate from the impacts of the users themselves (e.g. waste generated), although assessment of provisions to better manage these impacts is included (e.g. facilities for waste sorting and recycling).**

Figure 2-1 Framework of building environmental assessment methods



Source: Burnett, 2007[13]

2.2 Typology of Assessment Methods

2.2.1 Performance Criteria

Performance criteria, i.e. the requirements for the award of points or credits may be defined in various ways, and include quantified performance targets, compliance with particular standards or codes, compliance with certain conditions (e.g. as specified in a check-list), or provision of certain features. Prerequisites, i.e. performance requirements that must be satisfied, can be specified, either for a part

[13] Burnett, J., 2007. City Buildings-Eco-labels and shades of green!, Journal of Landscape and Urban Planing, vol.83, p.29-38, Elsevier.

of the assessment (e.g. energy use), or for particular points or credits. Pre-requisites normally include compliance with regulations, but may endorse a particularly important part of the procurement of a new building (e.g. basic commissioning in LEED).[14]

Third party certification is important for businesses which seek to declare higher performance standards, so BEAM assessments are generally carried out by independent assessors based on various submittals, i.e. a combination of declarations, specifications, site measurements, etc., with verification by independent third parties, and/or site visits by an accredited assessor. Support material; be it in the form of guides, on-line tools, advisory notes or consultations with assessors is an essential part of the process. Because of distances LEED requires extensive and detailed submittals (USGreen Building Council, 2001)[15], whereas BREEAM and HK-BEAM can take advantage of closer proximity to enable consultations, allow for interim assessments and to undertake site visits (Burnett, 2007).

Whatever the approach, it is important that outcomes can be **assessed in an objective manner** to avoid later disputes between project teams and assessors, and inconsistencies in assessment outcomes. The ability of the assessors to arrive at consistent judgements is important but in the final analysis much depends on the integrity of the client and his representatives, as it is not possible to verify all claims (e.g. the amount of recycled material used) (Burnett,2007).

2.2.2 Rating Methodologies

Energy certificates display the calculated outputs of the energy assessment, thereby providing key information for all stakeholders for a given building. Certificates need a simple, straightforward layout to ensure clarity, ease of use and comparability for all users; indeed, they must be understood by experts and by non-technical building owners, buyers and tenants. The certification should nonetheless provide sufficient detail from the energy assessment and appropriate information upgrading for owners and building managers. Many certificates provide a block of essential information that includes building size and energy consumption to facilitate quick comparison of certificates. The certificates usually take two forms (IEA, 2010)[16]:

- A positive label demonstrates whether a building meets a specified standard (such as the passive house standard). Winward et al. (1998[17]) name such types of label as endorsement labels. **Endorsement labels** essentially divide buildings into two categories: those that meet the specified criteria and those that do not. Only buildings that meet the criteria may be awarded the label. Endorsement labels are normally voluntary: it is expected that buildings good enough to win a label will wish to display that fact.
- A **comparative label** that allows comparison with other buildings (such as Home Energy Rating System (HERS) Index and many EU certification schemes). Comparative certification schemes often include advice on how to improve energy efficiency to obtain a better Energy rating. Comparison labels are multi-category: all buildings are attributed a label that classes them from “better” to “worse”.

[14] Burnett, J., 2007. City Buildings-Eco-labels and shades of green!, Journal of Landscape and Urban Planning, vol.83, p.29-38, Elsevier.

[15] U.S. Green Building Council, 2001. LEEDTM Reference Guide Version 2.0.

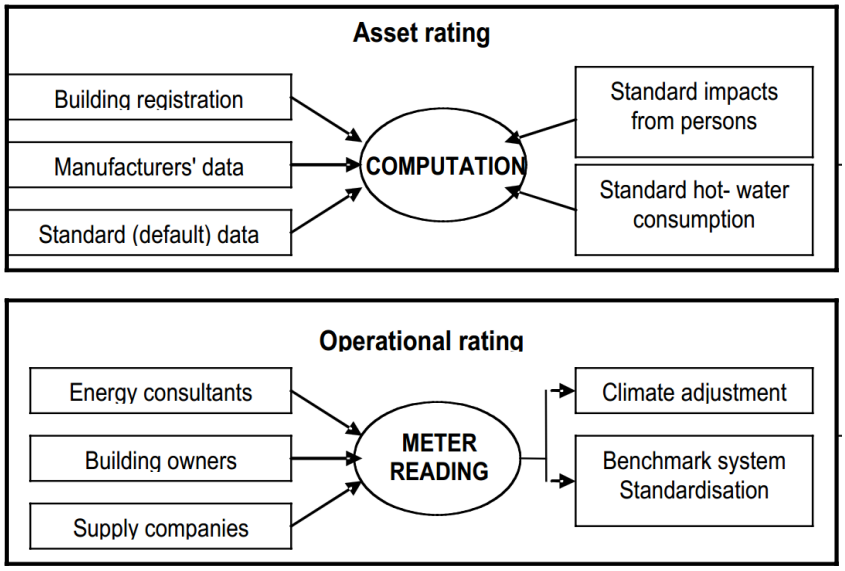
[16] International Energy Agency (IEA), 2010. Energy Performance Certification of Buildings, A Policy tool to improve energy efficiency.

[17] Winward ,J., Schiellerup , P. and B. Boardman (1998) Cool Labels: The First Three Years of the European Energy Label, Environmental Change Institute, University of Oxford

An alternative would be a hybrid between these two, where the higher ratings in the label indicate quality level but where there is also a level under which buildings are not awarded the label.

In general, two types of rating are used for building certification as shown in the figure below: asset rating is based on data derived from building inspection or drawings and building specifications; an operational rating uses metered data of actual energy consumption. Asset ratings are seen to be most appropriate for new buildings and buildings in which there is frequent change of users, as the rating is independent of users and can be assessed before occupation. An operational rating is more effective for buildings that have less frequent user turnover, and for large and complex buildings.

Figure 2-2 Approaches for energy certification



Source: Jensen, Wittchen & Hansen (2007). Development of a 2nd generation energy certificate scheme – Danish experience. ECEEE 2007 Summer Study.

Asset rating is defined as calculated rating, meaning calculated with input data as designed or input data as constructed and even input data as in use. Asset rating with energy simulation offers detailed information and a wide variety of outputs, however, it may require a great number of inputs, skilled users and a significant amount of time to gather and input the necessary data, all of which can make the process expensive (Perez-Lombard et al., 2009).[18]

Operational rating is measured rating (measured energy use or measured consumptions). Operational rating by means of measured consumptions can be obtained from energy bills or monitoring. Energy bills give easy access to energy consumption by energy source, although it is difficult to establish a split by end-users. Energy monitoring based on sub-metering can also be expensive but offers profuse performance information of great use to auditors and building maintenance. In summary, energy use of new and existing buildings may be obtained at different levels of accuracy and cost (Perez-Lombard et al., 2009).
In general, there can be operational rating with correction factors adjustments, i.e. taking into account factors such as climate, based on which you can compare buildings across different countries, and

[18] Perez-Lombard, L., Ortiz, J., Gonzalez, R., Maestre, I., 2009. A review of benchmarking, rating and labelling concepts within the framework of Energy certification schemes, Energy and Buildings 41, p.272-278, Elsevier.

disclosure of energy use (not necessarily rating) without adjustments, which only reports on energy use/ meter reading. If the aim is to communicate only energy use/ meter reading, there is no need for correction factors in reporting on 'as achieved'.

Table 2-1 Comparison of energy use estimation methods

Concept	Simulation	Measured on-site
Input data	Detailed information	Energy bills or metering
Output data	Detailed and split	Global and non-split
Weather and use	Standard	Actual
Energy use	Estimated	Measured
Scope	New and existing buildings	Existing buildings
Cost and user skills	High	Low

Source: Perez-Lombard et al., 2009

2.3 Market Penetration and Client Profile

Although they are sometimes specified by city or state governments and by large organisations to meet policy goals (Cassidy, 2004)[19], BEAM assessments are generally being undertaken on a voluntary basis. In the broader market, the perception that building green requires a substantial additional initial investment and risk has been widespread,[20] and with owner-occupiers rarely considering life cycle costs or undertaking a cost-benefit analysis, in the absence of financial **incentives the take up of a voluntary scheme depends on the benefits perceived by the client in terms of marketing advantage and/or enhancements to building performance**. Consequently, in the development of most BEAMs a key consideration is to balance overall difficulty against achieving market penetration (Burnett, 2007).

In order to encourage take-up most of the performance criteria included tends to focus on what the client and the project team can accomplish in the given circumstances although to enhance credibility, issues that are outside the client's influence are also included. For example, the location and nature of the land used (Greenfield, Brownfield, reclaimed), decisions about which are dominated by economic realities when land is in short supply, will be included, but given relatively less weight within the overall assessment (Burnett, 2007).

In order to discuss the objectives of assessment schemes certifying buildings' sustainability, one should bear in mind **which groups are addressed with such systems**. All of those who are involved in a "regular" construction process are stakeholders of such an assessment: planners (architects, engineers, etc.), house owners, house users, consultants etc. **The main target group, however, of such a certification, are real estate companies, investors or house owners of residential buildings**. Their **motivation is to have a label demonstrating** on the one hand the **greenness of their buildings,** and on the other hand **to have a proven assessment of the low energy demand of a building**. These two aspects should be split merely due to the importance of the energy issue. The first is rather a **marketing effect for a certain type of buyers** while the latter provides them with economic benefits as a low energy demand directly translates into **lower bills for fuels**. Other consumptive media such as

[19] Cassidy, R. (Ed.), 2004. Progress Report on Sustainability. A Supplement to Building Design & Construction, USA.

[20] Portland Energy Office, 2000. Green City Buildings: Applying the LEEDTM Rating System. Portland Energy Office, Portland, Oregon; Bartlett, E., Howard, N., 2000. Informing the decision makers on the cost and value of green building. Build. Res. Inform. 28 (5/6), 315–324; von Paumgartten, P., 2003. The business case for high-performance green buildings: sustainability and its financial impact. J. Facil. Manage. 2 (1), 26–34.

water should not be forgotten and are reflected in the systems, but energy has the highest importance (Dirlich, 2011).[21]

Research has confirmed that the fundamental driver for the emergence of certification programs is to promote organisational legitimacy. Arora and Carson (1996)[22] found firms with closer ties to their end product were more likely to participate in various waste and pollution reduction certification programs. Videras and Alberini (2000) confirmed that firms with greater consumer pressure were more likely to participate in the Green Lights Program in which the EPA provided a stamp of approval for an organization's voluntary efficient lighting efforts.[23] Researchers have found companies that place a higher importance on external recognition were more likely to participate in EPA's National Environmental Performance Track – a program offering companies "public recognition."(Coglianese and Nash, 2006).[24] Henriques and Sadorsky (1996) found that shareholder pressure was a motivating factor for companies to participate in voluntary environmental programs.[25] This body of prior work establishes a consistent message: firms are under pressure from a variety of external and internal sources to become more 'environmental,' 'sustainable,' and 'green.' What remains unclear to firms is what 'going green' means and how they convey that message to external agencies or organisations placing pressures to change the way they do business.

Box 1: Some user comments on success factors (Mark, 2013):[26]

Timothy Makower, principal, Makower Architects:
'This is a question about **global branding, interchangeability and the perception of 'value'**. The reason that LEED is taken outside the UK is, I believe, not so much because people compare the two and make a choice but because they **'default' to the one with the greater global reach** - ie LEED. 'That said, BREEAM could have done a better job **at branding** itself as 'the' standard. But these things take vast investments.'

Roger Fitzgerald, ADP Architecture:
'Given that this is a global problem there seems to be a lack of international collaboration on this issue. LEED does tend **to be more international in its use**, and architects certainly need to be familiar with it. 'But there are issues of language and even apparently simple things like units of measurement of carbon emissions, to be overcome. Also, the American view of "local", in terms of locally sourced materials, is slightly broader than we would apply here in the UK.'

Sian Moxon, associate, Jestico + Whiles:

[21] Dirlich, S., 2011. A Comparison of Assessment and Certification Schemes for Sustainable Building and Suggestions for an International Standard System, The IMRE Journal Volume 5 (1).
[22] Arora S and T.N. Cason, 1996. "Why do Firms Volunteer to Exceed Environmental Regulations? Understanding Participation in EPA's 33/50 Program," *Land Economics*, 72/4, 413-432.
[23] Videras J. and A. Alberini, 2000. "The Appeal of Voluntary Environmental Programs: Which Firms Participate and Why?," *Contemporary Economic Policy*, 18/4 449-460.
[24] Coglianese, C. and J. Nash, 2006. *Beyond Compliance: Business Decision Making and the US EPA's Performance Track Program* (Cambridge, MA: Harvard University, Regulatory Policy Program, Massaavar-Rhamani Center for Business and Government, John F. Kennedy School of Government)
[25] Henriques I. and P. Sadorsky,1996. "The Determinants of an Environmentally Responsive Firm: An Empirical Approach," *Journal of Environmental Economics and Management*, 30/3 : 381-395.
[26] Mark, L., 2013., LEED outstrips BREEAM across the globe – including Europe, Architects Journal, February 2013. http://www.architectsjournal.co.uk/news/leed-outstrips-breeam-across-the-globe-including-europe/8643464.article#

'BREEAM remains the dominant system in the UK, as it is accepted as standard**, required by the government for public buildings**, respected for its rigour, and tuned to the UK's climate and context. Internationally, LEED seems to be prevalent. 'LEED is not BREEAM's only competitor internationally: Green Star is widely used in Australia and New Zealand, NABERS in Japan and Green Globes in North America; there is also LEED India.'

An anonymous leading industry professional:
'As everyone knows, BRE was privatised some years ago and, since then, it has tended to guard its IP rather carefully; some people say it's too secretive and doesn't share information when it should for the benefit of the environment as a whole. It has also been criticised for **charging significant fees** for one-off BREEAM assessments, when a greater degree of standardisation would have been possible.
'By contrast, LEED is owned by the US Green Building Council, which takes the fees, whereas this option was of course not available to the UK Green Building Council. Together with its annual conference the US-GBC is therefore extremely well resourced and, as it is the oldest of all the GBCs worldwide it is increasing in its influence. It is also far more open to developing LEED than BRE is to developing BREEAM, largely because it's greatly **influenced by its membership**. I might add that the US was miles behind the UK in terms of green buildings and still is in any respects, but it was indifference from George W Bush and others which propelled the grass roots into action.'

2.4 Challenges

A general characteristic of the building industry is that it is **risk averse and enjoys simple, unambiguous messages regarding what to do rather than why.** The success of the current generation of building environmental assessment methods lies in their **perceived simplicity in declaring an industry expectation of what constitutes "green" building design and construction. Furthermore assessment methods:**

- Assist in creating a body of knowledge and expertise within the building design team to facilitate the assimilation of environmental issues into practice.
- Provide a reference by which building owners and design teams can formulate effective environmental design strategies.
- Provide a common and verifiable set of criteria and targets so that building owners striving for higher environmental standards have a means of measuring and demonstrating that effort.

Solutions to complex environmental problems that involve a wide range of scales of influence and time frames will necessitate systems thinking – the ability to appreciate and address **linkages and interrelationships between a broad range of often conflicting requirements**. Such an approach is one that emphasises wholes over constituent parts, relationships over specific entities, processes and transformations over physical structure, quality over quantity and inclusiveness over exclusiveness (Gladwin, Newberry and Reiskin 1997).[27] These are not the underpinnings of current building environmental assessment methods and are not easily superimposed on them. Existing methods provide frameworks for the structuring and organising of currently recognised environmental performance issues. Performance criteria are simply presented as independent requirements without any

[27] Gladwin, T.N., Newberry, W.E., & Reiskin, E.D., 1997. Why is the Northern Elite Mind biased against community, the environment, and a Sustainable Future, IN:, *Environmental Ethics and Behaviour*, (Eds., Bazerman, Messick, Tenbrunsel,. & Wade-Benzoni), The New Lexington Press, San Francisco, pp 234- 27.

acknowledgement of synergies or interrelationship between them. This simple characterisation of building environmental issues currently has both positive and negative impacts on design. For owners and design teams beginning to address environmental issues, the simplicity provides a straightforward means of discovering what is important and what is not important. **However, achieving a high score on an environmental assessment method may prove more important than aspiring to a good overall product.** This raises arguments similar to those discussed earlier related to the "dysfunctional" nature where the simple meeting of requirements detracts from the more fundamental issue of ethics and professional responsibilities (Cole, 2003).

A host of other issues surround the conflict between addressing complex issues through the use of simple tools. The **complexity of developing and using building environmental assessment methods** – perceived or real – derives from host of considerations (Cole, 2003).:

- The sheer number of issues that potentially describe building environmental performance and the difficult of knowing which are the critical ones to address within a specific building project. Weighting protocols can assist but they are both general and subjective.
- The amount of data that needs to be collected to make an assessment. Increasing the number of performance criteria influences the time, effort and cost of the assessment.
- The varying degree of scientific understanding of the issues and the metrics for representing them.
- The ability to assimilate and make sense of the results. Assessment methods are only a means to an end – the results of the assessment is the critical element in enabling decisions – strategic planning to be undertaken. The results must therefore be summarised into a manageable form.
- The results must be assimilated within a wider context of building design and construction

3 Overview of Building Certification Schemes in Europe

3.1 Summary Overview

We have reviewed and ranked 22 building certification schemes that are used in Europe (for more detail on the methodology and overview of the schemes, please see Annex B). From the screening and analysis of the existing market for certification schemes for buildings (both energy only and wider sustainability schemes) in the EU, it can be concluded that the EU27 can be roughly divided into two blocks:

1. Countries where voluntary sustainable and energy certification schemes have been developed (some of which are used internationally) in addition to the Energy Performance Certification (national EPC) rating system required by the EPBD, and
2. Countries where voluntary certification schemes have not been developed, and which to a large extent utilise the mandatory EPC certification scheme system required by the EPBD and make limited use of additional voluntary sustainability certification schemes.

Countries which have developed their own certification systems include:

Country - and national certification system	
The United Kingdom - BREEAM	The Netherlands – NL BREEAM,
France - HQE	Spain – ES-BREEAM, Verde
Germany – DGNB, DE-BREEAM, Passivhaus	Czech Republic – SBTool ICZ
Denmark – DK-DGNB	Austria – AT-BREEAM, OGNI
Sweden – Miljobyggnad, SE BREEAM	Belgium – Valideo
Italy – Casa Clima	Finland – PromisE assessment tool
Portugal - Lider A	

Analysis regarding the national certification market in each of the EU MS can be found in Annex A. An overview and comparison of the main schemes used in Europe is provided below. These schemes are mainly developed and used for commercial buildings. The majority of residential buildings in Europe are not certified. It appears that only a few European countries have developed sustainable certification schemes for residential buildings, including the UK, France and Sweden.

In the rest of the EU, we found little evidence of additional national voluntary certification schemes, with public and private users of such schemes relying on the mandatory Energy Performance Certificates (EPCs) required by the EPBD. Mandatory national EPCs relate mostly to as designed energy performance. Most countries are able to use existing schemes from other countries (for commercial buildings). However, these international schemes, such as LEED and BREEAM, are used to a very limited extent in these countries. Table 3-3 below shows the use of the main schemes per MS for commercial buildings.

The limited use is due to a combination of factors, including the high costs of the international schemes, low market demand (e.g. a small country, stagnating construction sector, etc.), and/ or a lack of resources at the national level to develop and run these schemes. Low awareness of the advantages of these schemes has also been mentioned as a potential reason. In these countries, the leading schemes are mainly used by international and European actors (property investors and

developers) operating in multiple countries to gain recognition for good performance. There appears to be a gap in the market for sustainable certification schemes for the residential sector across the majority of EU countries.

The majority of voluntary sustainable certification schemes are private schemes developed by national Green Building Councils, independent organisations, institutes, agencies and other private initiatives as well as in-house by large private companies. In terms of public schemes, there is a GreenBuilding voluntary scheme developed by the European Commission (JRC operated), however, it only focuses on energy performance. The GreenBuilding Programme was initiated by the Commission in 2005 to enhance energy efficiency in both existing and new non-residential buildings. To date the take up of this programme is limited except for some countries where GreenBuilding has been a considerable success. In Sweden for example, over 420 buildings have been certified by Green Building by July 2013. Some users have criticised the scheme for being too easy to acquire. In one interview, a large property owner described situations where buildings in poor condition were acquired and refurbished to the lowest possible standard to receive a GreenBuilding certification. However, the energy consumption of the refurbished buildings was higher than similar buildings with other certifications. This weakens the GreenBuilding certificate's ability to incentivise ambitious refurbishments.[28] However, the upward trend in GreenBuilding certifications is currently stagnating.

It is also interesting to look at the market in countries where EPBD compliance / mandatory schemes operate alongside a successful voluntary certification scheme. The interesting issue here is whether any market actors see any benefit in an additional energy use measurement and benchmarking approach. What emerges from our consultations is that the level of demand for an additional scheme is largely driven by the scope foreseen for it. If the scheme was simply an alternative methodology for calculating the mandatory national EPC score the only countries / stakeholders who foresee a demand for it are those who have very low confidence in their existing national EPC methodology. If the scheme is seen as trying to cover all aspects of sustainability, there are concerns of duplication with existing schemes in a market place where there are already credible options. The most positive view on a wider scope scheme is that if it could be made low cost and credible it could appeal to a wider audience than is served by the current schemes. However there is no clear evidence of potential users being put off by the cost of the existing schemes. The most positive views on demand for a new scheme come for a scope that enables the actual energy use of buildings to be benchmarked.

The results of our screening exercise of the voluntary certification market for non-residential buildings in Europe provided the following results: (A separate document providing an inventory of schemes per MS has been submitted with this interim report).

Table 3-1 Overview of voluntary schemes used in the EU27

Name	Country of origin	Year of creation	Other countries	Type	Rating system
BREEAM	United Kingdom	1990	> 10 countries	Whole Environmental Impact	Comparative label
CasaClima (KlimaHaus)	Italy (South Tyrol)	2002	3 - 5 countries	NZEB related	Comparative label

[28] Source: Björck and Olsson (2013) A Sustainable Future with Green Buildings. Department of Real Estate and Construction Management Centre for Banking and Finance, Royal Technical University, Sweden.

Name	Country of origin	Year of creation	Other countries	Type	Rating system
CasaClima Nature	Italy	2008	1 - 2 countries	Whole Environmental Impact	Comparative label?
DGNB	Germany	2007	> 10 countries	Whole Environmental Impact	Comparative label
Energy Star	United States of America	1992	> 10 countries	energy related	Endorsement label
FEBY12	Sweden	2007	1 - 2 countries	NZEB related	-
GPR Gebouw	Netherlands	1995	None	Whole Environmental Impact	Comparative label
GreenBuilding Programme	European Commission	2004	> 10 countries	NZEB related	Endorsement label
GreenCalc+	Netherlands	1996	None	Whole Environmental Impact	Comparative label
HQE	France	1992	5 - 10 countries	Whole Environmental Impact	Comparative label
LEED	United States of America	1998	> 10 countries	Whole Environmental Impact	Comparative label
Miljöbyggnad	Sweden	2005	1 - 2 countries	Whole Environmental Impact	Comparative label
Minergie	Switzerland	1994	5 - 10 countries	NZEB related	Endorsement label
OGNI	Austria	2009	5 - 10 countries	Whole Environmental Impact	Comparative label
Passive house certification	Germany	1996?	> 10 countries	NZEB related	Endorsement label
SBTool ICZ	Czech Republic	2010	None	Whole Environmental Impact	?
VERDE	Spain	2002	None	Whole Environmental Impact	Comparative label

3.2 Overview of Leading Voluntary Schemes in Europe

3.2.1 Comparison of the main schemes

The focus of our review has been voluntary schemes for assessing the energy performance of non-residential buildings. However, the review of existing schemes has not been limited to energy certification and non-residential buildings, but has also included broader certification schemes such as BREEAM and LEED, keeping in mind the necessary focus on the energy aspect of these schemes.

Our review indicates that there are six main voluntary certification schemes used in the EU. A more detailed analysis of each scheme is presented in Annex C.

Table 3-2: Overview of main certification systems in Europe

Certification system	Developer	Key figures
LEED	US Green Building Council (1993)	• US + 30 countries • Over 7 000 projects, over 140 km^2 • Sustainability rating
DGNB system	German Sustainable Building Council	• 25 countries • 13 different building types • Around 50 criteria assessed

Certification system	Developer	Key figures
PassivHaus	Germany (1988)	• Over 30 000 buildings • Over 15 countries
BREEAM	BRE (UK, 1988)	• Over 50 countries • 8 National Scheme Operators • Over 250 000 buildings
HQE	Association pour la Haute Qualité Environnementale (France, 2005)	• Primarily used in France • 14 targets for environmental quality • 4 different building types
Minergie	Switzerland	• Core markets: France, Italy, Germany and the USA (8 countries) • 13 building types, primarily used in residential sector • Energy and indoor comfort focused

Based on the current data on the number of certifications for commercial buildings by several leading schemes in Europe (Table 3-3), it can be seen that BREEAM is the European market leader. According to the 2013 RICS survey Going for Green (which appears to be the most up to date and comprehensive source), which includes pre-certificates and certificates for commercial properties (office, retail, logistic, hotels, etc.), BREEAM accounts for more than 80% of all sustainable building certifications in Europe. [29] BREEAM has issued 7,829 certificates across the EU28 (for new/ refurbished as well as existing commercial buildings) out of a total of 9,669 sustainable certificates in EU28 under the four leading schemes (BREEAM, DGNB, LEED and HQE). The numbers per Member State are presented in the table below.

Comparison with other schemes, including energy performance schemes (e.g. Passivhaus) is presented in the tables below.

Table 3-3 Overview of leading certification schemes and their market share

Country	BREEAM		LEED		DGNB		HQE	
	Retrofit and New Build	Existing Stock	Retrofit and New Build	Existing Stock	Retrofit and New Build	Existing Stock	Retrofit and New Build	Existing Stock
Austria	2	2	5	1	43			
Belgium	39	72	2				5	
Bulgaria	1		2	1	2			
Croatia								
Cyprus								
Czech Republic	11	19	7	2	1			
Denmark		1	3	2	8			
Estonia			1					
Finland	13	5	27	10				
France	83	51	11				955	125
Germany	9	85	46	11	349	5	1	

[29] RICS, "Going for Green, Sustainable Building Certification Statistics Europe", September 2013

Country	BREEAM		LEED		DGNB		HQE	
	Retrofit and New Build	Existing Stock	Retrofit and New Build	Existing Stock	Retrofit and New Build	Existing Stock	Retrofit and New Build	Existing Stock
Greece	1		1					
Hungary	14	12	6	2	2			
Iceland	4		1					
Ireland	22		2	1				
Italy	9	11	32	3			1	
Latvia								
Lithuania		2						
Luxembourg	9	4			7		7	1
Malta	1		1					
Monaco	1							
Netherlands	25	138	5	1				
Norway	3		1	1				
Poland	38	80	14	2				
Portugal	2		2					
Romania	10	8	2	1	3			
Russia	7	6	6					
Serbia		2						
Slovakia	2	6	2		1			
Slovenia	1							
Spain	9	18	35	4				
Sweden	13	10	33	5				
Switzerland	1	8	9		2			
Turkey	17	14	34	3	1			
Ukraine	1							
United Kingdom	6940	51	38	1				
Total	7288	605	328	51	419	5	969	126
Total all schemes = 9791	7893		379		424		1095	
% share	80.6%		3.9%		4.3%		11.2%	
EU 28								
Total	7254	575	277	47	416	5	969	126
Total all schemes = 9669	7829		324		421		1095	
% share of all schemes	81.0%		3.4%		4.4%		11.3%	

Source: RICS (2013) 'Going for green' report, the cut-off date of the survey is March 31, 2013, if no information provided, field left blank; the survey includes pre-certificates and certificates for commercial properties (office, retail, logistic, hotels, etc.) but not certificates for residential properties

In total, the four major schemes have reported 9,669 certifications in the EU28. There are several other smaller schemes but these have a significantly lower take up. In these cases, one certification typically assumes one building.[30] The following table presents the data we have on these other schemes.

Table 3-4 The number of certificates for Passivhaus and Minergie

Country	Passivhaus	Minergie
Austria	378	1
Belgium	8	
Bulgaria	2	
Croatia		
Cyprus		
Czech Republic	1	
Denmark	12	
Estonia	3	
Finland		
France	54	199
Germany	1863	2
Greece	3	
Italy	26	2
Lithuania	4	
Luxembourg	6	2
Malta		
Netherlands	12	
Poland	4	
Portugal	2	
Romania		
Serbia	1	
Slovakia	2	
Slovenia	2	
Spain	10	2
Sweden	7	
United Kingdom	30	
Total	2463	208

Source: Passivhaus http://www.greenbooklive.com/; Minergie https://www.minergie.ch/list-of-buildings.html

There are several studies which compare and contrast the various schemes.

A study by Force Technology for the European Insulation Manufacturers Association (EURIMA) published in May 2012 "***Analysis of five approaches to environmental assessment of building components in a whole building context***"[31] looks at BREEAM (UK), DGNB (Germany), HQE (France) and LEED (US). The primary conclusions from this report were:

- In all building certification schemes, the direct environmental life cycle performance of the selected building materials and products appears to be less important for the final rating than commonly thought, accounting at most for about 5% of the total score. The building materials and products may, however, also have a significant indirect influence on how the building performs in energy-related categories that are accounted for separately.
- The DGNB and the HQE schemes seem to follow the provisions in the upcoming European standards EN 15804 and EN 15978 (under CEN TC350) as close as possible and they are therefore well suited to describe the material and building impacts during building lifetime.
- The US-based LEED scheme does not use any kind of quantitative information about the life cycle environmental performance of materials and products. It does, however, give a small credit if EPDs are available.
- The HQE and DGNB schemes require that life cycle assessments (LCA) of building products are available. In DGNB, the LCAs are an integral part of calculating and rating the building performance, while HQE rewards the calculation of the contribution from building products, but not necessarily the results. However, if the life cycle results are used actively, e.g. in the choice of products, the overall rating of the building may improve.

[30] Interview with BRE

[31] http://www.eurima.org/uploads/ModuleXtender/Publications/88/Force_Study_Building_certification_systems_May_2012.pdf

- The UK-based BREEAM scheme appears to use an LCA approach which is not in full accordance with international standards and practice.
- In a building lifetime perspective it should be remembered that differences with respect to "fitness for use" of building materials often are much more important than the differences measured by assessments in which their function is not considered. This information should be available from good quality Environmental Product Declarations, and it is obligatory to consider these aspects in the HQE scheme.

ANNEX III of the JRC report on "***Development of European Ecolabel and Green Public Procurement Criteria for Office Buildings***" [32] provides extensive information about the coverage and scope of the following schemes: France (HQE), Germany (DGNB), Spain (Verde), Switzerland, UK (Code for sustainable homes, BREEAM) and Nordic Countries (Nordic swan).

Part of the OpenHouse project produced a scoping paper "Assessment of methodologies, normative, standards and guidelines for sustainability of buildings at national, European and International level"[33]. This identified more than 60 assessment methods active throughout Europe. However, only 4 were felt to have any significant level of recognition and penetration in the building sector:

- BREEAM from UK
- DGNB/BNB from Germany
- HQE from France
- LEED from the USA (Green Building Council initiatives focus on BREEAM as an assessment tool)

Main differences

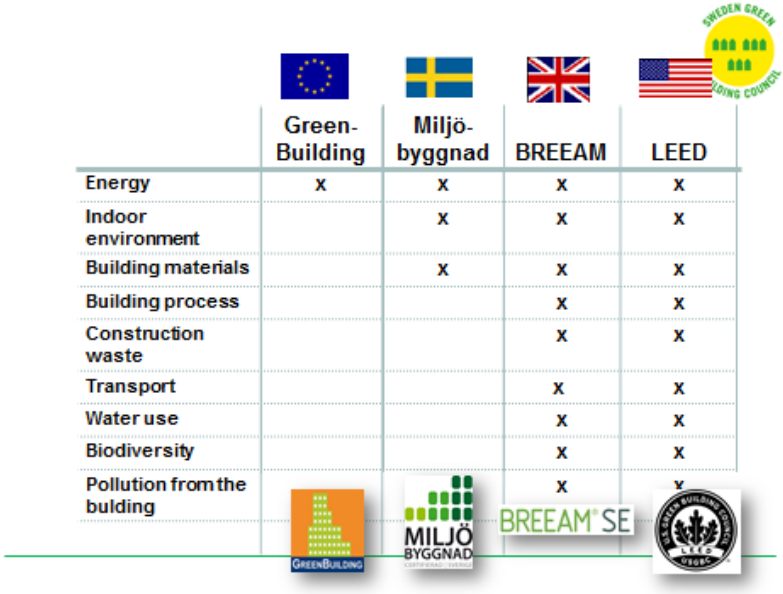
The main difference between these schemes is the environmental and energy aspects they cover (see for example figure below) and the weight they give to different environmental categories (see description and comparison of the main schemes below). These naturally follow the main environmental and social issues for that region, resulting in rating systems tailored to account for climate and local culture. Some systems also give credits for compliance with building regulations[34]. This makes benchmarking or comparison between schemes difficult as their bases, scope and indicators differ.

[32] http://susproc.jrc.ec.europa.eu/buildings/docs/product%20definition%20and%20scope.pdf

[33] http://www.openhouse-fp7.eu/assets/files/D.1.2.1_120227.pdf

[34] http://www.bsria.co.uk/news/global-env-assess/

Figure 3-1 Overview of aspects covered in four schemes



Source: Swedish Green Building Council

The following table provides an indicator of the weighting that three of the assessment frameworks give to different topics:

Table 3-5 Different aspects and their weighting taken into account

	BREEAM Offices 2008 (%)	LEED-N C 2009 (%)	DGNB New Office 2008 (%)
Ecology	33.6	31.1	16.3
Economy	0	0	23.6
Social aspects	2.5	4.6	2.5
Energy	23.5	32.2	14.4
Health and comfort	19.4	16	16.5
Functional aspects	0	0	2.5
Technical aspects	1.3	0	9.5
Design	1.2	6.9	4.2
Process/management	18.5	9.2	10.5

Source: OpenHouse project (2010)

However, this short analysis of the weights allocated for each aspect highlights the disparity between systems and the difficulty to compare the results from one method to another. There is consequently a need for analytical structure to be made more uniform.

The table below summarises the differences between the four leading schemes.

Table 3-6 Overview of key differences between the four major green schemes

BREEAM	LEED	DGNB	HQE
• Management • Health & well being • Energy • Transport • Water • Materials • Waste • Land Use & Ecology • Pollution • Innovation	• Sustainable site • Water efficiency • Energy & Atmosphere • Materials & Resources • Indoor environmental quality • Innovation & Design Process	• Ecological quality • Economical quality • Socio-cultural quality • Process quality • Site use	• Eco-construction • Eco-management • Comfort • Health

	BREEAM	LEED	DGNB	HQE
Target buildings	• New building • Extension • Existing building • Major renovation • Shell & Core	• New building • Extension • Existing building • Major renovation • Shell & Core	• New building • Existing building • Renovation	• New buildings • Renovation • In-Use
Scoring	• Unclassified • Passable • Good • Very good • Excellent • Outstanding	• Certified • Silver • Gold • Platinium	• Bronze • Silver • Gold	• Passable • Very good • Excellent • Exceptional
International Schemes	• Office • Retail • Industrial • Specific purposes • BREEAM In-Use • Bespoke	• Offices, • Commercial Interior • LEED ND • LEED Existing Buildings	• Offices, • Retail • Industrial • Specific purposes	• Tertiary • Renovation • In Use

	BREEAM	LEED	DGNB	HQE
Fees (on m2) Exp on 10.000m2	•Registration •BRE Quality Assurance •Assessor •(AMO) ✲✲	•Registration •US GBC fees •(AMO)	•Registration •DGNB fees •Auditors fees •(AMO) ✲✲✲✲	•Registration •Certivéa Fees •(AMO) ✲✲✲
Complexity of the process	Medium-	Medium-	Complex	Medium+
Certification	BREEAM assessors BRE QA	(LEED accredited professionnal) USGBCI	DGNB auditors DGNB	HQE auditors Certivéa

Source: PwC (2013) A comparison of green building certifications in Europe: How does it apply to practice in Luxembourg

Estimation of the costs related to certification

There are three **cost categories** for users of certification schemes:[35]

1. Certification fee – is the fee to issue a certificate once the building has been through the assessment process. This can be done at the interim design stage, i.e. between the end of the detailed design stage and the beginning of construction (relying on 'as designed' evidence), or at the final stage, i.e. toward the end of construction, close to handover of the building

[35] Interviews with scheme operators: DGNB, Swedish Green Building Council

(relying on 'as built' evidence).[36] This fee is related to the project size and goes to the certificate issuer.

2. Project coordination and assessment costs – these costs are related to the (pre-) assessment of the building, registration, coordination by a consultant or an auditor of the project (e.g. collating the documentation, project team meetings, translations, reporting, communication, etc.), auditors fee. This is the largest cost component and covers the assessment process from the conception phase to the actual operation phase.[37]
3. The costs of improvement of the building –the cost of actually making the building more sustainable, i.e. 'green' investments. This reflects any extra measures that need to be implemented to make the building achieve a particular 'target' score under the assessment scheme in question.

Different schemes and different sources define these cost categories differently or report only a subset of these costs, and hence the numbers reported vary per source. We have attempted to collect as much comparable data as possible. Values have been also crosschecked by other sources and interviews. There is also a large difference in costs between certifying a commercial and residential building.[38] Therefore certification costs are reported separately for commercial and residential buildings.

For **commercial buildings**, an overview of approximate costs per category per scheme is presented in the table below. These are based on a Swedish source reporting costs for LEED, BREEAM and Miljobyggnad, and interviews with DGNB.

Table 3-7 Estimated costs of certification schemes for commercial buildings in EUR (approximate values)

Cost	LEED	BREEAM	HQE (commercial)	DGNB	Miljöbyggnad
Certification fee	3 000 – 25 000	6 000 – 15 000	12 000 - 25 000	5 000 – 15 000	2 000 – 6 000
Project coordination/ assessment	75 000 – 100 000 + 20 000 (calculations)	75 000 – 100 000 + 10 000 – 20 000 (calculations)	Not obligatory	50 000 – 60 000	10 000 – 20 000 + 5 000 – 10 000 (calculations)
Extra over costs of making a building green – depends on the grade attained		57 000	n.a.	Low – up to 4% of additional construction cost, < 0.5% planning costs in Germany	Low or non (if reaching the Bronze grade, i.e. fulfilling the legislation)

Source: Miljöklassningsguiden by Bengt Dahlberg AB, http://omvarldsbevakning.byggtjanst.se/Artiklar/2013/september/Tips-i-miljoklassningsdjungeln/ for Miljobyggnad, BREEAM and LEED; interview with DGNB for DGNB; interview with the Swedish Green Building Council for Miljobyggnad, interview with BRE for the improvement cost of BREEAM. Calculations refer to assessing the environmental and energy performance of the design of a sustainable building. HQE (http://www.certivea.fr/home) for estimation on HQE certification.

[36] BREEAM, http://www.breeam.org/page.jsp?id=27

[37] An example of BREEAM assessment price list can be found here: http://www.eh-3dstudio.com/web_documents/price_list_eh-3d_packages.pdf

[38] Interviews with DGNB, Swedish Green Building Council, costs reported under the Code for Sustainable Homes in the UK

* For HQE, certification fee includes the registration fee and the assessment cost by their auditor. The cost for the assessor/ project coordination is not mandatory under HQE non-residential since the auditor price is included in the certification fee.

It should be noted that the schemes vary in scope (i.e. which criteria/ indicators they cover) as well as in their assessment and certification process (e.g. who can assess/ audit the building, verification procedures, etc.). An example of a possible comparison between BREEAM and HQE (and LEED) in terms of costs is the following:

Table 3-8 Estimation of costs of certification aspects for an office building of 20 000m²

Costs	HQE (excluding costs of energy label)	BREEAM (split review)	LEED (non USGBC members, split review)
Inscription	1 893 EUR	700 GBP	900 USD
Estimated costs of eventual translation	0 EUR	3 000 GBP	5 000 USD
Certification	23 812 EUR	2 200 GBP	12 900 USD
Total (converted to Euros)	**25 705 EUR**	**4 870 EUR**	**14 711 EUR**

Source: Bureau Veritas in http://www.lemoniteur.fr/201-management/article/actualite/871078-breeam-leed-et-hqe-a-la-conquete-du-monde (2012)

The table above also shows that the cost sub-categories differ importantly per scheme, per building type and per source, and as such comparison between the schemes is difficult. Other sources confirm this issue.[39] The cost could also play a role in the success of one specific scheme (BREEAM).

Nevertheless, based on the evidence collected so far, it appears that the larger commercial schemes such as BREEAM or LEED can become very expensive compared to smaller schemes such as DGNB and Miljobyggnad.

Estimates of **future projections on certification costs** are based on the views of scheme operators, as we have not identified any independent studies on this topic. Scheme operators report that the costs related to certification of a building are not likely to change significantly in the future and could even be expected to slightly decrease (timeframe 2020 and 2030).[40] According to DGNB, the certification fee might slightly decrease in the future but this change would not be significant. With respect to costs for environmental improvement, DGNB's opinion is that these may become cheaper in the future due to economies of scale, i.e. more certified buildings would lead to more standardised processes and hence more cost-effective sustainable solutions. In addition, data could become more accessible compared to the past, which would make it easier for assessors and auditors.[41] According to BRE, improvements in IT, automation and building information modelling as well as increased take-up will help bring the costs down. The market will expect to pay less of a premium for assessment in the future and will also

[39] On the difficulty comparing BREEAM and LEED, see http://greenbuildingmanager.wordpress.com/2011/02/01/how-much-does-it-cost-leed-ebom-and-breeam-in-use/; another source reports much lower costs for BREEAM and LEED (assessment fees for BREEAM €2.500 – 12.600, for LEED up to €47.600, certification fees (BREEAM €930 - €1.890, LEED €1.400 - €14.280), see http://wordpress.hrz.tu-freiberg.de/wordpress-mu/journal/files/2010/11/dirlich.pdf

[40] Interviews with BRE and DGNB

[41] Interviews with DGNB

expect the benefits and value to be clearer.[42] According to HQE, the costs, particularly the costs of greening the building are also expected to decrease as more buildings become assessed because it is mostly the initial investment into changing design and construction practices that makes the greening of a building more expensive compared to a standard building.[43] Once these practices are in place, the extra costs decrease significantly, as has been the case for residential buildings certified in France with HQE.

Based on this information, it is plausible to assume that certification costs are not going to significantly change by 2020 and 2030 compared to the current (2013) estimates.

Scheme administration costs

The cost of operating established and self-supporting schemes can become low.[44] The cost of developing a new scheme will depend on its complexity[45], the cost of labour and also whether it builds on existing schemes (e.g. when an existing scheme is extended to cover other types of buildings). For example, the cost of developing the new DGNB scheme for existing building was relatively low. This is due to the fact that DGNB is an NGO and people spent time and expertise for them for free to develop the scheme. DGNB estimates that in addition to this expertise, approximately 1 full time equivalent (FTE) / year is needed for project management, managing the expert group of 10-20 people. Hence, in general, a tool would need around one to one and a half years to be developed in addition to the cost of labour.[46] In Sweden, the development cost of the Swedish Miljöbyggnad has been reported as about 2.2 million EUR, with 16 indicators.[47]

More complex schemes, such as BREEAM, require substantial investment to develop the scheme, such as the costs of the IT to support the assessment process, as well as resources to maintain and manage the scheme (quality assurance, technical support, and training etc.) until such time as it becomes established and self-supporting.[48]

3.2.2 Residential building certification schemes

There is a number of voluntary energy and environmental certification schemes for residential buildings. The majority of these are focussed on specific member states. Some examples of the schemes include the following:

In the UK BRE reports 17 353 certified projects to date, under their Code for Sustainable Homes (CSH) and Ecohomes, which corresponds to over 418 000 individual dwellings.[49] In France, the HQE Association reports 245 648 certified residential 'units' under their scheme.[50] The Swedish Miljöbyggnad scheme also targets residential buildings. For example, two very large nation-wide owners of apartment

[42] Information provided by BRE.
[43] Interview with HQE
[44] Information provided by BRE
[45] Private conversation with DGNB
[46] Interview with DGNB
[47] Interview with the Swedish Green Building Council
[48] Information provided by BRE
[49] Interview with BRE
[50] Information provided by the World Green Building Council

buildings (HSB and Riksbyggen) have taken the decision to certify all their new and renovated buildings. The Swedish Green market is said to be booming.[51]

The French HQE scheme for residential buildings, and the UK's CSH began as a mandatory requirement for social housing in order to get government financial support. However since 2005 the HQE scheme became voluntary for social housing and the scheme also developed variants for different residential building types. In France 90% of social housing and 40% of privately developed housing is certified under the HQE residential system.

There is a German DGNB certification scheme for new residential buildings such as apartment blocks, as well as a scheme for new small residential buildings of less than 6 units or single-occupation homes. The DGNB does not currently have a system for existing residential buildings. Overall the numbers of DGNB certified residential buildings are very low.[52]

3.2.3 Building energy use benchmarking schemes

In addition to the schemes described above, and profiled in more depth in the Annex C to this report, our research has highlighted a number of energy use benchmarking schemes in Europe and elsewhere that illustrate interesting aspects of market need and demand.

The BRE run International Sustainability Alliance (ISA)[53], and the UK's Better Buildings Partnership[54] are two examples of schemes that offer their participants the ability to benchmark the energy use of their buildings with that of similar buildings. The ISA scheme operates across Europe and beyond and allows building owners (for a membership fee) to gain access to a database of current energy use figures classified by building type and location. The information is kept anonymous. The UK's Better Building Partnership provides a similar service for it's (mainly London based) members. The operators of the latter scheme are in the process of developing a more comprehensive landlord focussed energy benchmarking scheme. They, and other stakeholders, mentioned the Australian NABERS scheme[55] as an important model and inspiration for their work. The US Energy Star for buildings scheme was also mentioned as being of a similar nature (and appeal) by two large property owners. An important aspect of the NABERS approach was that it creates an assessment which allows for the landlord and tenant controlled aspects of the energy performance to be separated. This is attractive to property owners because it avoids a building receiving a low rating because of poor energy management on behalf of the tenant. The rating reflects those aspects of the energy performance of a building under the control of the landlord, e.g. the efficiency of the primary heating/ cooling system and the lighting equipment. The US Energy Star for buildings scheme was praised for its open source and free to use nature. This means that building owners/ users can easily enter their own building energy use data and compare their performance, on an energy use per unit of floor area basis, with other local buildings.

The key attraction of these benchmarking schemes is that they allow a property owner to quickly and easily analyse the relative actual achieved energy performance (and hence cost of operation) of their

[51] Interview with the Swedish Green Building Council

[52] Information provided by DGNB

[53] http://www.internationalsustainabilityalliance.org/

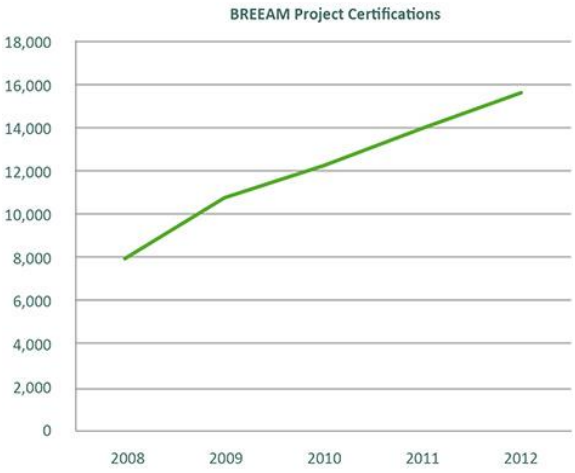
[54] http://www.betterbuildingspartnership.co.uk/

[55] http://www.nabers.gov.au/public/WebPages/Home.aspx

stock of buildings. This analysis also helps prioritise investments in energy efficiency, on the basis that those furthest from the benchmark should be investigated for savings first. These schemes also overcome the fact that mandatory national EPCs are based on a theoretical energy use, which for many reasons, is often very different to actual energy use. Potential tenants / owners of the building (and those considering lending to finance purchase) will also have information which is a realistic indication of future energy costs for the building.

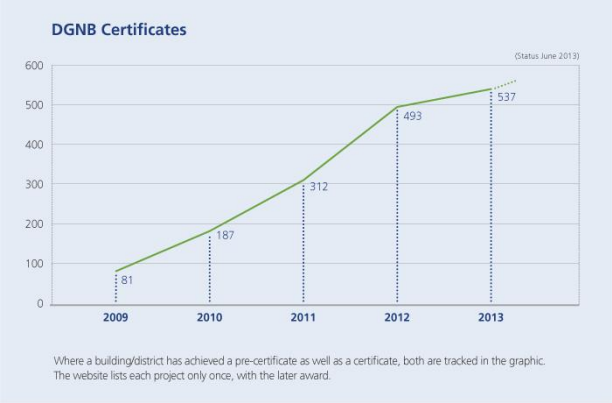
3.2.4 *Historical trends of the major voluntary certification schemes for commercial buildings*

BREEAM Project certifications 2008 - 2012



Source: BREEAM

DGNB certificates 2009 - 2013



Source: DGNB

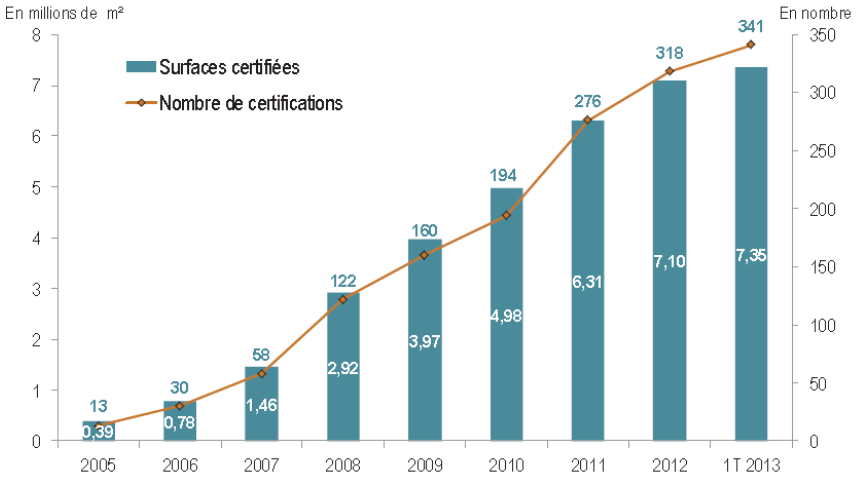
For BREEAM, a clear increasing (almost linear) trend can be seen between 2008 and 2012. The number of certifications almost doubled (from 8 000 to almost 16 000) in those five years. Similarly, for DGNB, there is a clear (almost linear) upward trend; however, the increase in certifications has been six fold in these past five years. In both cases, the trend shows a reduction in growth rate, i.e. the trend line gets flatter with time. The numbers take into account all certifications, including those for residential buildings, which form a minority; hence the numbers differ from the RICS estimates used earlier in the report.

DGNB expects that in 2020 around 75% of new commercial buildings constructed in Germany will be certified.[56] They also expect the scope of existing schemes to expand, for example, DGNB started a new scheme for existing buildings in summer 2013. The reasons that DGNB gave for their opinions and actions were market demand and the fact that certifying existing stock is where they could make most difference in energy use.[57]

[56] Interview with DGNB

[57] Ibid

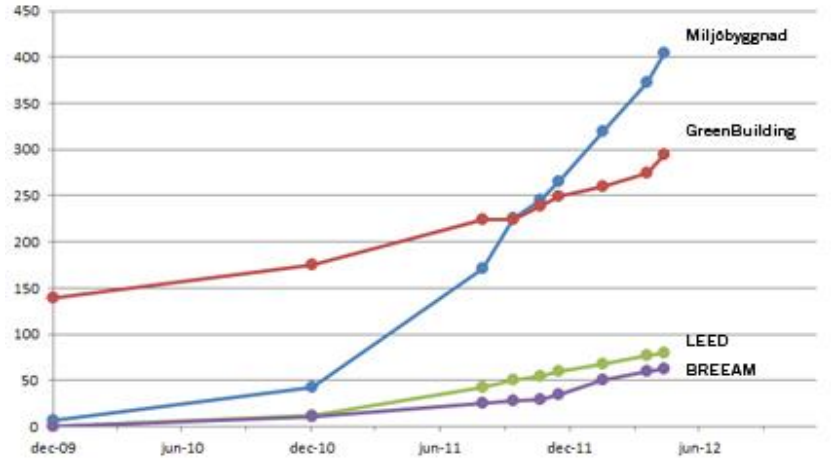
Evolution of the cumulative number of HQE[58] offices in Ile-de-France 2005 - 2013



Source: HQE, Jones Lang LaSalle, Certivea and Immostat

For HQE, the number of certifications in France has been rising steadily, with most certifications taking place in and around Paris (Ile de France - shown above).

Overview of Miljobyggnad, GreenBuilding, Leed, BREEAM, 2009 - 2012 in Sweden



Source: Swedish Green Building Council

The uptake of the Swedish scheme is rapidly increasing, to the point where it is now the most popular. The reasons for this growth are reported as including the perception that the scheme takes national context into account. However, it is not possible to differentiate between residential and non-residential buildings. Green Building is the energy voluntary certification scheme managed by JRC.

3.3 The EPBD and national Energy Performance Certificates (EPCs)

The Energy Performance of Buildings Directive (EPBD) (Directive 2002/91/EC), required all EU countries to enhance their building regulations and to introduce energy certification schemes (leading to mandatory national Energy Performance Certificates (EPCs)) for buildings. However, during the course

[58] Construction or renovation or exploitation for buildings completed or not

of the original Directive, assessments have shown that while all Member States had introduced some type of act or a Decree implementing the EPBD, in some MS not all parts of the policies had come into force and certification had not been fully implemented for all building types.[59]

In this respect, the 2010 recast of the EPBD (Directive 2010/31/EU) requires EU Member States to move towards nearly-zero energy in new and retrofitted buildings (NZEB) by the end of 2020 (2018 in the case of Public buildings), but also introduced mandatory certification of new and existing buildings (constructed, sold or rented out to a new tenant) along with periodic certification of public buildings, thereby clearly strengthening the importance and roles of national EPCs. The Concerted Action on Energy Performance of Buildings (regular meeting of MSs to share experience on creation and adoption of national laws for implementation of the EPBD recast[60]) provides an overview on the status of transposition and implementation (by March 2013) and is the most current and complete overview currently available:

- 6 MSs have legally fixed their national application of the NZEB definition, another 6 MS ready but not yet published in a legal document.
- 12 MSs had provided the EC with their national plans for increasing the number of NZEBs.
- Several countries use public buildings as exemplars for the general development of high performance buildings.
- All MSs have national mandatory EPCs systems in place, however the importance of the systems and therefore enforcement/compliance vary for the different MSs.[61]

Pilot and demonstration NZEB projects have been built in several MSs along with promotion and subsidy programmes to support their market implementation.

With respect to national EPCs, discussions on how to implement the respective articles of the EPBD recast revolve around a broad range of topics, including, software programs, qualification requirements for auditors and quality assurance of certificates, modalities of transferring and storing energy performance certificates, publishing of certificates and adaptation of the certificate to the new requirements (especially concerning near zero-energy buildings requirement and the cost-optimal methodology), layout and information included in the certificate, acceptance of the certificate in the real estate sector, and use of certificate data for monitoring processes.[62]

Table 3-9 Estimates on the number of EPCs issued for some countries[63]

Country	No. EPCs issued new buildings	No. EPCs issued existing buildings	
		Residential	Non-residential
BE - Brussels	430 (2011 – 2012)	60 000 (as of Nov 2012 for houses and apartments)	3 million m2 offices covered
BE - Flanders	90 000 (since 2006)	> 532k (since 2008)	6 563 (2009 – 2012 for public buildings)
BE - Walloon		> 150 000 (since 2010)	

[59] BPIE (2010), Energy Performance Certificates across Europe – From design to implementation

[60] http://www.epbd-ca.eu/

[61] Concerted Action EPBD (2013), Implementing the EPBD: Featuring country reports 2012

[62] Concerted Action EPBD (2013), Implementing the EPBD: Featuring country reports 2012

[63] Concerted Action EPBD (2013), Implementing the EPBD: Featuring country reports 2012

Country	No. EPCs issued new buildings	No. EPCs issued existing buildings	
		Residential	Non-residential
Croatia		> 3 000 (since 2010)	> 2000 (since 2010)
Cyprus		> 12 000	1 600
Czech Republic	Around 40 000 in total		
Denmark	Around 160 k residential, around 14k commercial		
Estonia	Around 8200 in total		
France	> 5 million in total		
Greece	Around 210 k residential, around 30 k non-residential		
Ireland	Around 334 k residential, around 11 k non-residential		
Italy	Around 1.3 million in total		
Lithuania	Around 7 k residential, around 3 k non-residential		
The Netherlands	New and existing buildings	> 2.4 million (2008 – 2012)	15k (2008 – 2012)
Portugal	111k (2007 – 2012)	444k (since 2009 – 2012)	
Romania		Around 16k (until 2012)	Around 4k (until 2012)
Slovakia	Around 23 k	Around 10 k	
Sweden	Around 420 k in total		
United Kingdom		457,504 (total non-domestic)	

Source: Concerted Action EPBD (2013), Implementing the EPBD: Featuring country reports 2012; some countries do not report this information as it may not be centrally collected or compliance is low (e.g. BG, PL). UK source: https://www.ndepcregister.com/lodgementStats.html

A major issue when discussing national EPC systems across all MS is the great variety of options and approaches to building certification. While all Member States have mandatory EPC systems in place, the attention given to the systems differs greatly. Denmark for instance has been certifying its buildings stock since 1991 and as of the end of 2012 had certified over 1.1 million buildings while Bulgaria and Poland are struggling with compliance and recording of the buildings certified. [64]

The table below gives an overview of the key elements of the mandatory EPC systems of some selected countries, giving the implementation responsibilities, assessment method as well as the year since when EPCs have been issued in the Member State.

Table 3-10 Overview of key elements of mandatory EPC systems in selected MS

Country	Implementation responsibilities	Assessment method	EPCs issued since
Austria	National & regional	Calculated rating	January 2008, January 2009 (public buildings)
Belgium	Regional	Calculated and measured rating (public buildings)	Flanders Region: November 2008 (sale), January 2009 (rent), January 2009 (public buildings). Non-residential expected in 2011
Czech Republic	National	Calculated rating	January 2009 (new buildings and existing renovated buildings)
Denmark	National	Calculated rating	2006
France	National	Calculated and	November 2006 (sale res and non-res), July

[64] Concerted Action EPBD (2013), Implementing the EPBD: Featuring country reports 2012

Country	Implementation responsibilities	Assessment method	EPCs issued since
		measured rating	2007 (rent), July 2007 (new buildings), January 2008 (public buildings)
Germany	National	Calculated and measured rating	2002 (new buildings), July 2008 (existing buildings)
Hungary	National	Calculated and measured rating	January 2009 (new and public buildings), January 2012 (existing buildings)
Ireland	National	Calculated rating	January 2007 (new res buildings), July 2008 (new non-res and public buildings), January 2009 (existing buildings)
The Netherlands	National	Calculated rating	January 2008 (sale and rent), January 2009 (public buildings, and social housing)
Poland	National	Calculated rating	January 2009 (new buildings, renovations, existing buildings for sale/rent and public buildings)
Portugal	National	Calculated rating	July 2001 (new res and non-res buildings >1000 m2), July 2008 (new buildings), January 2009 (existing and public buildings)
Spain	National & regional	Calculated rating	2007 (new buildings), after 2010 (existing buildings)

Source: BPIE (2011)[65]

There are currently no up-to-date studies on the implementation and progress in MS's mandatory EPC systems after 2011/2012 besides the Concerted Action on EPBD reports. Additionally, most studies carried out focus on a selection of around 10-15 MSs. Therefore, it can already been seen as an indication of the level of implementation reached at Member State level. It is further evident that access to data can be challenging and that the state of the European building stock is still widely unknown.

Additionally, the answers received during the consultation interviews for this study (detailed results presented in chapter 4 and 5) show that adoption of the rating has been rather slow and that the systems and their uptake vary between European regions. The interviews further support the impression stated in other studies that where awareness is low (especially in the Eastern EU), the uptake of certification schemes in general and for voluntary schemes in particular is also low.

Therefore the challenge of an EU wide voluntary scheme will be to generate added value to the mandatory national EPC. A strength a common scheme could have is that it is able to offer a common methodology for building performance assessment throughout the entire EU. Making the energy performance of the EU's buildings more comparable would be of benefit for stakeholders, operators and users acting on an international level. From a longer term perspective merging the common EU voluntary scheme with the national EPCs could be a way to form a common basis for energy performance assessment and to gain a better understanding of the EU's building stock.

[65] BPIE (2011), A review of the implementation of the Energy Performance Certification Scheme in Europe

The number of non-residential EPCs completed in those countries that report is significantly higher than the number of certifications (BREEAM, HQE, LEED etc.) in those countries. This gives a clear indication that all of the voluntary certification schemes are only being utilised by a small fraction of the potential market. This has important implications for this report. If the key objective for the proposed scheme being considered in this report is assumed to be reducing energy use in buildings, then trying to 'compete' with the existing certification schemes is not the most effective way of achieving this objective. The reason for this is that these certification schemes are only of interest, and therefore of influence on, a small percentage of buildings. It also appears that the buildings which will be improved by the existing schemes are typically owned / occupied by groups who are likely to be the best energy performers anyway.

3.3.1 Implications of the national mandatory EPC for the new EU common scheme

While national mandatory EPC system (based on recast-EPBD) and a new voluntary EU wide scheme for non-residential buildings would be separate systems, they should still link to each other.

A flexible open EU voluntary scheme that connects with other EPC systems could maximise its uptake. During the design phase the possibility to use (parts of) inputs and results of national EPCs for receiving certification under the voluntary scheme should be considered, thereby forming an inter-linkage between the two schemes. Similar approaches are already done by other EC accredited certification schemes. For instance, the Roundtable on Sustainable Biomaterials[66] allows for other biomaterial schemes to fit under it, so that already received certification can be counted towards reaching the RSB certification. However the different basis of assessing energy performance currently observed among the national EPC schemes poses a challenge for finding sound ways of integrating other ratings into the EU voluntary certification scheme.

A major issue identified by EuroAce (2011)[67] with the implementation of national mandatory EPCs is that it often involves several actors, cutting across numerous national ministries' remits. Thereby making implementation a complex administrative process, as EPC implementation typically requires the coordination of:

- trade / industry;
- construction / housing;
- energy / environment;
- and employment / skills / education ministries.

Therefore an added value of a common EU scheme could be that its implementation may not be as complex as for the national EPC, while still having the main objective of reaching EU targets, which distinguishes it from other voluntary schemes (e.g. BREEAM, HQE, LEED).

As a long term perspective the voluntary scheme and national EPCs for non-residential buildings should in best case converge, to further increase synergies in preparation and use of certification of non-residential buildings. This can be supported by the following actions:

- Setting up the voluntary scheme in close connection to the national EPCs by creating links to certification bodies, national assessors and experts currently working with EPCs and including

[66] http://rsb.org/

[67] EuroAce (2011), Factsheet on Energy Performance Certificates

them in the processes of the new voluntary scheme. This way synergies can be better identified and facilitated between the two schemes.

- Issuing of voluntary certificates could by default be done by actors that are also responsible for issuing the national Energy Performance Certificates. This will allow for quick implementation and uptake of the new scheme and will further support the future merging of the two systems.
- Within the current EPBD, MSs themselves could voluntarily adopt the common scheme. The EC together with the scheme manager could create guiding documents and other incentives to support MS in adopting the common scheme.
- By involving national experts in the revisions of EPC as well as the voluntary scheme methodology the two systems can be linked more closely. By taking advantage of planned revision cycles, like the one in 2017, and discussing ways to integrate the two schemes early on with experts familiar with both schemes the further integration of the schemes can be facilitated.

4 Market Analysis & Market Demand

4.1 Current Experience of Building Certification Schemes

This chapter presents the findings related to the current experience of stakeholders in Europe with building certification schemes. This includes analysis of the use of such schemes by building owners, property developers, real estate companies and finance providers. We also looked at the factors influencing the selection of a scheme as well as the possible drawbacks in order to derive conclusions on what the market needs and wants in the future.

73 interviews have been carried out. We have based the quantitative analysis on 58 of these respondents, in order to have a sample of one respondent per target group per country. Additional respondents per target group per country were excluded from the quantitative analysis to avoid biased results. The distribution of responses for the three stakeholder groups is shown below:

Table 4-1 Total number of people interviewed

Type of stakeholder	Number of people interviewed
Scheme operators	24
Building owner/Scheme user	22
Finance provider	12

Not all questions were answered by all participants. Therefore there are a lower number of responses for some questions. The response rate for each question from each stakeholder group is shown in the tables and graphs.

4.1.1 Views on the market demand for building certification schemes by scheme operators

The vast majority of scheme operators think that current and potential customers need and want schemes which include wider sustainability issues (67%), while 28% think different customers want different things and only 6% think customers want energy only schemes. In order to respond to this finding the proposed EU scheme could be developed in a modular way, starting with the 'energy module' and (eventually) developing additional modules on other sustainability issues. However, it should also be borne in mind that the users of the current schemes are not a large share of the total potential users.

In general, the view was that the nature of any new scheme has to match with the interests of the scheme operators and the users. Any new system should also align with national mandatory requirements (e.g. verification for energy performance certification should be covered by the new system). Some scheme operators stated that since there are already many certification systems, customers expect a standardised/unitary system or a broad common base. Such an 'energy module', as suggested above, could also be incorporated in existing schemes with a wider scope. This could help avoid the perception of the scheme as an additional scheme in the market.

It was also mentioned (NL) that the EU should focus on those who are lagging behind, mostly small actors who do not want to do anything with sustainability. Therefore a scheme should be accessible. It was also suggested that if a voluntary scheme does not work, the scheme should become mandatory.

4.1.2 *Current use of building certification schemes by building owners and other scheme users*

We have interviewed (potential and current) users of building certification schemes across the EU, including large real estate service companies, property developers and managers, engineers and building owners.

The survey shows that the vast majority (95%) of scheme users that responded currently make use of a certification scheme for the assessment of the performance of their buildings (Table 4-2). These schemes include mandatory and voluntary energy and sustainable labels as well company's own energy standards.

Table 4-2 Current use of building certification schemes by building owners and scheme users

Are you currently using a certification scheme for the assessment of the performance of your buildings?	count of respondents	% within respondents
Yes	18	95%
No	1	5%
Total respondent rate	86%	

Out of these, 61% of respondents use voluntary national or international schemes. Even those that have not used voluntary schemes before begin to appreciate their value. For example, in Estonia, the scheme (LEED) was implemented in order to attract foreign buyers. The real impact is expected to only become apparent in 1-2 years. The same respondent stated that local investors are beginning to value sustainability as much as foreign investors.
A similar trend is also seen by respondents from Hungary, who expected certification of buildings to become more common over the course of the next years. One respondent (HU) pointed out that more and more companies look for certification in their office buildings and view these as an asset, especially the ones with a "sustainability" scope.

It was reported that many companies, in Latvia for example, do not use an international scheme or a voluntary label scheme because they feel it is currently too expensive. At the moment potential local investors are not highly aware of international energy certification schemes.

It is also apparent that the majority of scheme users stick to the scheme they use first (70% of respondents mentioned they have not used a different scheme previously). One respondent who changed scheme, in the Netherlands, stated that they changed from LEED to BREEAM because LEED is too American, contains no review of whether the building was actually built the way it should have been and it is basically 'a big checklist'. Another Hungarian respondent also pointed out that LEED was noticeably an American scheme, making it at times challenging to apply to the European case. However, he valued its high quality, international standing as well as its wider sustainability scope and therefore sticks to it.

With regard to the type of buildings certified, the majority of scheme users questioned certify new buildings only (47%), new and deep renovation only (7%), with 27% of respondents certifying all of their buildings (and another 20% new and existing). See table below:

Table 4-3 Use of schemes per type of building (new vs existing)

Do you use schemes for the whole of your building portfolio or only certain buildings?	count of respondents	% within respondents
New only	7	47%
New and deep renovation only	1	7%
New and existing	3	20%
All	4	27%
Total response rate	68%	

It appears that in Western Europe certification of new buildings is more or less considered mandatory for certain development types, as most new buildings have more than one certification. The reason quoted for this is that it is more difficult to sell the building or the value is reduced without certification (even though those asked – in Luxembourg - were not able to calculate the value of this reduction). For existing buildings, it is difficult to persuade landlords to get their buildings certified, because of the cost of certification and the cost of any works required to improve the rating. In addition, there is no obligation to gain certification and it was reported by stakeholders from Luxembourg that it does not provide any significant added value for existing buildings.

This finding suggest that BREEAM (and the other certification schemes) only appeal to a relatively small niche market which is virtually all new buildings and owners / occupiers motivated by CSR and reputation.

There are differences between European regions, as mentioned in the previous chapter. The Western EU countries which have their own national voluntary leading schemes, e.g. BREEAM in the UK, DGNB in Germany or HQE in France, all report a steady rise in certification. In contrast, answers from other parts of Europe indicate that many respondents have only recently started using the rating schemes. For example, it is apparent from the interviewees from Central and Eastern Europe mostly rely on the mandatory EPC system. Given the low awareness in these regions, there is concern regarding the uptake of a voluntary scheme. In Cyprus, for example, it has proven to be very difficult to develop a scheme on a national level (complexities include accrediting surveyors, QA, etc.). Moreover, there is no large demand apparent in Cyprus for such a scheme, except in some potential niche markets e.g. international players, retailers and possibly holiday homes. As a small country (with limited resources) they would prefer to either use their own national scheme **or** the common scheme, there are no resources to support both.[68]

A potential way to address this would be to link the EU voluntary scheme to the existing mandatory EPC system (e.g. by making the voluntary EU scheme only a few more steps within the EPC process).
The situation in Nordic countries is similar to that in Western Europe, with the use of building certifications growing substantially in all three Scandinavian countries over the last decade, although it still remains a niche market. Building owners and developers see a clear future for the schemes for several reasons. Firstly, legal demands from national and EU authorities are getting more stringent. Secondly, they bring down the maintenance cost over time. While consumer demand is starting to rise, the interviewees emphasised that in most cases other factors are more important to their choice of building such as location, size, and price. Certifying a building is a way to "future-proof" an investment and building and sustainability issues are becoming increasingly important. While demand is

[68] Feedback from the first expert meeting

consistently increasing the Nordic countries, the certification landscape is quite fragmented in the three countries and there does not appear to be any move towards consolidation. Denmark and Sweden have both developed their own schemes. Denmark based their scheme on the German DGNB scheme whereas Sweden decided to develop a completely separate scheme. They are still developing a scheme in Finland. In all three cases the national regulations are used as the basis to modify or create new schemes. One interviewee mentioned that foreign schemes such as LEED sometimes prove difficult to apply in local conditions. The result is that the use of national schemes is taking-off in Sweden and Denmark whereas LEED remains the most used scheme in Finland. Interviewees in Sweden and Denmark highlight the importance of having schemes that are aligned with national building codes to reduce the administrative burden. Due to the nascent stage of the Finnish scheme, users and developers are still not using it.

4.1.3 Use of building certification schemes by finance providers

We have interviewed stakeholders providing finance for buildings, including environmental and energy efficiency funds and banks across the EU Member States. Many interviewees were not familiar with, or do not request a building certification scheme. Those that answered yes, included institutions offering funds for residential buildings (EE, LT).

This shows that even though the EEFIG Interim Report[69] analysing in particular energy efficiency and finance states that energy performance certification is one of the key drivers of investment in energy efficiency of (commercial) buildings, we have not currently seen it in practice, at least not on the ground. However, this might be also due to the fact that our study had only limited involvement of finance providers, and hence the results might not be representative, while the EEFIG report is a high-level study analysing drivers and providing recommendations to spur investments in energy efficiency of buildings.

Central and Eastern Europe – BG, CZ, SK, PL

The stakeholders interviewed do not use any schemes in their decisions to offer a loan, and were not confident in answering all the questions. The decision is taken by their clients (investors) to request a scheme or not. In Slovakia, the interviewee noted that they as a bank do not require any such certifications and are not planning, or wishing, to require them, which would apply to an EU common scheme as well. Neither do international schemes, such as LEED or BREEAM influence the bank's decision to loan or the decision process.

Baltics – EE, LV, LT

Two interviewees work with residential buildings (EE, LT) and they do request 'certification' in the form of an energy audit. The main demand comes from building permissions for new buildings or for buildings under major renovation. They need specific energy calculations, rather than environmental certification. In some cases, audit of energy performance is mandatory for all buildings applying for support from the agency. With this, the agency wants to ensure that renovation of buildings is carried out to the highest standards and for the longest period possible (LT).

For Latvia, the interviewee does not request any certification and as such it does not have an impact on the loan offer. Also the respondent does not anticipate that a certification would be required in the

[69] EEFIG (2014), "Energy Efficiency – the first fuel for the EU Economy", Interim Report

future. The current mechanism, which is when a building is renovated it must have an energy efficiency audit, is regarded as sufficient. It is up to applicants to pursue a certification, but it does not make a difference for the fund.

South

In Italy, the interviewee from a bank mentioned that they offer a specific loan for which they request Protocollo Itaca certification. Protocollo Itaca has a public origin and is managed by ITACA, the Federal Association of the Italian Regions. It is used to promote sustainable buildings, particularly within the framework of the social housing programmes. In general, the bank recognises and values a green label in terms of improved loan offer (e.g. rate reduction and facilitation of administrative procedures).

West

Although finance providers were not interviewed, we did ask building owners and scheme operators about the interest of finance providers in certification schemes. In the UK it was reported that finance providers were aware of schemes and that a building with a high score in a rating system, would be viewed as being more attractive to tenants or purchasers (and therefore a loan on it would be less risky) than another building in a comparable location with a lower score. However, despite this awareness there were no known examples of any finance provider habitually offering improved terms to buildings which had certifications.

4.2 Factors Influencing the Selection of Certification Schemes

4.2.1 Shortcomings of certification schemes

Building owners/ scheme users

Building owners and other scheme users identified the following shortcomings of current certification schemes:

Table 4-4 Shortcomings identified by scheme users

Are there any shortcomings in the certification schemes that you use? E.g.	% within respondents
high cost	29%
low perceived reliability	14%
low international acceptance	7%
not internationally comparable	14%
limited accessibility in your home country	0%
limited range of applicability (building type / use)	7%
scope specific to energy only	14%
scope covering environmental and social impacts in addition to energy related impacts	0%
the certification institute	0%
other	14%
Total response rate	**64%**

As can be seen the main shortcomings relate to the cost – including the cost of changing a building if a particular score is required. One interviewee (EE) stated that they expected the brand name to sell itself, in terms of adding value to the building. National (cheaper) schemes are not known abroad. Other barriers are low perceived reliability and low international comparability and energy only scope.

In Nordic countries, the short-comings were reported to be the following:

- Not aligned with national building codes.
- Not specific to local conditions.
- Source of energy is not included in the calculation (in Nordic countries this should be beneficial to the total evaluation due to use of renewables, CHP, etc.)

In Luxemburg, the respondent mentioned that clients do not care about the detail of the certification scheme, all they want is a certificate, which will increase the value of their property. Similar observations were made in Hungary, however a respondent also pointed out that a high quality, ambitious certificate can impact and change the way a building is built or operated and can create a benefit beyond a mere marketing effect.

Language barriers were also mentioned as a shortcoming (AT).

In general respondents feel that the administrative process of getting a certification is moderately onerous. Similarly, the quality assurance is seen as of 'medium' burden for the majority of respondents (see table below).

Table 4-5 Administrative process and quality assurance

How would you rate the administrative process of the certification scheme you are using (compared to others)?	% within respondents
Heavy	19%
Moderate	63%
Light	19%
Total response rate	**73%**

How would you rank the quality assurance (e.g. traceability of the documentation) of the certification scheme you are using)?	% within respondents
Good	38%
Medium	56%
Poor	6%
Total response rate	**73%**

Finance providers

The main shortcomings reported by finance providers in Europe were the following:

- Low perceived reliability / Low quality
- Lack of comparability across countries and different types if buildings
- High cost
- Narrow scope (energy only)
- Low international acceptance
- Not detailed enough / Lack of data for specific buildings
- Lack of awareness from potential users (Latvia)
- Also they fail to provide the energy savings (in bills).

The main drawbacks identified regarding existing certification schemes are their lack of comparability across countries and different types of buildings, perceived low quality and reliability and covering too narrow a portfolio of green buildings. For example, one respondent in the Baltics mentioned that certificates are often prepared without visiting the building in question and are based only on plans, which makes them similar across the same category of buildings, e.g. apartment houses. There is also a

general lack of specific data for each building in the Baltics region. They felt that each building is specific and needs to be described in detail, e.g. how many windows are renovated. Currently certificates disregard this information and e.g. report that all windows in the building should be renovated although this is not always true. In order to help firms/ individuals in preparing investment plans, certificates must be more detailed and reflect the actual state of the building.

Another issue is that there is lack of awareness from potential users about certifications and their possible benefits, i.e. how the information provided in the certificate can be used. It was also mentioned that in order to avoid a certification process which has limited practical use and is costly, it is important to make sure there is enough demand and to inform and educate stakeholders.

Similar shortcomings have been identified also by the EEFIG report[70], which mentioned that coherence, reliability, usefulness, ease of access and accuracy were all terms used by EEFIG members on their "wish list" for improvements and standardization of Energy Performance Certificates and Buildings certificates in EU Member States. Moreover, the report also stressed the need for collection, organisation and open access for higher quality and more detailed data on the existing building stock.

4.2.2 Factors influencing choice of scheme

Building owners/ scheme users

Building owners/ scheme users are influenced by having a certification that is internationally recognised, there is rarely a preference towards a specific certification scheme. Currently BREEAM is the market 'standard' as it is regarded as easy to use and has an in-use variant. It is very important that new schemes are well recognised and accepted in the market in order to be taken up (LUX). Many of the large developers/owners work with one scheme in particular and have built up expertise in this scheme. In the Nordic countries, GreenBuilding is sometimes chosen because it is felt to be a better fit to the Swedish context. However, it is also sometimes deemed too lightweight in terms of indicators which is why other schemes such as BREEAM are chosen.

The main factors include international acceptance, cost and accessibility in the home country (see table below).

Table 4-6 Factors influencing the choice of a certification scheme

What are the factors that influence your choice in selecting a certification scheme?	% within respondents
Cost	20%
perceived reliability	13%
international acceptance	27%
international comparable	0%
accessibility in your home country	20%
range of applicability	7%
scope	7%
the certification institute	0%
its market share in last 3 years	0%
Other	7%
Total response rate	**68%**

[70] EEFIG (2014), "Energy Efficiency – the first fuel for the EU Economy", Interim Report

The most important factor is international acceptance of the scheme, this is observable across all Member States.

Table 4-7 The most important factors

What are the most important factors among the following factors in your choice of certification scheme?	% within respondents
Administrative process (ease of)	21%
certification body (credibility)	21%
international acceptance	36%
Scope (e.g. energy consumption, water consumption, land use and ecology, emissions/ pollutions, etc.)	21%
Reliability	0%
quality assurance (traceability of the documentation)	0%
Time required to issue certificates.	0%
Total response rate	**64%**

Finance providers

There were a wide range of opinions expressed regarding choice of certification scheme. Some examples are:

- Reliability.
- Cost (for voluntary schemes, not mandatory).
- International acceptance.
- Accessibility in your home country.
- Comparable internationally.
- Ease of administrative process, e.g. time required to issue certificates.
- Credibility - is important as it should ensure that similar rules are applied for everyone.
- Certification institute.
- Wide range of applicability.
- Scope covering environmental and social impacts in addition to energy related impacts.
- Recognition by public bodies.

According to stakeholders in the Baltics, there is limited time and willingness to innovate and go beyond mandatory schemes. They also mentioned that they would expect higher uptake of schemes which are clearly understood and easily accessible. It is also key that the benefits from the certification scheme are clearly communicated. Scheme users expect these benefits, particularly if they invest their own money in achieving a certificate. The more buildings are certified, the more experience investors and certifiers gain and the quality of certificates would improve.

4.3 Conclusions of Market Analysis and Demand

The analysis presented above and these conclusions related to the current experience of stakeholders in Europe with building certification schemes are based on notes and open questions as well as the analysis of multiple choice questions from the interviews. Even though there are a limited number of interviewees, this analysis has proved valuable for assessing the market and demand for an EU voluntary certification scheme for non-residential buildings.

The market for voluntary certification schemes is young. However, it is important to note that there are differences between European regions. The Western EU countries which have their own national

voluntary leading schemes, e.g. BREEAM in the UK, DGNB in Germany or HQE in France, all report a steady rise in certification. Furthermore, it appears that in Western Europe certification of new buildings is more or less considered mandatory for certain development types. In contrast, other parts of Europe have only recently started using the rating schemes.

We also looked at the factors influencing the selection of a scheme as well as the possible drawbacks in order to derive conclusions on what the market needs and wants in the future. Some of the key factors when choosing a certification scheme include reliability, cost and international acceptance.
As for market demand, 67% of scheme operators surveyed think that current and potential customers need and want schemes which include wider sustainability issues. In order to respond to this finding the proposed EU scheme could be developed in a modular way, starting with the 'energy module' and (potentially) developing additional modules on other sustainability issues. It was also highlighted that any new system should also align with national mandatory requirements. Linking the EU voluntary scheme to the existing mandatory EPC system (e.g. by making the voluntary EU scheme only a few more steps within the EPC process) would address this and might also reduce the costs for implementation due to synergies.

5 Scoping & Positioning of an EU Energy Scheme

The aim of this section is to identify the scope and positioning for a successful common EU certification scheme for the energy performance of non-residential buildings. We have built our analysis and recommendations on the response to the interview questions that provide information on the market views in terms of the potential scope and positioning of a new EU voluntary scheme, taking into account both the support and the concerns expressed by the stakeholders. This is complemented by a comparison of what is available in the market based on conclusions drawn from fiche and SWOT analysis prepared for the six leading existing schemes. The full list of questions and results, as well as detailed information - in the form of Fiche and SWOT analysis - for the six leading schemes in the building certification market are presented in Annex C.

5.1 Scoping for a Common Certification Scheme

This section focuses on assessing the need for a common EU voluntary scheme for non-residential building and its potential scope. It focuses on the market needs and demands for such a scheme.

5.1.1 Is there a perceived need for a new EU energy scheme?

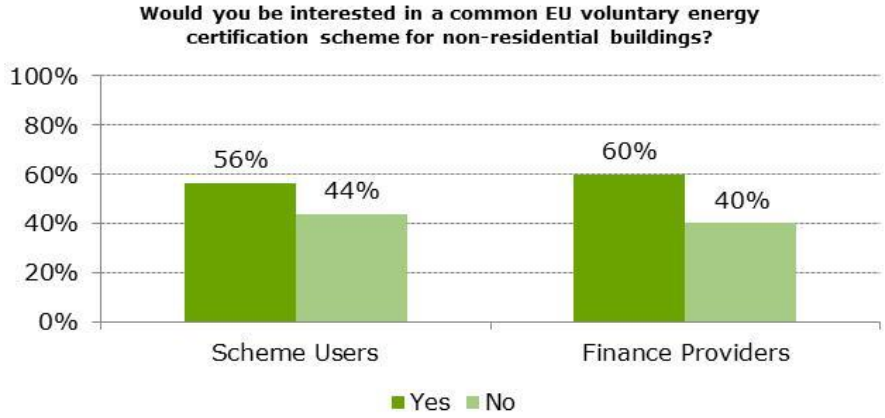
We asked scheme users and finance providers whether they would be interested in a common EU voluntary energy certification scheme for non-residential buildings. A small majority of the interviewees think that an EU voluntary certification scheme can bring value to the market as it would provide international acceptance and comparability. It should be noted that it was in general difficult for the respondents to assess such a voluntary scheme up front as it is not yet known how it will function.

Market demands and needs

- ✓ Current users of building certification schemes and building owners stated that in their opinion the most significant aspect of added value that a new EU scheme would bring is to allow for a consistent comparison between buildings in different countries. Many large property owners have properties around Europe, an important issue in any new scheme for them would be common and consistently applied standards. In addition to this need for consistency another commonly expressed concern (44% of the interviewees) was the need to avoid duplication of efforts and costs, between any new voluntary scheme and existing mandatory schemes (i.e. Energy Performance Certificates). This reasoning for building owners may be due to the fact that the non-residential sector is more internationally oriented than other parts of the building sector, e.g. for offices and hotels. In this way it is easier to benchmark across countries and make fairer financial analysis when projects are compared.
- ✓ The finance providers expressed an interest in a new scheme that helped them compare the energy performance of buildings with a baseline so that they could assess the level of risk associated with ongoing high energy costs, for a building. They were supportive of a single, EU wide, approach to such a scheme. As with the existing scheme users they also raised concern over the added value of a new EU-scheme over existing voluntary and mandatory schemes. Similarly (also mentioned above), the EEFIG report identifies energy performance certification as one of the key drivers for energy efficiency renovation where easier comparison across

countries would facilitate the delivery of a single market for EE which in turn would lower transaction costs for businesses.

Figure 5-1 Interview results for market interest in EU voluntary certification scheme



*The response rate for this question is; Scheme users: 76%, Finance providers: 91%.

Building owners/ scheme users

As has been mentioned above many respondents felt that a new scheme would be of clear benefit to very large property owners that have properties in many EU countries. Energy costs are an increasingly important factor in the 'rentability' of a building (and by extension in how easy it is to get finance for the building in the first place). At the moment each MS operates its mandatory Energy Performance Certificates (EPCs) in a slightly different way. This makes it difficult for these large property owners to compare buildings across their portfolio across different MSs even though their portfolios are relatively homogenous (e.g. large office blocks). Therefore a common methodology across Europe would be of great use to them. On the other hand, such a scheme would need to have clear added value in comparison to the mandatory EPCs. Suggestions on how this added value could be achieved included if a new system could address problems of lack of reliability in national mandatory EPCs, (because of assessor quality) and/or if a new system was based on the actual energy use (and costs) of a building, as opposed to the as designed figures used in national EPCs. Large property owners are interested in more than just the theoretical / calculated energy use.

Building owners and scheme users in Nordic countries hold a middle ground, neither fully supporting nor strongly opposing the introduction of a new common voluntary scheme. Some interviewees mentioned that it is very difficult to react to a proposition without seeing what it would entail in more detail. They felt that the position of the owner or developer depends on the detail of any new scheme and to what extent it follows the methodologies and regulation in place. They are generally interested in common calculation methods but have concerns on whether it is possible to reach an agreement on a common method. For such a scheme to be of use, it would need to offer added value to the national schemes (both mandatory EPC and voluntary schemes) and in particular to the GreenBuilding certification- a sentiment which was voiced in several other MSs as well. A common EU scheme could help raise ambitions in countries with low standards on building certification and building stock. There is a role for a small and "light touch" scheme – with the administrative burden minimised - in the certification market as some countries and companies have capacity and resources problems with using schemes such as BREEAM and LEED.

Finance providers

Respondents are divided on the question as to whether they are interested in a common EU scheme. There is also no pattern with respect to regional differences. In some countries respondents are not very familiar with the concept of certification schemes (e.g. BG) but they see the concept of a common EU scheme positively. Particularly if such a scheme 1) provided international acceptance; 2) enabled different types of buildings to be compared across countries, which is currently not possible (EE, PL, SL); or 3) if it made the certification system simpler, e.g. countries would use a single scheme instead of a number of national systems (LT).

Others are satisfied with the current situation and do not see any value added by another scheme (CZ) or do not think these schemes provide sufficient relevant information to justify their costs (LV). Some argue (SK, ES) that a bank's decision to loan is not influenced by having a certificate or not, since in their view, certification does not influence the market value of a property. It is seen as positive additional information which may influence future credit risk or some investors. Even according to the international valuation standards, it usually does not influence the R/E valuation and it does not look like the situation will change in the near future. However, it was recognised that certification does have an influence with respect to trading commercial properties where certification is a must if a bank wants to access a certain type of investor. For some investors, certification by LEED or BREEAM is a minimum criterion to even include a building in their portfolio.

In the UK it was reported that financiers are interested in the energy performance of a building, in terms of its 'rentability' but this remains a very minor factor in comparison to traditional factors such as location. It is becoming more of an important factor, especially as from 2018 it will not be possible to rent properties with an EPC rating lower than G – but this is EPC rating, not actual energy use.

5.1.2 Energy only or beyond energy

Broad and ambitious schemes already exist in the market and these are being used by a limited (but increasing) number of users. It appears that a new EU scheme would increase its chances of appealing to users if it could be made cheaper and faster than established schemes and have a focus limited to energy performance with extended, improvement options and recommendations. While for scheme operators the focus is clearly on broader sustainability issues, for the finance providers and scheme users interviewed this is not straightforward. For some users an area of potential added value in comparison to national EPCs is a wider scope. A modular scheme, addressing energy first and complemented by other modules on different sustainability issues later on, would be one way of achieving both areas of added value. Such a modular design would allow moving forward sooner, and continuing with the development of other – more complex – sustainability issues later on. Furthermore, it would be possible to combine these modules with existing schemes, thereby allowing existing scheme operators to use part of the new scheme.

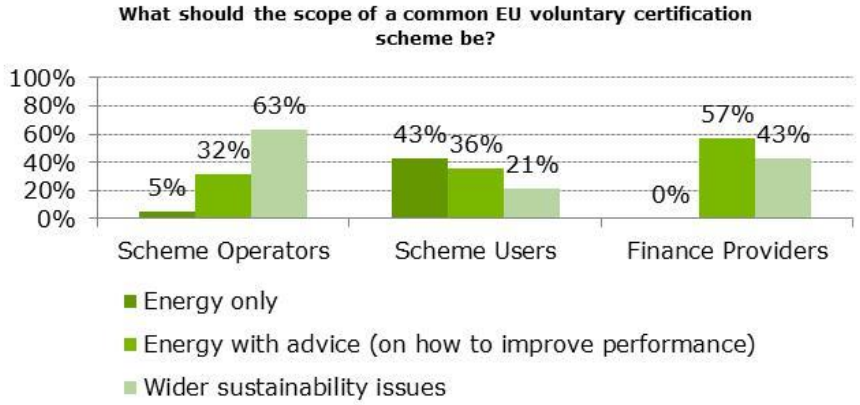
Market status

The existing voluntary certification schemes in the market mostly cover a wider range of sustainability aspects rather than energy only. They have the advantage of offering a wider scope but this brings disadvantages of complexity and cost.

Market demands and needs

- ✓ The operators of existing schemes mentioned that the scope should be driven by the ambition (regarding take up and impact). If the ambition is low, they feel it is better to have a broad scope; if the desire is to achieve high take-up it would be better to focus on energy only.
- ✓ The scheme users and building owners mention that although wider sustainability issues are important there will not be a large demand for such a scheme. The majority of potential users and building owners are not ready for full sustainability assessment, thus another scheme in addition to those already available, would risk creating confusion in the market.
- ✓ Finance providers focus on the ease of understanding and interpreting scheme results, thus they would prefer an assessment scheme to maximise simplicity. As such they prefer energy only as the most transparent component in their decision making process with advice on how to improve performance.

Figure 5-2 Interview results for content scope of EU voluntary certification scheme



*The response rate for this question is; Scheme Operators: 79%, Scheme users: 64%, Finance providers: 58%.

For the energy aspect of the scheme, most interviewees expect any new scheme to only award a higher level of energy performance than that required to achieve a high rating under mandatory national schemes (EPCs). However, a couple of interviewees mentioned that the EC's requirements in the EPBD are already very high, and becoming higher e.g. NZEBs, and it would be difficult to require higher performance than this.

Scheme operators

The 2012 Green Market Study in Finland showed that consumers are mainly interested in space efficiency, quality of indoor working environment and energy efficiency. Austrian scheme operators mentioned that as there are already a lot of certification systems, customers expect a standardised/ unitary system and that any new system would need to be in line with national mandatory requirements (e.g. verification for energy performance certification should be covered by the new system). Operators in the Mediterranean region felt that the scope of a new scheme should be wider. However, it was recognised that awareness among potential users of the importance of 'wider scope' issues such as the embedded energy of building materials, toxicity, etc. is very low. If the market had a higher level of awareness of the benefits of green buildings, the requirement for sustainability would be higher. In addition, it was also noted that due to the fact that the Mediterranean region climate is different to rest of Europe, the technical thresholds should be adjusted according to local conditions. In Eastern Europe, the view was expressed that more focus is needed on tenant-based potential savings; with less

focus on general social benefits. For example the Estonian interviewee mentioned the need to also include legal and financial aspects.

Building owners/ scheme users

UK property owners expressed an interest in measuring in use energy consumption and ideally allowing for landlord and tenant controlled energy use to be separately assessed (as in the Australian NABERS scheme and the approach being developed by the UK Better Buildings Partnership[71]). They regard BREEM and LEED type schemes as being aimed at a different and much smaller market – i.e. potential users at the top end of the market who want the prestige, and developers obliged to get certificates by planning requirements. They do not see any value in introducing a new EC scheme to rival existing offers

All building owners interviewed in Nordic countries were in favour of using more than merely energy as an indicator for sustainability. This is currently the case in the national voluntary schemes developed or under development.

Finance providers

It appears that finance providers have a higher level of interest in energy only scheme with advice rather than one covering wider sustainability issues. There was support for a scheme which included additional advice on how to interpret scheme results and how they could help finance providers assess project risks and make informed decisions on whether to finance the investment or not.

The EEFIG report which surveyed a larger number of financial stakeholders concludes that there is a clear interest in energy performance certificates as lenders of finance for energy efficiency building refurbishments consider the economic benefits (derived substantially through reduced energy bills and increased asset value) of such investment and asset improvement, in addition to looking at the general creditworthiness of the building owner in its assessment of risk.[72]

5.1.3 New vs existing buildings

Both, new and existing buildings are important and including both categories ensures a larger potential market uptake (and in the end, energy savings). It seems that the current voluntary schemes in the market respond to market demand in terms of proposing performance assessment for both existing and new buildings, although take up of the schemes focussed on existing building energy use (e.g. BREEAM in use) remains much lower. This is similar to the requirements set for the mandatory national EPC, where most Member States use calculated rating for all building types, both for new and existing building assessment. However, a few exceptions exist where MS use measured rating for parts of their building stock (e. g. Belgium, France, Germany and Hungary). The new EU voluntary scheme should be a single scheme in order to allow for a possible comparison of an existing building with a new building. However, when it comes to benchmarking, the right comparison should be done, i.e. it should be benchmarked against the same age of a building.

[71] http://www.betterbuildingspartnership.co.uk

[72] EEFIG (2014), "Energy Efficiency – the first fuel for the EU Economy", Interim Report

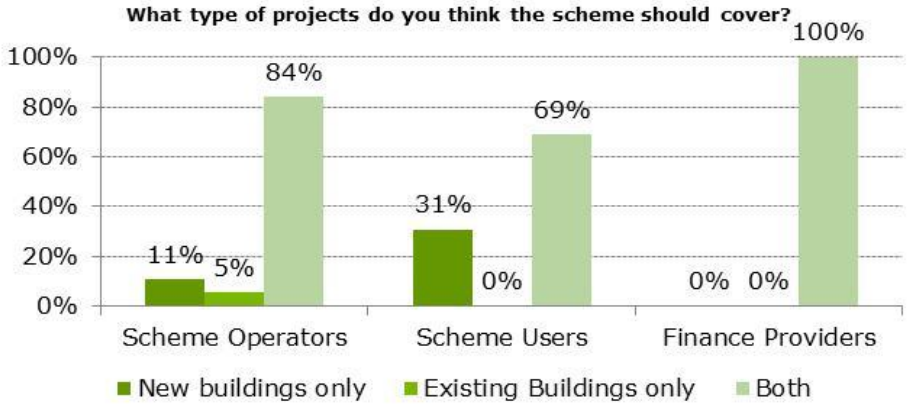
Market status

The market leading voluntary certification schemes (except Passivhaus) cover both new and existing buildings.

Market demands and needs

- ✓ Scheme operators recognise the large stock of old buildings and their dominance in total building sector energy use. They feel that both new and existing buildings should therefore be addressed in the scheme.
- ✓ The scheme users mentioned that all buildings put on the real estate market should have an energy rating that would help the buyers and/or tenants decide on buying/tenure. (Though this need should be already addressed by the mandatory EPC).
- ✓ Finance providers mention that it is important for them that the scheme covers the whole of the real estate market, i.e. new and existing buildings.

Figure 5-3 Interview results for type of buildings that should be targeted in EU voluntary certification scheme



*The response rate for this question is; Scheme Operators: 79%, Scheme users: 59%, Finance providers: 58%.

Scheme operators

Certification of new buildings motivates sustainable building from the "roots" while certification of existing buildings is needed because there are many existing buildings in Europe that need extensive renovation/ reconstruction. While most scheme operators mentioned that both new and existing buildings should be certified, there was no strong preference stated regarding a focus on publically owned buildings. Offices and logistics buildings (i.e. large warehouses) were mentioned as being the most interesting building types in terms of international prevalence.

Building owners/ scheme users

There is less added value perceived by the potential investor in certifying existing buildings in comparison with the energy performance of new buildings. However, many large property owners are interested in benchmarking the energy consumption of their properties.

Finance providers

New and deep renovation buildings are already being financed and certification is usually required by the investors. The existing buildings market is much larger than the new building market and there is large potential for efficiency improvements in existing buildings. Therefore if the intention is to

maximise the efficiency of the building stock existing buildings should be covered by the scheme. In addition, this would allow the comparison of a wide range of building types, e.g. by developing different benchmarks for different building types.

5.1.4 Rating system - scale or pass/fail

When asked for their preference, most mentioned that a scale is far better (and easier to understand) than a pass/fail. It was mentioned that a scale indicates quality and provides more information. In addition, it gives users an incentive to improve, allows for comparison between buildings and illustrates the different levels of effort required to maximise performance.

Scheme operators

A risk of pass/fail systems is that only the minimum requirements will be fulfilled; while a scale gives an indication of the potential room for improvement. HQE for example mentioned that they started as a pass/fail scheme, but due to their clients' demands, they switched to a ranking. Clients demanded it because it leads the market to not just do well but to do excellently. While pass/fail is more oriented to legal regulatory requirements, a scale would result in a scheme that gave extra reward to a higher level of performance. A hybrid approach could be considered, where there is a rating system combined with an endorsement label. This would imply that a label is obtained by complying with certain minimum requirements but that there is also a rating system for those who 'pass'.

Finance providers

Respondents agreed that the scheme should be a scaled label, which is easier to understand, interpret and compare than a pass/fail. Such a rating gives users a full picture of the building state and its quality. A pass/fail rating is seen as too general, not comparable with other certificates and it does not give enough detail.

5.1.5 Cost issues

Cost of certification is one of the most important issues in choice of scheme and adoption of a building certification strategy by users. Cost issues relate to the fees required from the scheme user to obtain certification (including registration fees to the scheme operator and audit fees) and the administrative burden on relevant parties. Currently the market accepts the high costs required for use of existing certification schemes. Not all users would expect or prefer a free scheme. Most stated that they are willing to pay a reasonable cost although it is difficult to define what is reasonable as this depends on the project scope, size of building etc.

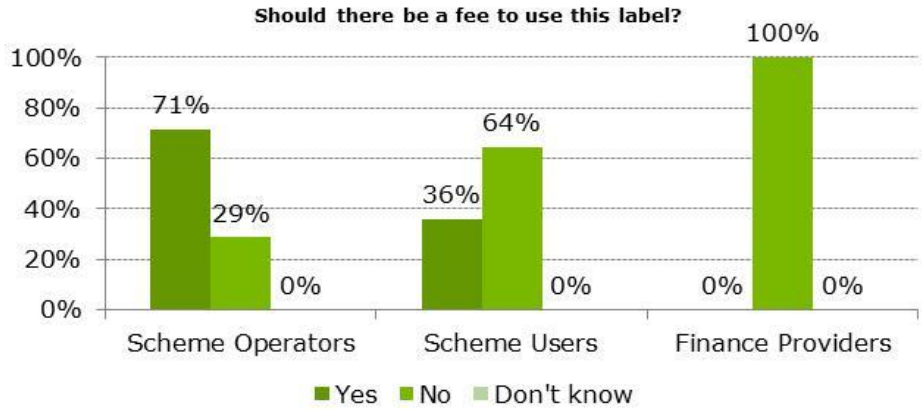
Market status

All existing schemes in the market require a substantial application/registration and certification fee, paid by the user to the scheme operator (and auditing body).

Market demands and needs

- ✓ The majority of scheme operators feel that there should be a fee for using the voluntary certification scheme. This is in line with current market conditions.
- ✓ More than half of the scheme users would prefer to have no fee for the voluntary certification scheme. The ones who think there should be a fee state that it should be a reasonable value (e.g. 1000 Euros per building) as with no fee it will not be valued in the market.
- ✓ Finance providers are against having a fee for a EU voluntary certification scheme.

Figure 5-4 Interview results for setting a fee for EU voluntary certification scheme



*The response rate for this question is; Scheme operators: 88%, Scheme users: 64%, Finance providers: 50%.

A reason mentioned for the use of a registration and certification fee to be paid by the users, was that a fee is an indicator of a certain quality and reliability. However, interviewees in favour of a fee also mentioned that it should be significantly lower than existing schemes to ensure uptake (e.g. half covered by government and half by owner). Interviewees in Nordic countries mentioned that these fees should be enough to cover the costs of running the scheme, e.g. the costs of a green building council to operate it.

It was assumed by the interviewees that the **development cost** of an EU voluntary scheme would be borne by the EU. This would provide am advantage for the Member States and their relevant private actors (e.g. Green Building Councils), in those countries where certification is low and a system based on national standards is not yet developed, as these counties could use the EU framework rather than developing their own. It was also assumed that **costs relating to scheme** operation would be borne by the Member States or their Green Building Councils or some other organisation running the scheme.

Interviewees also mentioned the need for such a scheme to be easy to administer and to have low operating costs. Some suggestions on how to minimise the administrative burden of setting up a scheme included:

- Online tools & automated;
- Clear pre-set (and few) requirements (including e.g. a simplified list of energy measures)
- Operated by entities that already run similar schemes (with a contact point in the country)
- Integrating it in other schemes will decrease costs
- Streamline (e.g. integrate with energy declaration and in line with national norms/within existing procedures)
- Outsource monitoring.

As mentioned above, regarding the predicted costs of developing and running the scheme, this depends on the complexity of the scheme and whether there is a basis on which one can build.[73] More complex schemes, such as BREEAM require a substantial investment to develop and the necessary IT to support

[73] Private conversation with DGNB

the assessment process, as well as resources to maintain and manage the scheme (quality assurance, technical support, and training etc.) until such time as it becomes established and self-supporting.[74]

The development cost of the Swedish Miljöbyggnad has been seen as relatively cheap, and amounted to about EUR 2.2 million, with 16 indicators.[75] However, it has been stated that the cost of operating the Miljobyggnad system is increasing as the number of certificates rapidly increases. This is due to the fact that more and more people are required to keep the system running.[76] For example, in Germany, the costs of training for a qualified and certified auditor/ assessor for DGNB are around EUR 5 000, excluding the cost of time.[77]

With respect to **certification costs** under the EU voluntary scheme, these will depend on the scope (commercial and/ or residential, how many indicators, etc.) and assessment process (who can assess, calculations needed and their difficulty, etc.) of this new framework. Assuming it will be a simpler and cheaper framework than BREEAM or LEED certification costs are expected to be significantly lower than for these schemes. The Swedish Miljöbyggnad could be used as an example of certification costs for commercial buildings under a simpler assessment scheme. The Spanish Verde scheme is also cheaper than most of other schemes, with a registration cost of EUR 450, certification costs ranging from EUR 1 500 (for buildings of less than 4 500 m^2) and EUR 15 000 for very large buildings (more than 45 000 m^2) and additional costs for an accredited evaluator, which are not high.[78]

Scheme operators

Scheme operators mentioned the need for a fee to cover administrative cost, maintenance, technical support and third party QA. The fee itself should be determined by the complexity of the system, but it should be as low as possible. A balance needs to be found, as with a fee there is a risk of having no uptake; while without a fee (and being voluntary) it might be perceived as lacking credibility and might not be taken seriously. There should also be a link between price and quality, and the level has to be comparable with existing schemes.

Finance providers

All interviewees mentioned they would expect the borrower to meet the costs for the certification. However, with respect to fees, building owners do not want to pay any fee, or would only like to pay the first time they use a scheme. They interviewees stated that the price should be determined by the market. One respondent noted that if the scheme is free, it will provide incentives for independent assessment of a building.

To reduce the administrative requirements, finance providers suggested the use of online process (EE, IT), a quick response rate by responsible agencies (LV, PL) by e.g. use of methodology used in energy audits procedure, or implementation of transparent evaluation processes (LV).

[74] Information provided by BRE

[75] Interview with the Swedish Green Building Council

[76] Interview with the Swedish Green Building Council

[77] Private conversation with DGNB

[78] Information from the Spanish Green Building Council

5.1.6 *Energy figure – as designed vs as achieved*

In summary the consensus of opinion which has emerged is that a scheme based on as achieved energy figures is needed to reflect the reality of how a building operates (and how much it costs to run). However, as designed energy figures should be used as a security mechanism. If as designed energy figures are not checked, an improvement in practice will be unlikely (to measure and to build in practice). Therefore a two-step approach where the building performance is assessed in the design stage and then controlled and verified in the as built condition is the optimum solution. Market needs point towards a certification system that can measure and account for the changes occurring during the construction process that deviate from the original energy target planned on paper.

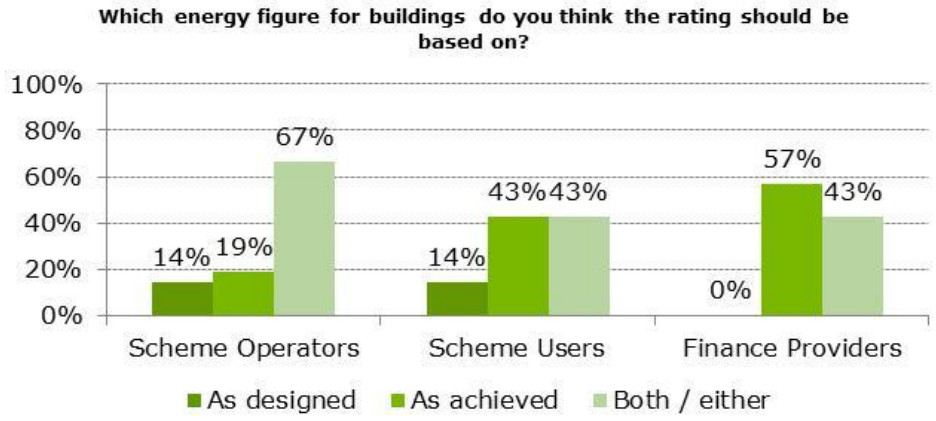
Market status

The existing voluntary certification schemes virtually all base performance assessment on modelled results on building design. LEED and BREAM offers assessment both on design and as achieved.

Market demands and needs

- ✓ Both scheme operators and users mentioned that it is important to have assessment both on the design phase (which has the highest potential to optimise energy efficiency) and realised building performance to control the quality and effectiveness of construction and use.
- ✓ The finance providers mention that an assessment of the 'as achieved energy use' is particularly important as this is the figure that in reality influences the energy costs and cash flow for management of the building.

Figure 5-5 Interview results for type of preferred energy figure of EU voluntary certification scheme



*The response rate for this question is; Scheme Operators: 88%, Scheme users: 64%, Finance providers: 58%.

Building owners/ scheme users

Most interviewees **stated that they think** it should be both (as design/achieved) so that savings can be verified. The UK property industry was reported as being generally in favour of expanding the need for Display Energy Certificates (which show actual energy use) from public buildings to private buildings. This had been proposed in recent legislation but the government withdrew it at the last minute due to administrative burden concerns.

Finance providers

The responses vary and there does not seem to be a geographic pattern. Some believe energy should be measured 'as designed'. Others believe 'as designed' is not a good measure as the results depend on

the methodology used and that the energy figures should be reported 'as achieved' as this shows the real consumption, which depends on management and maintenance of the building. However, actual consumption can be biased as it depends on management and maintenance of the buildings, its occupancy and use, which may distort the energy consumption results.

5.1.7 Other characteristics

Updating

Most **finance provider interviewees** agreed that the rating achieved under a new scheme should require updating though there were different answers as to the frequency of update varying between 3 and 10 years. Those who preferred longer periods between updates want to reflect the time depreciation of the building, to cover a substantial period of time and avoid annual fluctuations due to management or weather. Others believe a shorter time periods should be required, e.g. 5 years as the performance of a building could significantly change during a 10-year period due to e.g. maintenance and management, new technology systems implemented in the building, change in the requirements for buildings or user's expectations / behaviour. An updating period of 8 years at the most would appear to be a compromise between the opinions expressed.

Data disclosure

Most interviewees would be willing to disclose information on their building energy use (though some would prefer the information to be anonymised) and are positive towards data disclosure as it gives more transparency and promotes good buildings.

All **finance providers interviewees** are very positive towards energy data disclosure. They feel that data disclosure would increase the reliability and transparency of the scheme which would in return attract more users as they could compare their projects with others and make informed decisions.

5.2 Position of the Common EU Scheme in the Market

5.2.1 The added value of the voluntary scheme for non-residential buildings

Even though Member States have an existing regime for energy certification in place, there appears to be some potential added value in a new common EU scheme. Such a scheme would provide international acceptance and comparability. Furthermore, it would help international property owners by having a single system in all Member States. From a different perspective, finance providers are interested in a scheme that provides them with baseline energy use comparisons for buildings they are considering lending to, that they can use for risk assessment purposes. They find the idea of a single EU scheme across all Member States useful.

An aspect of potential added value in comparison to national EPCs lies in a wider scope. This can be achieved if the scheme is developed using a modular approach by first developing the energy module and then having the opportunity to build upon the scheme and expand to other sustainability issues. A study from the Energy Efficiency Financial Institutions Groups[79] mentions that energy performance certificates and Green labels – for commercial and public buildings - are of increasing use when they

[79] Energy Efficiency – the first fuel for the EU Economy. How to drive new finance for energy efficiency investments. http://ec.europa.eu/energy/efficiency/studies/doc/2014_fig_how_drive_finance_for_economy.pdf

support "green value" (greater property value through energy efficiency), providing increased investor confidence and changes in risk perception. A scheme which was based on 'as achieved' rather than 'as designed' energy performance would also be of added value in comparison to mandatory national EPCs.

It is also important to take into account the potential drawbacks of such a scheme. The most important of these are: the risk of duplication, the danger of scheme fatigue and the risk of confusion among the potential scheme users. There are ways in which these drawbacks could be reduced. For example, if efforts were made to create synergies with the existing schemes instead of developing a new independent scheme. In this way existing scheme operators could include the common EU scheme as a module in their sustainability schemes. Another approach would be to eventually replace the mandatory national EPC with such a scheme, and/or that those who use the EU common scheme achieve compliance with national EPC requirements (avoiding the duplication of efforts). A new well-designed EU scheme could meet these concerns.

5.2.2 Expected uptake

Although there is some interest and a clear potential for an EU voluntary scheme the views on the level of uptake it could achieve are inconclusive.

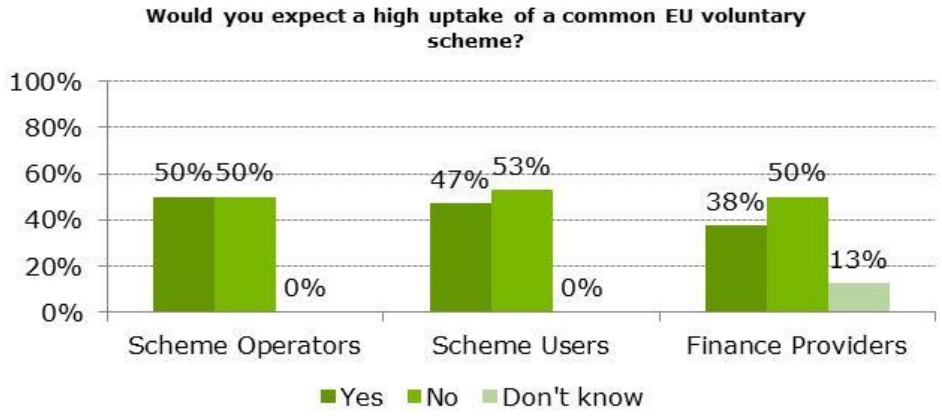
In order to increase expected uptake, a common EU scheme should seek to minimise uncertainty over its **comparability and level of EU wide recognition**. It was also mentioned that uptake would be increased if it was integrated into existing schemes or if it replaced other mandatory schemes. A good communication plan and support from public administrations can also positively influence uptake. **Financial incentives and financing opportunities** (e.g. from the EC) and/or lower costs should also be considered.

Some stakeholders predicted low levels of interest and low expected uptake due to factors such as the need to adapt the new scheme locally; the need for high brand recognition (which will be difficult to obtain as good schemes already exist in the market); and, the likely perception of it as an extra cost and extra burden. Many stakeholders did not see an additional voluntary scheme as being a useful addition, as for them the current range of schemes is sufficient.

Market demands and needs

- ✓ Some existing scheme operators see an opportunity for high market uptake as the development of the new certification system can be an opportunity to establish an internationally comparable system. On the other hand 47% think that as there are established voluntary schemes, plus national mandatory schemes in the market and it would take a long time for demand for EU scheme to grow.
- ✓ Although 50% of scheme users think that it has a high potential for an EU scheme' largely because of the international comparability it would enable, the other 50% worries that it is too late, because there are already established schemes internationally used in the market.
- ✓ Finance providers who are not interested in the EU voluntary scheme reported that they regard the existing well established schemes in market such as LEED and BREAM as sufficient for their purpose. Those who expressed an interest in the EU scheme think that it would be simpler if all countries use one system. They also mentioned that they are interested in a baseline that they can use for risk assessment purposes.

Figure 5-6 Interview results for expected market uptake for EU voluntary certification scheme



*The response rate for this question is; Scheme operators: 75%, Scheme users: 77%, Finance providers: 67%.

Finance providers

There are varied responses with respect to the expected uptake of the EU scheme. Those that expect good uptake of the scheme mention this would be due to:

- Comparability across EU countries, which they see as its main value added
- Financing opportunities from the EC contributing to uptake, e.g. within the EU2020 Strategy and beyond, which promotes green certification.

Those that do not expect a significant uptake mention that this would be due to:

- No need for yet another voluntary scheme.
- No uptake if perceived as an additional burden, needs to be a **useful** addition to the current schemes.
- Difficult to change people's existing habits.
- Market in some countries might be too small.

5.2.3 Success factors for an energy performance scheme for buildings

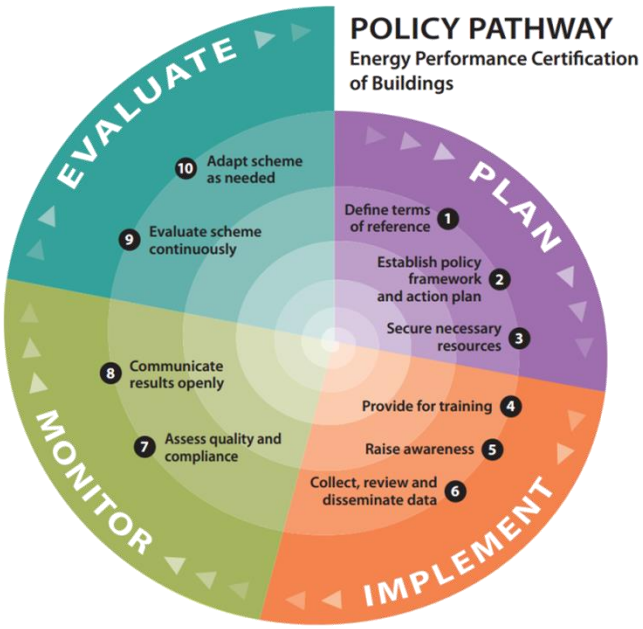
The table below identifies a number of key success factors for the introduction of an energy certification scheme, based mostly on an IEA study[80].

	Success factors
Scheme itself	• Ensure that the energy rating scale is properly representative across the building stock, and leaves sufficient room at the good end of the scale to motivate the industry to improve building specifications in the future. • Require the certificates to include information on potential actions to improve the energy efficiency of the building the certificate is issued for, and if possible on the cost-effectiveness of these actions. The certificate should also specify whether the actions should be implemented in connection with usual renovation (e.g. of the walls, the roof, the windows, or the heating and cooling system) or can be implemented independently from usual renovation. • Encourage building owners to present the energy performance rating of the building or, where space allows, the certificate itself whenever a building is advertised for sale or rent. Building owners should also be encouraged to show and hand over the certificate to potential buyers or tenants without the latter needing to request it.

[80] Energy Performance Certification of Buildings - A policy tool to improve energy efficiency (IEA, 2010). http://www.iea.org/publications/freepublications/publication/buildings_certification.pdf

	Success factors
	• Publish the energy performance ratings achieved by all buildings in a database or register. • Provide sufficient communication to the public and to building industry stakeholders, as well as training, certification and assessment tools for assessors who will issue the certificates
Process to introduce scheme	• Establish an active co-ordinating group to plan and oversee the implementation of the scheme. • Publish an Action Plan for implementation to provide the construction industry and stakeholders with a clear signal of strategic intent, as well as proposed tasks, decision issues and options, responsibilities and timetable. • Involve stakeholders from the outset. • Be realistic and provide sufficient resources for both the development and operational phases of certification scheme. • Use the power of a highly automated technical and administrative system to report and support certification.

The same study developed the policy cycle below for the implementation of national energy performance certification schemes. This appears appropriate for consideration in the development of the EU common scheme.



5.2.4 *Geographical positioning of the EU scheme*

It is foreseen that the EU scheme would be a tool developed for use particularly in countries where certification is currently low, without the need for Member States (and their private actors) to have to go through a process of developing a scheme themselves. This builds on the assumption that the EU voluntary scheme would not aim to compete with existing voluntary schemes, such as BREEAM, etc. but rather would provide added value to the current market by filling the gaps.

To assess the extent of uptake, we have reviewed the voluntary certification schemes market in the EU. As discussed in Chapter 3 on the current market for certification schemes in Europe, there are several Member States (MS) where certification of buildings is very low and/ or there is no national voluntary scheme. These MSs include:

- Baltic states - Estonia, Latvia, Lithuania

- Central and Eastern Europe - Poland, Hungary, Slovakia, Bulgaria, Romania, Slovenia and Croatia
- Southern Europe – Malta, Greece and Cyprus
- Western Europe – Ireland (due to the proximity with the UK, BREEAM scheme is used).

The low uptake in the certification market can be considered to be due to the perception of certification schemes as too complex and/or too costly, but also due to the lack of awareness of the business case. Box 2 shows an overview of countries with a relatively low uptake of certifications.

Box 2: Overview of countries with a low uptake of certifications

Baltic countries

✓ Voluntary certification schemes are not commonly used in the Baltic States. In total, there are five officially certified buildings in both Estonia and Lithuania. In Latvia there are two. However, efforts are being made to promote schemes. For example, Lithuania is considering establishing a cheap and simple voluntary national certification scheme. International certifications such as BREEAM are too costly and complex for local companies, but a local scheme with a lower price and less complex administration could be more attractive providing a unique opportunity for companies to differentiate themselves from the rest of the market.

Central and Eastern Europe - Poland, Hungary, Slovakia, Bulgaria, Romania, Slovenia

✓ In **Poland**, there are five voluntary schemes in use: LEED (6 certified buildings), BREEAM (15 certified buildings), DGNB (no certified buildings yet), GreenBuilding (5 certified buildings) and Passive Haus. However, all have a very low market share amongst certified non-residential buildings (below 25%), partly because these schemes only entered the market in 2010. The main certification used is the mandatory EPC.

✓ There are two widely used certification systems in **Hungary**: BREEAM and LEED. The total stock of green buildings in Budapest, including certificates granted for new buildings as well as for existing buildings, totaled 262,000 sq m at the end of 2012; 8.2% of the total modern Budapest office stock. By the end of 2014, the country expects completion of four BREEAM and two LEED certified buildings, comprising 112,000 m^2 of new green office space in the city[81]. In addition to office buildings, green shopping centers have also started appearing around the country (using the BREEAM In - Use "Good" certification or DGNB scheme).

✓ **Slovakia, Bulgaria, Romania and Slovenia** - International schemes such as BREEAM and LEED have a very low presence and uptake due to low awareness of the schemes' existence and, low knowledge of the schemes in the real estate market as a whole.

Southern Europe - Malta, Greece and Cyprus

✓ In **Malta**, voluntary certification schemes are little used. Malta has a total of four certified buildings: three by BREEAM and one by LEED.

✓ **Greece** has an active local green building council but lacks a domestic rating system. Stakeholders currently use the US Green Building Council's LEED rating system. The domestic Green building council is primarily focusing on education and outreach.

✓ At this time there appears to be very little activity in **Cyprus** with no apparent registered or certified projects in any of the major international schemes.

Western Europe - Ireland

✓ In Ireland, the slow growth might be due to low levels of new construction. There appeared to be disagreement as to whether there was actually a green premium for rent or investment associated with better environmental performance.[82]

[81] http://www.colliers.com/~/media/files/emea/hungary/research/market%20reports/2012/2012h2/hungary_mid%20year%202012_sustainable_eng.pdf

[82] Building Environmental Assessment for Ireland. Exploratory study. Brophy, Vivienne. UCD Energy Research Group (2011). (with the Irish Green Building Council) http://erg.ucd.ie/UCDERG/pdfs/IGBC%20FINAL%20Full%20.pdf

Based on this screening of the certification market, it can be seen that potential for use to be made of the EU voluntary scheme exists in all MS but the need might be greater in some MS (those with low uptake).

With respect to the countries which have certification systems in place, the views of current scheme operators suggest that industry might question the necessity for another scheme.[83] As described above, there are already a number of schemes and scheme providers that have been successfully operating in a competitive market place for some time and uptake of building assessment and certification is growing in Europe.[84]

One key point of the EU scheme is to have a system in place that is comparable and to ensure a broad roll out of the scheme.

5.2.5 *Stand-alone or integrating the EU scheme into an existing system*

It is clear that different stakeholder groups have different concerns in terms of operating an EU voluntary scheme. The results show that the majority (approx. 67%) of scheme users are in favour of integrating the EU voluntary scheme within existing mandatory or voluntary schemes. This indicates the markets tendency to avoid increasing the number of schemes in the market to prevent further complexity.

Market demands and needs

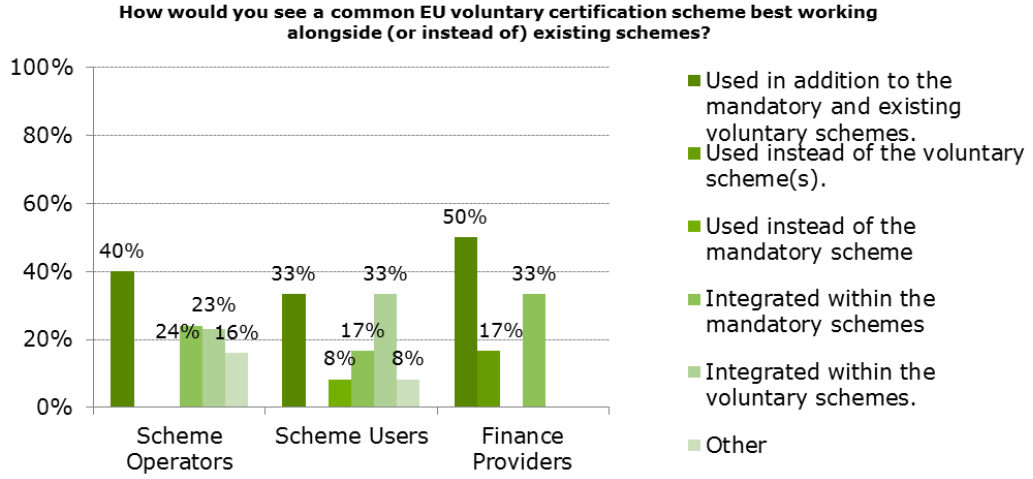
A diverse set of answers are observed in all stakeholder groups.

- ✓ The scheme operators are mostly in favour of having the EU scheme as an additional tool on the market and they emphasise competition between EU scheme and their scheme should be avoided (e.g. by incorporating the EU scheme within theirs), as this could harm the certification market as a whole.
- ✓ The response from scheme users is equally divided between having the EU scheme as an addition or integrated within existing voluntary schemes.
- ✓ Half of the finance providers prefer to have an EU voluntary scheme in addition to existing schemes.

[83] Interviews with BRE and DGNB

[84] Interview with BRE

Figure 5-7 Interview results for relation of existing schemes with EU voluntary certification scheme



*The response rate for this question is; Scheme operators: 83%, Scheme users: 55%, Finance providers: 50%.

Integrating into an existing system

In summary the response to this question suggests that if this scheme is to be focused on energy only, the options are to integrate it with existing voluntary schemes, or link it with a common EU green scheme. Some interviewees proposed to link it to the mandatory national EPC, however this was on the assumption that the new scheme should be a wider scope 'EU green scheme' that is not only energy focused. Some interviewees prefer energy only, with a possible link to the mandatory EPC as it is currently perceived as low quality; however, this might present complications as it would mean that 28 national systems would have to adopt a common one (if the common methodology was integrated into national EPC).

Another potential route would be to incorporate the EU scheme as a module in the existing certification systems. According to DGNB, it has been noted that DGNB is based on the German government guidelines and regulations. However, when internationalising the tool, other countries' national standards and tools have to be taken into account. According to them, a potential role of the new EU framework could be in this area where it would be quite helpful to have another, more standardised, tool, e.g. with respect to LCA data which is difficult to find in other countries.

Scheme operators

There were varied views on this topic. Sustainability issues are not included in the mandatory EPC schemes at the moment, though this could be a possibility. It will be difficult to have a scheme that replaces the national systems and the added value would need to be clear.
In Poland, for example, it was mentioned that the fastest way to implement such as scheme would be to integrate it with the mandatory scheme, which in some cases (such as PL) need updating.

Building owners/ scheme users

An important point made by interviewees from this group was that the voluntary certification market is a private market, while an EU scheme would be largely a public scheme that could be taken up by private scheme providers if it is being used in a modular way.

Finance providers

The responses of finance providers vary on the question whether the EU scheme should be used alongside the existing schemes or instead of/ integrated into them. Those that feel it should be used alongside feel that this would increase the range of options that can be used (IT), that it would provide international comparability (which is currently lacking) (SL) and that it could be used in addition to the mandatory EPC scheme, where the voluntary EU scheme would be based on the knowledge gathered through the mandatory schemes while building on best practices of international voluntary schemes (PL).

Those that argue it should be integrated into an existing scheme mention there are already too many different schemes which creates confusion as to their differences and benefits (LV, LT).

5.3 Conclusions of scoping & positioning analysis

The synthesis of results presented above and the conclusions given here are based on notes and open questions as well as the analysis of multiple choice questions. One challenge of this study is the relatively low response rate to the sent out requests for interviews particularly in the group of finance providers and therefore the low number of actors that agreed to be interviewed in this group. It should also be mentioned that not all participants provided answers to each question as they did not feel well informed enough on the sector or were hesitant to mention personal opinions on the subject. However, the interview process has provided valuable results that can be used for formulating recommendations on scope and positioning of EU voluntary certification scheme for non-residential buildings.

Overall our analysis has shown that there is significant and increasing interest among stakeholders for certification schemes, especially for ones targeting full sustainability assessments. However, it is also frequently mentioned that such wide scope schemes have the disadvantages of high cost and slow administrative processes. Market players are inclined to welcome a new scheme if it can address these disadvantages without comprising on the quality of assessment. International acceptance and cross-country comparability seems to be the most important potentially distinguishing feature of an EU voluntary scheme, in comparison to existing schemes. However, although many participants mention this aspect as an important aspect of added value, only a limited amount of potential users ‘on the ground’ (e.g. international property owners and real estate agencies) seem to require cross-country comparison. Nevertheless, this conclusion needs to be taken with care since only a small sample of finance providers has been interviewed.

A further concern voiced by many of the consulted stakeholders was the abundance of certification schemes already in the market and that will cause confusion. Finding ways of linking the new voluntary schemes to already existing ones was therefore viewed as a desirable option. It was also seen by a reasonable amount of interviewees that a new scheme had the ability to create competition among the existing schemes and hence foster improvements across all certification.

6 CEN and its Calculation Methodology

CEN is in the process of developing updated standards in relation to the recast EPBD. A key part of this is the development of a set of standards that together form an energy performance assessment methodology. To see how this methodology fits against the potential requirements of a voluntary common European Union certification scheme for the energy performance of non-residential buildings, we have included a detailed explanation on the CEN EPB methodology itself and the context in which the methodology is being developed in Annex D. This section sketches what role CEN plays as an actor within Europe and what possible active role(s) CEN could play within the setting up and running of the new scheme.

6.1 The Role of CEN in the Context of a Common EU Scheme

6.1.1 The role of CEN in the setting up of the new EU scheme

The updated CEN standards developed in relation to the EPBD can be the basis of the new EU scheme. The current project to develop the set of CEN EPB standards will result in a consistent overall calculation procedure to assess the energy performance of buildings, including a voluntary set of default choices, boundary conditions and input data. This voluntary set is put together for every standard in the so called "Annex B" (for more details: see annex D), which is based on the experts' knowledge of the EPB standards writers and optional input from stakeholders. A first validation of the set will be done during the public enquiry period of the CEN standards, which all include an "Annex B". The Annexes B will make the calculation procedures operational.

To obtain wide support for the common EU certification Scheme it is recommended that the default choices of Annex B are additionally validated against criteria such as how representative the choices are for the whole of Europe and what necessary differentiations are (such as climatic zones, but maybe also other data). Such validation can be part of the periodic review of the common certification scheme. Practical experiences gained over the whole of Europe during the use of the common EU certification Scheme will prove to be a valuable asset in this validation procedure. Therefore, it is envisaged that during the period review feedback is organised on the understanding and interpretation of the standards, leading to recommendations for improvement.

Some of the aspects that could be assessed under the periodic review are:

- Choices within Annex B, such as:
    - primary energy factors,
    - climatic data,
    - classification of space categories (for example: residential space, office, shop, assembly room, hotel room, hospital bed room, class room, theatre, corridor, etc.)
    - conditions of use per space category (for example: occupancy patterns, required minimum and maximum space temperatures, ventilation rates, lighting requirements, domestic hot water needs, …)
    - various 'policy related' definitions, such as the definition of new versus existing building, definition of on-site versus nearby, the specification of nearly zero energy building, etc.
- Aspects that are directly coupled with the choices in Annex B, such as:

- matching benchmarks and other ways to express the energy performance, since these have to be in line with the assumptions behind the calculation procedures.
- The common assessment protocol, which should be tuned to the complexity of the method and the quality level of the assessors.

6.1.2 *The role of CEN in the running of the new EU scheme*

As described in the previous paragraph, the first periodic reviews will be crucial to adapt especially the voluntary set of default choices, boundary conditions and input data (the Annexes B) to optimally match the needs of all European regions. An active role for CEN experts in this process will ensure the consistency between these aspects and the CEN EPB methodology.

The following roles are envisaged, based on the role of CEN in the development of the calculation methodologies to support the transposition and implementation of the EPBD:
NOTE: These potential roles are not covered in the current project under the mandate M 480.

- Periodic review and revision (updating) of the calculation methodology, following the regular CEN procedures.
- An active role of CEN experts in the periodic review of a common set of choices for options, boundary conditions and input data given in the calculation methodology (a common set of Annexes B)
- An active role of CEN experts in the periodic review of the benchmarks and other ways to express the energy performance
- An active role of CEN experts in the periodic review of the set of 'policy related' definitions.
- An active role of CEN experts in the periodic review of the common assessment protocol

6.2 What could we learn from CEN's process/ interaction with MS for this new scheme?

The development of a European Standard is governed by the principles of consensus, openness, transparency, national commitment and technical coherence and follows several steps, including a public commenting stage ("CEN enquiry") on the draft standard. During this public commenting stage, everyone who has an interest (e.g. manufacturers, public authorities, consumers, etc.) may comment on the draft. These views are collated by the CEN national members and analysed by the CEN Technical Body. Quality assurance procedures such as this are recommended for any type of organisation responsible for the development of the new scheme or parts of it.

In addition, within these procedures the communication between CEN and the Member States is important, to ensure the match between technical possibilities and national policy needs. The instruments set up for the dynamic interaction between the CEN project Collective team Leaders and the MS as described in annex D have proven to be very useful, efficient and productive.

Based on these experiences, for the new EU scheme and its regular updates it is advised to use similar, preferably existing, development and feedback procedures, including the dynamic interaction with the Member States.

7 Recommendations

This section presents our suggested scope and positioning for a voluntary common EU scheme, based on the analysis of interviews and research and taking into account both the support and the concerns expressed by the stakeholders in a way that attempts to suggest solutions that will lead to a successful scheme.

7.1 Analysis of Options

In order to arrive at our initial recommendations, we have considered the following aspects:

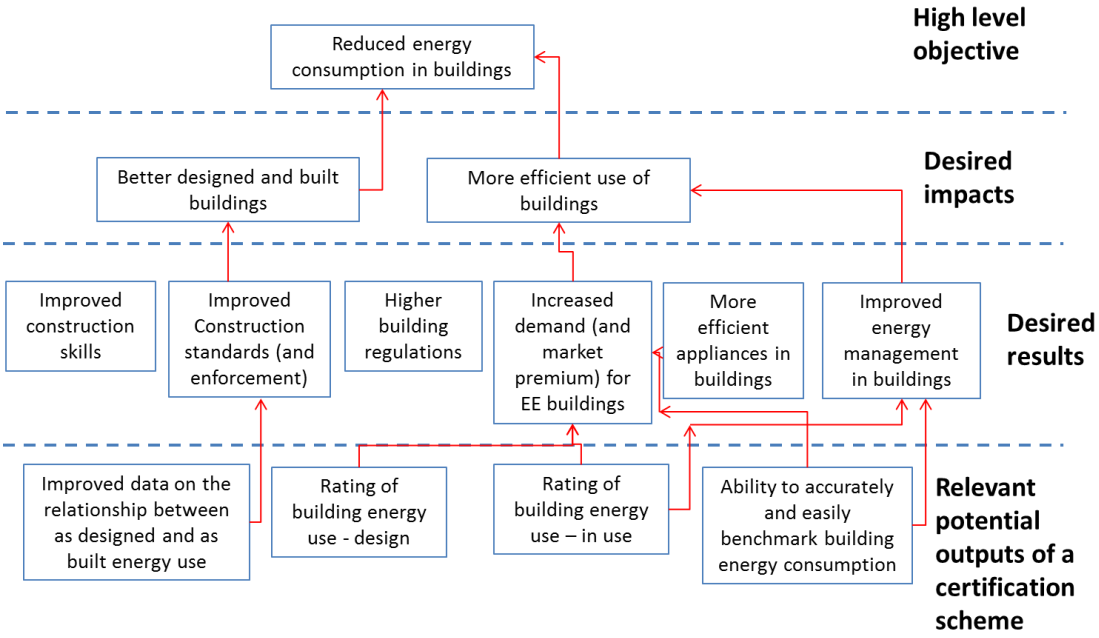
- ✓ ***The purpose of the certification scheme. i.e. a basic intervention logic***. Although the scheme is included in the recast EPBD, there is some flexibility available on its precise design and method of implementation. This process helps to clarify the overall policy objectives in this area, how the scheme fits against these and how it can best help achieve these.
- ✓ ***Market needs and demands***. This discusses the market aspects that need to be addressed in order to achieve policy objectives. It also discusses what market actors would like the scheme to help them achieve (i.e. market demand).
- ✓ ***Scheme design options vs. objectives, needs and demands***. There are a number of ways in which the design of the scheme can be varied. We have considered these variables and compared them against the scheme objectives and the market needs and demands.

7.1.1 Scheme Purpose

A building certification schema (like the foreseen voluntary common EU scheme), should set out clear goals at the start. We have drafted the following intervention logic illustrating the links between the main potential outputs from a certification scheme and subsequent results, impacts and ultimate policy objectives. The diagram also shows three results (construction skills, building regulations and efficiency of appliances) that the certification scheme would not directly enable (though it could have a positive influence on them). These results would be achieved by other policy approaches being pursued by the Commission (and others). The red arrows show where we expect the proposed scheme to have an influence.

Some of the potential outputs would depend on certain decisions being taken on the design and scope of the scheme. The most significant of these relates to the need for a scheme that has both: an asset rating for a building (characterising its performance under standard conditions), and information on actual energy use, i.e. provides transparency and disclosure of actual energy consumption. The difference between these two figures helps to identify the impact of poor workmanship (when a building does not achieve its as designed energy performance) and illustrates the impact of efficient use of the building (active energy management) without the need for correction factors. However, as a next step, operational rating, which allows for benchmarking (e.g. on an energy per m^2 basis) is much in demand by the potential users. It appears that this is central to achieving the objectives of the scheme.

Figure 7-1 Intervention logic



Source: own analysis, taking into account Commission comments

It is useful to briefly restate the origins of the proposed scheme because they have important implications for the potential scope and the nature of the mandate that the Commission has to act on this matter. The EPBD (in article 11(9)) stipulates that *'the Commission shall, by 2011, in consultation with the relevant sectors, adopt a voluntary common European Union certification scheme for the energy performance of non-residential buildings. That measure shall be adopted in accordance with the advisory procedure referred to in Article 26(2). Member States are encouraged to recognise or use the scheme, or use part thereof by adapting it to national circumstances.'*

The voluntary common EU scheme should be developed in addition to the already existing mandatory national EPCs under Articles 11, 12 and 13 of Directive 2010/31/EU.

Furthermore, Recital (31) of Directive 2010/31/EU says that: '*(…) uniform conditions for a voluntary common certification should be established in order to enhance the transparency of energy performance in the Union's non-residential property market (…)*'.

The important points from this text are:

- The scheme is only intended to cover energy use – there is no mention of wider sustainability issues.
- The scheme is intended to be voluntary – how it will be linked to the national schemes is left to the MSs to decide.
- The main focus of the scheme is the non-residential property market, where voluntary sustainability certification (including an energy component) is already widespread.
- The aim of the voluntary common EU scheme would be to enhance the transparency of energy performance in the non-residential buildings market on the basis of uniform conditions across the EU.

The idea of the voluntary common EU scheme came from suggestions made by the European Property Federation. From consultations held with them during the process of this study, and as reported at the expert meeting, their prime motivations were to encourage a scheme that enabled their members (large, multinational property owners) to be able to benchmark the actual energy use of their buildings on a consistent basis across all Member States.

It is useful to further consider the ex-ante evaluation type approach for the certification scheme. Given the intervention logic outlined above, the following high level, but useful and important, assumptions and statements can be made:

- Impact and effectiveness will increase as the number of participants in the scheme increase and as the level of improvements the scheme incentivises goes up. i.e. more buildings in more Member States making more EE improvements.
- It is important to work with the market and be very aware of existing schemes. This will maximise efficiency, help avoid duplication and replication, and maximise coherence.

7.1.2 Market Needs and Demand

It is possible to summarise the following needs and demands related to the energy certification of non-residential buildings that have emerged from our consultations and research. For the purposes of policy design it is important to clearly understand the difference between need and demand. Demand refers to an objective that the market (or part of the market) is already interested in achieving, because the market participants can see the benefit(s) that they would achieve by doing so. Demand also implies that market participants are willing to pay for it. A need can be something that has to be in place for the market to function but also refers to an objective that while beneficial to society as a whole is not so obviously attractive to market participants, so is not as likely to be actively pursued (or demanded) by them.

Needs

Provide information for building users that allows them to understand the impact of their behaviour on the energy efficiency of their building. The certification system needs to provide information on energy performance that reflects good practice user behaviour, and/or excludes (or separately identifies) the element of energy performance which is determined by user behaviour. The impact of the certification system should be that those who choose buildings will favour those with a better energy performance and will be able to make this judgement based on potential building performance, rather than actual building performance which can be distorted by inefficient user behaviour.

Influencing choice. The certification could also be used as a way of 'choice editing' if building users commit to only purchasing or renting buildings above a certain rating, or just if all buildings for sale or rent are 'graded', in the expectation that this information will influence decisions in favour of more efficient buildings.

Address the controllable reasons why the as achieved energy consumption of buildings is usually higher than the theoretical as designed. There are a number of justifiable reasons why the multiple assumptions on conditions that need to be made to produce a modelled prediction of energy use (as

used in EPCs) will differ from what actually occurs, for example weather conditions and user behaviour[85]. Some of the reasons relate to poor construction standards, inspections and skills which are beyond the scope of the certification being considered here. However certification schemes which highlight the differences between as designed and as achieved energy consumption can help address the reasons related to user behaviour, for example by producing ratings based on the landlord controlled elements of a building's energy use. This is why we need both 'as achieved' and 'as designed' energy consumption within the scope.

Demands

Benchmarking the energy performance of buildings. Benchmarking is a core tool for energy management as it gives a very clear indication of where performance is lacking and the level of improvement that can be practically achieved. For those who own multiple properties it will also enable a prioritisation of attention, with the worst performers being the highest priority. In order for benchmarking to work the comparative measure has to be calculated on the same basis.

Benchmarking between properties in different Member States. This is an issue for large property portfolio owners. The main requirements are a methodology that can be consistently applied between different Member States. There are some important variations in the type of benchmarking that different types of building owners and building occupiers want. The main differences relate to the differences between asset rating and operational rating energy use.

Asset rating would produce a modelled performance based on a completed / existing building and applying 'standard' occupancy and climate factors (the CEN methodology produces such a figure). The operational rating would simply be based on the actual recorded energy use for an occupied building. Those who own ***and occupy*** a homogenous property portfolio, are likely to be interested in both figures. This would allow them to assess both the underlying energy efficiency of the buildings (via the asset rating figure) and the energy management and use patterns of the building users (via the as operational rating figure). Those who own but rent or lease out a property will be most interested in the asset rating figure, as this reflects the efficiency of the building, rather than the practices and attitudes of any past (or future) tenants. Potential tenants (or purchasers) should also be interested in both figures as they illustrate what the building they are considering renting or buying is capable of achieving but also what past occupants (for existing buildings) have actually spent on energy. If there are large differences between the two figures it could indicate non-standard occupant behaviour or some problem with the buildings energy system (or metering).

Comply with green standards. This can vary from the requirements of many UK spatial planning authorities to have BREEAM certification for new buildings, to private and public building user 'green' purchasing criteria to a preference among lenders to loan to more energy efficient (and greener) buildings, in the belief that (if other factors are equal) more efficient and greener buildings will have higher value on the market and/or be easier to rent or sell.

Brand Assurance and Corporate Social Responsibility. Many property owners (and occupiers) operate in highly competitive markets where the protection and promotion of their corporate reputation and

[85] See 'A Tale of Two Buildings Report' http://www.betterbuildingspartnership.co.uk/download/bbp-jll---a-tale-of-two-buildings-2012.pdf

image is of great importance. Therefore the production and/or purchase / use of buildings which are certified as being low energy use (and low environmental impact) can be seen as a means of brand assurance. These objectives often overlap with CSR where property owners seek 'green' buildings to help demonstrate their corporate reputation.

Concerns over mandatory EPC quality. In some markets there are concerns over the quality of national EPCs, with assessors often being driven by price pressures to produce over standardised reports. In some markets there is also concern about the quality of the national methodology and the rigour of the enforcement.

Concerns over mandatory EPC relevance. Many property owners also feel that the 'as designed' basis of the mandatory national EPC rating is of limited practical use in terms of either improving the energy management of a building or providing realistic information on energy use and costs to prospective tenants or purchasers.

Concerns over the cost of some existing certification schemes. There is some evidence of the costs of official certification putting off potential users, despite their interest. For example architects and engineers use the scoring systems of BREEAM, LEED etc. to help improve their designs but do not seek official certification. Costs were also reported by some as a key issue for the national EPC certificates.

7.1.3 Scheme Design Options vs. Objectives and Market Needs and Demands

The following table presents some key design options for the voluntary common EU scheme with positive and negative aspects linked to both the objectives and scheme purpose, and to the market needs and demands.

Table 7-1 Key design options for the voluntary common EU scheme

Scope / Issue	Scheme Design Options	Positives	Negatives
Energy	***As designed***	A one off calculation. CEN methodology will produce a method which is acceptable to all MSs. Allows for grading of performance on the basis of achievement above the national building standard.	Replicates the national EPC (though not those that use operational rating). Does not take account of the differences between actual energy use and as designed (due to construction and commissioning problems, building management and maintenance, occupancy patterns, etc.)
	As achieved -In use - operational rating (with correction factors) and/ or mandatory disclosure of actual energy consumption (without correction)	Clear added value in comparison to the mandatory EPCs. Operational rating is needed for benchmarking – reflects the various factors described above and to the right. Gives a more realistic view of the potential energy costs of using a building and the reasons behind (low/ high) energy use. Moreover the workmanship and building efficiency can be seen. Would allow building users understand the impact of their behaviour on the energy use. Without correction – simple and easy to use.	Periodic updating (ideally annual) needed. Does not exactly match the CEN methodology for 'as constructed' which is under development -so a new methodology would need to be formulated and agreed if operational rating is required. Ideally needs benchmarks in order to 'grade' performance. The more building types the scheme covers the more benchmarks will be needed. The CEN methodology does not currently include the definition of benchmarks. Operational rating with correction factors is very difficult to do. Mandatory disclosure without correction factors makes it difficult to know what the numbers mean and what the reasons are for (high) energy use.
	Combination of as achieved (mandatory disclosure of actual energy consumption) and as designed (asset rating based on CEN standards)	Maximises potential positive influence of the scheme by providing both values. In line with EPBD-recast Article 11(1) second subparagraph ("the energy performance certificate may include additional information such as the annual energy consumption for non-residential buildings"). Transparency gives added value, as the disclosure of energy performance and energy use also says something about the	Mandatory disclosure of actual energy consumption is difficult to interpret. The actual energy consumption and the asset rating can differ hugely. A good explanation of why this happens is necessary to ensure public support for the scheme.

Scope / Issue	Scheme Design Options	Positives	Negatives
		two in relation to each other and provides incentives for "good energy behaviour" by the users of the building	
Green issues?	***Energy only***	Ability to limit cost and complexity of using the scheme. Energy costs are arguably a higher priority for the building owners and users than other 'green' issues. Avoids duplicating existing schemes – which appear to meet the majority of market needs. Clear distinction makes it possible for schemes to use modules that do not overlap.	Misses the opportunity to highlight and address other issues.
	Energy as a base minimum with the option to add other issues	Enables the users to tailor cost and complexity to what they are willing and able to do. Will highlight more issues than energy alone.	Increased complexity of audit and risk of lack of comparability between 'certified' buildings. CEN methodology does not include anything other than energy use.
	Wider scope	Ability to highlight and address other issues - results in 'better' buildings. Increases competition with existing schemes.	Adds complexity and cost – which will deter many potential users. Significant risk of duplication with existing (relatively well established) schemes (BREEAM, LEED, HQE etc.).
Force	***Mandatory***	Increases uptake	No legal basis. Burden
	Voluntary	Allows best performers to lead by example and differentiate themselves. Low burden.	Risk of low up take.
Sector	***Public only***	Fit with other policies and legislation requiring them to 'lead by example' – e.g. Energy Efficiency Directive articles. Low private burden	Partly duplication with Display Energy Certificates (DECs) – in place in some MSs, which already require 'public buildings' to show energy use.
	Private only	Benchmarking ability, and transnational comparability is most attractive to large multinational property portfolio owners – who are virtually all private sector.	Excludes a lot of buildings.

Scope / Issue	Scheme Design Options	Positives	Negatives
	All	Maximises available / relevant building stock – thereby maximising potential positive influence of the scheme. Ensures comparability	DEC duplication for public sector,
Building age	***Just built only***	Opportunity and data readily available.	Excludes the most inefficient part of the building stock. Ever tightening building regulations for new buildings will limit the impact of the scheme
	All existing buildings	Fully addresses the building stock.	Once the building is constructed, timing/opportunity to get certified is not convenient (unless there is a change of ownership or tenant). Data is not readily available.
Building (use) type	***Offices & hotels***	Simplicity that would make it suitable as a pilot for the scheme. Relatively high level of comparability between MSs, because the energy demands of an office building have less variation due to climatic and other factors (e.g. construction techniques) than other buildings Allows for testing Offices seen as the most likely to be interested in common certification by most interviewees Hotels are international assets, have high visibility and standardised services which makes them an interesting building type to certify and monitor.	When other non-residential buildings are excluded, the scale of the relevant building stock and hence the potential for energy savings are reduced.
	Multiple types	Maximises the relevant stock – thereby maximising the potential energy savings.	Complexity – may need multiple benchmarks if the scheme is based on a scale that would be different for different types of buildings, e.g. a 'good' performance for an office would not be good for a hotel.
Residential vs. non-residential	***Non-residential only***	Simplicity – avoids the complexity of MS variations. Avoids duplication with residential schemes. In line with the text of the Directive.	Misses the opportunity to address residential energy issues. No mandate in the EPBD.

Scope / Issue	Scheme Design Options	Positives	Negatives
	Residential only	Maximises relevant stock, so increases the potential to save energy.	Complexity – the housing stock is much more diverse than the non-domestic stock. Excludes a lot of buildings. The Directives says 'non-residential' so there is no mandate to include housing.
	Both	Maximises stock	Complexity. Lack of mandate to include residential.
Fees (to get certified/ use the calculation tool)	***Open source (free)***	No cost barriers to use (as individuals fill in their values themselves). Open to private sector adaptation and tailoring. Reduces administration cost. Not seen as an extra cost burden in addition to mandatory EPCs. Will require a very simple CEN methodology – positive if that is the aim.	Lack of certified experts may reduce credibility. Lack of any fee can decrease the value of the building's certificate. Will require funding to set-up and continue to operate– with no income to offset it. No business case for companies to get involved in the development of software or management of the scheme.
	Low cost (e.g. €1000). With possible extra cost options	Low enough cost to attract building owners who are unwilling to pay for existing wider scope schemes. Some income to offset set-up and operation (including audit) costs. Gives the option to increase the fee if users are willing to pay for additional complexity. Creates a business case for the market, e.g. to develop calculation tools by software companies to sell their tool or make the assessments themselves.	Any cost will deter some potential customers. Lower cost than established schemes may give the impression that the voluntary common EU scheme is lower value. Certification fee implies the scheme has a certain quality and reliability of the methodology that will require highly qualified experts.
	Fully commercial (cost + profit)	A fee can help give intrinsic 'value' Profit motive drives marketing and promotion efforts. Income will reduce (or even remove) the need for public costs. Business case for the market to get involved.	Charging will put the scheme into competition with other long established schemes – possible risk of duplication and/or low take up (and therefore low impact) A balance between cost and complexity of the scheme will have to be struck, otherwise need of highly qualified experts

Scope / Issue	Scheme Design Options	Positives	Negatives
			who have the necessary accreditation, and are also able to work across different MS (relates to recognition of qualifications across the EU and language skills).
Centralised registration system and disclosure	***Fully public (e.g. JRC)***	Low costs for the private sector. Expected higher uptake than if fully commercial.	Higher costs for the public sector – the question of 'who will pay for it' needs to be answered. Adds to the Commission's administrative burden.
	Outsourced but publicly funded	Management of the registration system and disclosure might be more efficient than if fully public. Less administrative burden for the Commission. Low costs for the private sector. Creation of a new market for businesses. Expected higher uptake than if fully commercial.	Question of 'who will pay for it' needs to be answered..
	Third party commercial system (e.g. pay as you register)	Less administrative burden for the public sector and the Commission. Expected good management/ commercial.	Risk of lower than expected uptake if costs are higher than if publicly paid for.
Label design	***Endorsement label (pass/ fail)***	Very simple	Limited communication value as it only says that the building "passed" a certain threshold, no rating Limited incentive to perform to a high standard, as the label does not differentiate performance between those that passed
	Comparative label (rating system, e.g. A+,A, B)	Still simple and allow for comparison, provide incentive to go beyond what is required, Generally accepted	Might be difficult to design as the standards are improving, resulting in A+++ labels, which could be confusing.

7.1.4 *Key design options for voluntary common EU scheme related to the CEN EPB methodology*

The following overview sums up the key design options, and reflects upon the relation with the CEN EPB method, namely to what extent the CEN EPB method would fit the respective key design choices for the voluntary common EU certification scheme. Note that where choices for the voluntary common EU certification scheme would go beyond the CEN EPB method, the EPB method could still be the central method, complemented with additional parts, developed by CEN or a third party. In any case, it is important that such additions are developed using a procedure of public enquiry and international transparency.

- **Energy use assessment:** The key design choice is whether the voluntary common EU building certification scheme should be based on an asset rating or an operational rating. The CEN methodology will be applicable to assess the design stage as well as the 'as constructed' stage of the building. The asset rating will be covered by the methodology. If the scheme allows both assessment types, then the applied type of assessment shall be indicated clearly on the certificate. However, within the CEN EPB methodology - in both cases, 'as designed' and 'as constructed' - standard user behaviour is concerned, since the energy performance of the building and systems is assessed and not that of the occupant. Only by using standard behaviour, can the energy quality of buildings be compared on a standard basis. If a voluntary common EU certification scheme needs to cover real user behaviour (and climate, etc. i.e. operational rating), the scheme needs to be expanded beyond the CEN EPB method. This expansion would be quite complex and would require substantial resources. In addition the CEN EPB method does not generate standard benchmarks of 'good' or 'bad' energy use for different building uses or types of construction project (new build, major refurbishment or existing buildings).
- **Green issues**: The key design choice is whether the voluntary common EU certification scheme should only cover the assessment of the energy use of a building in the use phase or whether it should have a wider scope. The CEN EPB method covers energy aspects only. Harmonising other green issues goes beyond the scope of the EPBD and the CEN method would have to be expanded.
- **Sector**: The key design choice is whether the voluntary common EU certification scheme should cover public buildings, private buildings or all buildings. This choice has no relation to the usability of the EPB CEN method, since CEN serves both the public and private sector.
- **Building age**: The voluntary common EU certification scheme should cover both new and existing buildings. The CEN EPB method covers both new and existing buildings.
- **Building type**: The CEN EPB method covers multiple types of buildings, including residential and non-residential buildings, so in principle this is not an issue for the usability of the EPB method. However, the development of a voluntary common EU certification scheme would benefit by initially focussing on a limited selection of building types. For non-residential buildings, the category described in the EPBD Article 11(9), a logical subcategory would be offices (and hotels). There are many issues to solve in reaching an optimal measure of comparability between buildings and this could be more realistically done if relatively simple and comparable building types are selected. In addition to building characteristics that are specific to offices and hotels (e.g. construction type and usage patterns), characteristics that are common to all building types will be automatically covered as they are covered by the CEN EPB method. At a later stage, if and when the pilot for the office and hotel buildings is successful, other types of buildings can be included.

- **Force**: The key design choice is between mandatory and voluntary. It goes against the spirit of the EPBD to force an assessment methodology. If uptake of the common certification scheme is a step towards comparability across Member States, beyond the set of CEN EPB standards currently being developed under the mandate M 480, this is likely to benefit from a voluntary approach.
- **Fees**: The key design choice is whether the common EU certification scheme should be open source (free), low cost, or fully commercial (cost + profit). The development of the CEN EPB method is funded by the European Commission. CEN will have the copyright, meaning that the method will not be published for free to the general public, but can be purchased for a small fee. However, this only concerns the paper version of the methodology. An energy assessment is only possible with a software tool[86] and trained assessors. This lies beyond the current scope of CEN and can be taken on by anyone, publicly or privately, though there would be a requirement for an accreditation system to be put in place by the European Commission. The costs for this need to be covered, via fees or some other source of finance.

Label design

Any label must be as simple as possible, with a message which is both easy to communicate and easy for the consumer to understand. Previous research[87] into this issue suggests that it is important to ensure a clear and simple message when designing a certification label. "Less is more" is the experience of existing standards. This should be considered when defining the scope of the voluntary common EU scheme and the criteria that will be presented in the label. However, other research[88] suggests that including additional information, i.e. recommendations on potential actions to improve the energy efficiency of the building the certificate is issued for, and if possible on the cost-effectiveness of these actions, will help increase energy efficiency in buildings. In addition, the label could also include disclosure of last year's energy consumption, EU average values, or the percentage of energy from renewable sources in the total energy consumption.

With regard to the label's rating system, we suggest the A to G type approach which has proved very successful for household appliances. Rating systems are easier to understand and provide more information than just an endorsement scheme (pass/fail), they allow for comparison and provide an incentive for improvement. Furthermore, due to the labelling of consumer goods the A to G labels are generally accepted. Endorsement schemes, on the other hand, would raise questions such as what the criteria for pass/fail should be and whether the same criteria (and their cut-off values) should apply for the whole of the EU. Rating systems can also be applied to all building types (new/just built and existing).

7.2 Recommendations

To achieve a system that best matches the intervention logic and market needs and demands we suggest the following:

[86] Assessment methodologies generally use software tools to calculate energy performance and ratings, which will often be based on annual energy use in specific terms, such as the number of kilowatt hours used per square metre (kWh/m2/year) or the British thermal units used per square foot (BTU/ft2/year).

[87] Ecofys (2008). Development of a Biofuel Label: Feasibility Study. A report by Ecofys and E4tech

[88] IEA (2010). Energy Performance Certification of Buildings - A policy tool to improve energy efficiency

- ✓ **Offices and hotels (as a pilot for initial launch)** – this approach was also used by BREEAM, which started as offices only. This approach helps with simplicity and comparability. After some time, it could be expanded to cover other building types.

- ✓ **Public and private sector** – to maximise potential uptake and to allow the public sector to 'lead by example'.

- ✓ **One single version for all buildings (existing and new)** - to ensure comparability among buildings across Member States.

- ✓ **Start with a module for energy only** – this would avoid duplication of wider scope schemes such as BREEAM, LEED etc., and could be taken up by other scheme providers as the "energy module" of their schemes. If other schemes (including any future EU common approach to assess the environmental performance of buildings as suggested in the Commission Communication on resource efficiency opportunities in the building sector[89]) wish to use the benchmarks and methodology in their wider scope schemes this should be allowed and encouraged. The possibility also exists of the scheme expanding in future.

- ✓ **Needs to have energy in use and as designed** – this makes use of the CEN method for the 'as designed', and for a standardised 'as constructed' version; it also addresses the market need for benchmarking and the need in some MSs for an accepted mandatory EPC methodology. Mandatory disclosure of actual energy consumptions is in line with the EPBD-recast as mentioned above, with a possibility to generate a statistical benchmark, which could be used for communication purposes. Energy in use with benchmarking (i.e. taking into account correction factors and typical building type energy use) requires in use benchmarks to be calculated / collated, which could be achieved by inviting bids for scheme operation, which will hopefully be responded to by existing benchmarking scheme operators. The in use benchmarks appear key to offering added value in comparison to national mandatory EPCs and to achieving the objectives of the scheme. However, in use benchmarks are difficult to develop. There may be a need to develop an operational rating methodology and benchmark in addition to the asset rating.

- ✓ **Low cost** – CEN methodology is publically funded so should be available at a low cost. However, an energy assessment is only possible and credible with a software tool and trained assessors. This will require a small fee to create a business case for, e.g. software companies to develop such a tool.

- ✓ **Centralised registration system and disclosure outsourced but publicly funded** – Should maximise uptake and create a new market for businesses while making the system more efficient. If the data can be made public it will also be very useful for research purposes.

- ✓ **Comparative label design** – will allow for comparison of energy efficient building stock and provide incentives for scheme users/ building owners to improve their performance beyond a minimum requirement.

[89] COM(2014)445

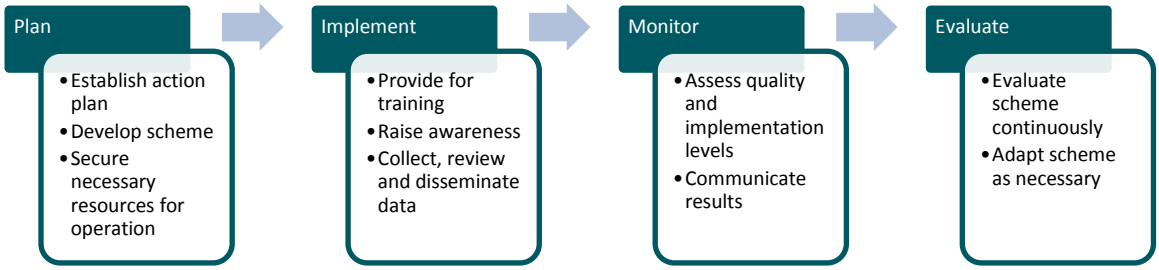
8 Roadmap

This roadmap aims to provide a course of action for the roll-out of the voluntary common EU scheme discussed in the previous chapters. In this regard, we differentiate between two broad stages:

1. ***Technical development of the scheme*** – this stage covers who will develop the scheme and how it will be developed. This stage is closely related to the technical aspects which were discussed in the previous chapter (which form it will take, which indicators, scope, etc.).
2. ***Organisation and running of the scheme*** – this stage deals with the organisational aspects of the label, including the establishment of an action plan as well as the identification of resources and structures needed to implement and successfully operate the scheme, once it is developed and on the market. The key questions addressed here include who will manage the label, how it will be operated, the market surveillance / monitoring of the scheme, the distribution of the software tool and training of assessors.

The sections below develop each of these stages and provide clear guidance as to what should be considered for the introduction and operation of the scheme. Overall, the actions proposed in this chapter follow the course of the widely used policy cycle as described in IEA (2010) and visualised below.

Figure 8-1 Policy cycle



While the roadmap designed in this chapter mainly falls under the planning phase of the policy cycle (develop scheme and setting up of resources for operation), guidance is also provided for the *implementation*, *monitoring* and *evaluation* phases.

Chapter 8 concludes with a summary of the steps needed for the successful roll out of a new voluntary common EU certification scheme. It also provides a schematic overview of the optimal operational set up based on the recommendations and information gathered throughout the course of this project.

8.1 Technical development of the voluntary common EU Scheme

8.1.1 Technical development of the scheme

The scope and positioning of the voluntary common EU scheme in order to maximise its uptake has been discussed in the recommendations section. However, when developing the scheme, some decisions will still have to be made regarding the different design options.

We recommend that the technical development of the voluntary common EU scheme is done by a consultant/ technical adviser to assist the European Commission with an active role for CEN, and in consultation with private and public stakeholders. We also propose, as suggested by the IEA[90] establishing an active co-ordination group to plan and oversee the implementation of the scheme and to continue involving stakeholders throughout the implementation process. Section 8.2 describes the role of such a 'working group/ round table'. Such a working group/ round table should also help achieve consistency with the existing CEN EPB methodology by including CEN experts (more in section 8.2).

The energy assessment method used is a key part of the technical development of the voluntary common EU scheme. The updated CEN standards and the set of default CEN options developed in relation to the EPBD can be the basis of the scheme. In this development process, the regular CEN procedures to build consensus, involving a wide range of stakeholders, should be complemented by specific consultations with the Member States, with the aim of achieving maximum acceptability and usability.

The CEN EPB method reflects the delicate balance in the requirements set by the mandate M 480 on developing a harmonised methodology with flexibility at national/regional level. It will contain choices between options (e.g. simplified or more complex assessment methods), boundary conditions and input data that may differ per country (e.g. climate and user patterns). CEN will provide a CEN default value for all choices within the methodology, which will make the voluntary common EU scheme operational. Periodic review and adaption of these default values based on practical experience will increase the utility of the scheme for the Member States. This makes these periodic reviews an essential part of the setting up and running of the EU scheme. We advise an active role for CEN experts to ensure consistency between the voluntary common EU scheme and the CEN EPB method.

Label design

The different types of label design (endorsement vs comparative label) have been discussed in chapter seven. A comparative label with a rating system e.g. A to G has been proposed. The energy rating scale needs to be properly representative across the building stock, and to leave sufficient room at the good end of the scale to motivate the industry to improve building specifications. We suggest investigating the rating of (new and existing) buildings across the EU to learn what the range of performance is. Another option is to design a rating scale based on the information/ expectations that exists and explore whether any modifications to the rating system are needed during the pilot stage.

The development cost

It is proposed that the technical development cost of the voluntary common EU scheme would be borne by the EU. The scheme should be usable throughout the whole of the EU and should therefore be under the control of a European institution. This would be of particular advantage for those countries where the uptake of certification is currently low and a system based on national standards is not yet developed. This would also be of benefit for the national building ministries, who usually have to use their own resources to translate the EPBD requirements into national legislation.

The costs to a national ministry of developing a mandatory national EPC system consist of internal costs (own time, usually not accounted) and external costs (costs for research programmes/consultancy).

[90] IEA (2010). Energy Performance Certification of Buildings - A policy tool to improve energy efficiency

Developing EPCs usually takes a Member State several years, requiring research and stakeholder involvement. The costs can vary significantly, as can the EPC schemes which range from schemes developed via large research programmes to schemes developed by "copy pasting" from a neighbouring Member State.

8.1.2 Technical operation of the voluntary common EU scheme

There are currently 28 different EPC schemes – one for each Member State. The voluntary EU scheme will effectively be number 29, but the intention is to minimise additional burden and complexity. The main way in which the burden can be minimised is by maximising integration with existing schemes. This can be achieved by:

1) Integration within existing voluntary schemes,
2) Links to the EPC, and
3) Setting up the new scheme as an independent online tool or a possible combination.

These options are described in more detail in the table below, together with their pros and cons.

Table 8-1 Technical operation of the new scheme options

Operating option	Description	Positives & negatives
Integration into existing voluntary schemes	Integrating the energy component into the existing energy or sustainable voluntary schemes, allows for a voluntary "add-on" to the mandatory EPC, creating an "EPC-Plus.	✓ Immediate uptake in an existing structure. ✓ No need to set-up. ✓ There is potential to match the CEN default choices. - Existing scheme that is looking for /interested in integration of such part is needed. - Fewer opportunities for the EC to 'steer' the handling of the overall scheme. ✓ The level of expertise of the assessors, the reliability of the assessment and the costs of the operation of the voluntary common EU scheme (based on the updated CEN standards including the set of default CEN options) might not match with the level of expertise of the assessors, the reliability of the assessment and the costs of the operation of the existing scheme.
Linked to the national EPC system	~The voluntary common EU scheme should be intended as a pilot for proof of concept of a CEN-based (in-use) energy label. A MS could 1) allow for the use of the voluntary common EU scheme to replace their existing mandatory EPC schemes for non-residential buildings or 2) allow for a voluntary "add-on" to the mandatory EPC, creating an "EPC-Plus" EU Label that would meet market needs for in-use, EU-wide energy performance certificate. For example, the government of Luxembourg has developed a free to use software tool for sustainable reporting, EPC+ that uses national EPC data as input.	✓ Easier to introduce and would have higher/faster uptake. ✓ Opportunity to improve quality perception of the mandatory national EPC (e.g. by including operational rating or making comparability easier). ✓ Combining the new scheme and the mandatory EPC is considered to be beneficial by stakeholders, as replacing the mandatory national EPC would be too difficult. ✓ The required level of expertise for assessors of the voluntary common EU scheme might be higher or lower than for the assessors of the mandatory EPC scheme. If the former, training will be encouraged. ✓ The reliability of the assessment and the costs of the operation of the voluntary common EU scheme (based on the updated CEN standards including the set of default CEN options) might not match the reliability of the assessment and the costs of the operation of the existing national mandatory EPC scheme, since this mandatory scheme is based on the updated CEN standards, but with the national (regional) version of the default options. The voluntary common EU scheme could lead to improvements. - If the national EPC system is not well accepted in the national market, a link by default contains risks due to potential lower acceptance of the EU scheme. However, if the quality of the alternative is better, this risk is mitigated. - Streamlining the varying degrees of complexity and structural set up may be challenging/costly

Operating option	Description	Positives & negatives
Independent online tool	An independent online tool would allow potential users to do the assessments themselves (with support from online guidelines) and e.g. print out their label themselves. There needs to be a validation process to ensure a minimum standard of reliability and the assessment protocol should match the limited knowledge of the user. It is important to allow for national/regional differentiation.	✓ Decrease in costs. ✓ Simplifies data input compared to mandatory national EPC. ✓ Ensures uniform procedures, standard input data and uniform calculations & results. ✓ Increases accessibility, transparency and objectivity of the assessment. ✓ Databases and online tools have shown to increase acceptance. - Less reliable results. - The level of expertise of the assessors, the reliability of the assessment and the costs of the operation of the voluntary common EU scheme (based on the updated CEN standards including the set of default CEN options) might not match with the level of expertise of the assessors, the reliability of the assessment and the costs of the operation of the independent tool.

To summarise, in all three options the energy part of the voluntary common EU scheme consists of the updated CEN standards including the set of default CEN options. In option one this would be directly linked to the national EPC method, which also consists of the updated CEN standards, but with a national version of the default options. Under this scenario, the assessors in every country could be the assessors that perform the national calculations and have the education level that matches this national method. They have to collect data, comply with the national data collection protocol and comply with the default EU scheme protocol. In many cases the educational level needed to perform the assessment with the CEN defaults will differ. Also the required input data may differ as will the cost of collecting this data. This needs to be taken into account when deciding on the technical operation of the scheme.

In option two the voluntary EU common scheme is embedded in an existing voluntary scheme. The existing requirements on the educational level of the assessors may not match that required for the CEN default options. In option three the voluntary common EU scheme is put in place as a stand-alone tool with a relatively low level of educational requirement for the assessor, which is unlikely to match the educational level needed to deliver an assessment using the CEN defaults.

The level of complexity associated with the common methodology (CEN Annex B default) will have consequences for the level of education needed for assessors and the cost. A more complex scheme will need qualified assessors and will have higher cost than a simple tool. A complex tool cannot be linked to an implementation option that allows everyone to use it (i.e. the online tool, third option). However, it is not the aim to introduce an overly complex voluntary EU common scheme.

Irrespective of the way the scheme is operated, based on the experience with the development of CEN standards, having a good software tool and providing guidelines is a necessity. These guidelines would provide all necessary information to carry out certification in accordance to the voluntary common EU scheme, covering all general rules and national ones if/where applicable for certification, inspection and calculations, and drawing up the energy certificate.

8.2 Organisation and running of the voluntary common EU Scheme

This section describes the various bodies required to operate a certification and labelling system as well as the different steps that need to be taken in order to successfully roll out the new scheme. Within these steps different options for execution and set up of the scheme are described, together with the pros and cons. Each step is finalised with a suggestion of the best suitable option as well as the concrete tasks that will need to be carried out within the step and the task owner. These suggestions are based on the findings and recommendations derived from the stakeholder interviews and the research work done within this project.

8.2.1 Step 1: Ownership and management

The first and essential steps in setting up the organisational part of the new scheme will be to choose the scheme owner and the manager. These roles can be filled by two parties or one, as long as the different tasks and responsibilities are defined for each function.

The scheme owner must set the strategy and provide guidance, manage the scheme (or outsource the management) and make decisions regarding the voluntary common EU scheme[91]. The main functions of the role include[92]:

- ✓ Defining goals.
- ✓ Developing a governance model.
- ✓ Creating brand value.
- ✓ Setting/adopting scheme & providing guidance documents and/or calculation tools.
- ✓ Defining a certification & verification model.
- ✓ Maintaining a database or register with the energy performance ratings.
- ✓ Providing communication to the public and building industry stakeholders.

The tasks and responsibilities of the scheme owner/ manager are strongly dependent on the scheme type. We foresee three main options for the management of the voluntary common EU scheme:

1) **European level** (either through the Commission, one of its agencies or a new EU level entity).
2) **National level** (through national contact points reporting to the EC).
3) A **third party** in the form of a suitable consortium with international operations and national contact points.

A study by Jensen et al. (2007)[93] states several advantages and disadvantages regarding the ability of central regimes to manage an energy certification scheme. A central authority can allocate the necessary resources to implement a certification scheme at all levels (e.g. regulation, reviews, and information for end-users), and can therefore enforce rapid implementation of the scheme. However, localised management can adjust performance with respect to local building traditions and administrative practices.

In addition to the involvement of public servants and engineers/architects, it is also important to keep in mind that stakeholder representation is key and that building the value of a new brand can be very expensive. A study[94] on the Ecolabel mentioned that strong cooperation with private labels and certification bodies is important and contributes to making a scheme more acceptable to stakeholders. Taking this into account, the scheme owner and management alternatives are presented below:

[91] The CEN EPB method itself remains subject of CEN and ISO copy right policy.

[92] See for example, Ecofys (2008) 'Development of a Biofuel Label: Feasibility Study' and IEA (2010) 'Energy Performance Certification of Buildings - A policy tool to improve energy efficiency'.

[93] Jensen, Wittchen & Hansen (2007). Development of a 2nd generation energy certificate scheme – Danish experience. ECEEE 2007 Summer Study.

[94] Oakdene Hollins (2011). 'EU Ecolabel for food and feed products – feasibility study'

Table 8-2 Overview of key options for a management and scheme ownership of the voluntary common EU scheme

Scheme ownership and management level	How	Positives & Negatives
EU level - centralised operation	The European Commission, through one of its agencies; through an outsourced consultancy service; or through the creation of a new entity.	✓ EU involvement gives validation to the initiative. ✓ Independence of Commission would help with credibility. ✓ Maximum control of quality for the Commission. ✓ More likely to be comparable across countries. - Higher costs and lack of Commission manpower – would probably require outsourcing to an Agency and/or contractor. - Risk of Member State resistance. - Risk of duplicating existing schemes.
National level	Through national bodies reporting to the EC (e.g. linked to mandatory national EPC or to GBCs). Member State (public) implementation with EC audit role.	✓ Reduces EC workload. ✓ Enables MS flexibility in implementing and facilitates adaptation to local context. ✓ Potentially lower costs due to synergies. ✓ Easier to streamline requirements together with mandatory national EPC process. - An energy label for buildings would be at risk of duplicating the national EPCs and would be much more complex than for other labelled products.
Third party (such as an existing scheme operator)	Any third party actor certified/ recognised by the Commission (existing and trusted organisation, e.g. one of the commercial scheme operators), with national contact points and EC taking an audit role.	✓ Local contact points facilitate adaptation to local context. ✓ Builds on their previous experience. ✓ Potentially lower costs due to synergies. ✓ Existing brand value. ✓ Experience in developing/adapting & running certification schemes. ✓ Cooperation with private labels increases acceptance from stakeholders. ✓ Reduces EC & MS workload. ✓ Enables EC to retain control of implementation. ✓ Allows private sector to participate in the scheme (including operators of existing schemes). - Still requires some EC level oversight. - Risk of existing scheme operators taking on operation of this scheme and under promoting it in favour of their own existing schemes.

There are a number of important considerations which need to be taken when deciding on which entity should develop, manage and own the certification scheme. A feasibility study for the biofuel certification scheme[95], identified the following aspects:

- ✓ **Brand value** is very important for a label, since consumers must recognise and understand the positive meaning of the label before it becomes of value to a company.
- ✓ **Overhead costs:** A single entity that runs multiple labels or one label for multiple products may be more cost-efficient than an entity that only runs a single label for a single product because general costs can be spread out over multiple product-label combinations.
- ✓ **Representative governance structure:** Overall, the governance structure should represent different stakeholder groups and will need conflict resolution mechanisms which are perceived as fair by the different stakeholder groups. There is no one correct governance structure as it will depend on the goals of the scheme and the context in which it operates. Depending on the entity that owns the certification and labelling system, the governance structure may be more or less predefined. Setting up a new entity clearly brings with it more flexibility in designing the governance structure.

Recommendation for management and ownership

Based on these considerations we suggest that the operating structure consists of a **third party,** that possibly **operates with certifiers within Member States. To ensure quality and validation of the certification scheme an audit and verification role is foreseen for the EC as the scheme owner.** The operation and management of the scheme could therefore be outsourced to a third party (e.g. a suitable consortium), possibly with a cost (to the Commission) to operate the open source aspect. This would also enable the operators of existing schemes and those groups with a significant interest in the scheme (e.g. large multi-national property portfolio owners) to be involved in the detailed development of the scheme. In order to maximise the uptake, we suggest exploring synergies with existing national schemes and the potential links to national EPC and MS certifiers to benefit from structures and processes already established and functioning within the different Member States. Regardless of which management structure is selected we also suggest assigning a management board of two to three people within the EC to follow up on the management of the scheme.

Due to the complex technical set up of the scheme we advise supporting the management structure through an independent working group, or round table, of EU wide building sector stakeholders and experts that will be responsible for the development and maintenance of the technical components of the scheme including the development of rules and standards for the certification scheme, the labelling range as well as the ongoing revision of the guidelines and methodology.

Tasks under Step 1 management and ownership

Sub-task	Description	Task owner
Staffing	Set up of staff including the management board, system administrators etc.	EC
Assignment of roles	Within the new management structure it will be important to decide on the roles needed for implementation, verification and quality assurance,	EC in collaboration with the appointed scheme management

[95] Ecofys (2008). Development of a Biofuel Label: Feasibility Study. A report by Ecofys and E4tech

Sub-task	Description	Task owner
	public contact point, creation of online platform and other IT issues.	
Training and Marketing activities	Taskforce of professionals that will design and carry out training and marketing activities, as well as develop distribution and communication strategies.	Scheme management
Set up of working group	Taskforce run by professionals and knowledge institutes for problems/ challenges with the application of the EU label where stakeholders can interact and consult with experts.	Management in close collaboration with EC and external consultants/technical experts.
Quality control and verification	Set up of quality control and verification of staff (internal or external, e.g. possible links to national EPC qualified consultants).	Management in collaboration with EC.
Creating brand value	The strategic positioning of the scheme within the market as well as other marketing tasks should be designed early in the process of setting up the scheme.	Marketing team in collaboration with EC.

Certification experts from Member States should also be consulted when necessary. Depending on the management structure and the structure of the scheme (which will be further described in Step 2), the following staff for daily operation will be required:

- ✓ Management board or secretariat.
- ✓ System administrator and support for online platform.
- ✓ Taskforce of professionals for training and marketing activities.
- ✓ Taskforce run by professionals and knowledge institutes for problems/ challenges with the application of the EU label where stakeholders can interact and consult with experts.
- ✓ Quality control and verification staff (internal or external, e.g. possible links to national EPC qualified consultants).

As a best practice example, the box below presents the main players and roles in the Danish energy certification scheme, a scheme that came into force in 1997 and has since been revised to accommodate the EPBD requirements.

Example: Danish energy certification scheme[96]

- ✓ The **overall administrator of the scheme is the Danish Energy Authority**, which is responsible for:
  - Setting up general rules for the scheme
  - Control of budget and costs
  - Overall control of the scheme
  - Appointment of individual energy consultants
  - Setting maximum charges for consultants
  - Information for consumers/user
- ✓ The **Danish Building Research institute (SBi) is responsible for the calculation tool.**

[96] Jensen, Wittchen & Hansen (2007). Development of a 2nd generation energy certificate scheme – Danish experience. ECEEE 2007 Summer Study.

- ✓ A **secretariat**, hosted by a consortium of two private energy and building consultancy companies, is responsible for **daily administration**. Operational activities include:
  - Registration of energy consultants.
  - Training consultants
  - Development and maintenance of consultant's handbook.
  - Registration of energy labels in a database.
  - Continuous evaluation of the performance of the scheme.
  - Collection of statistics.
  - Quality control of the energy labels and the work performed by the consultants.
  - Operation of the website.

8.2.2 *Step 2: Management structure and scheme management*

After deciding on the ownership and management of the scheme, the management and operational structure as well as the running of the scheme should be discussed further, as these two aspects are strongly linked and the operational set up should be designed in close contact with the scheme owner/manager. The three main options we see for the operation structure are listed below, together with their pros and cons.

Table 8-3 Overview of key options for the operational structure of the EU scheme

Structure type	How	Positives & negatives
An electronic platform	Online platform + QA and training + very light oversight and moderation at EU level.	✓ Cheapest. - Least effective.
A light physical centre with an electronic network	Online platform + QA and training + EU level management and daily operation.	✓ More effective than just electronic platform. - Higher investment. - Higher cost of operations.
A fully fledged physical centre combined with an electronic network	Online platform + QA and training + local management and daily operation. It can be independent, possibly linked to the mandatory national EPC or run by **commercial scheme operators** with a national contact point.	✓ Potential synergies with national EPC and/or existing schemes. ✓ Most effective. - Highest investment. - Highest cost of operations.

Recommendation for operational structure of the voluntary common EU scheme

We suggest a management structure based on a **light physical centre** in form of a secretariat with an electronic network (this is linked to the registration system and disclosure proposed in chapter 7). This would allow the public and stakeholders to get support and follow up from the secretariat, but would not incur high overhead costs. The light physical centre will be responsible for the coordination of activities at an EU wide level, and will form a contact point for the working group as well as the scheme owner/manager. Depending on the size chosen for this centre it can also pick up data management tasks, including the collection, review and dissemination of information around the issued certificates. Directly connecting the light physical centre with the maintenance of the electronic network can further benefit the overall management process of the scheme and relieve the European Commission of additional administrative burden. Depending on the party that is chosen to function as scheme manager it should be decided in the development process whether to either have the party

take up the role of the light physical centre or just provide staff to deal with the different tasks assigned to the centre. This will depend on the size of the party assigned with management, as well as its other responsibilities and general capacity.

Tasks for the operational structure of the voluntary common EU scheme

Important tasks that the light physical centre acting as a secretariat will need to perform are presented in the table below. The essential task of the online platform should be to connect where possible with other electronic databases and certification bodies. The effectiveness and possibility to connect will strongly depend on available structures in Member States, so a solid collaboration between the scheme owner and Member States representatives responsible for certification should be aimed for. If there is enough support from the Member States (as the scheme is voluntary), we suggest making a link to the mandatory national EPC (due to the potential synergies).

Sub-task	Description	Task owner
Point of contact	The light physical centre should be a point of contact for public, assessors, certification bodies and others and should employ staff that can fill this role.	Light physical centre.
Organisation of different parties	It should also be a communication contact for EC and the technical working group/roundtable as well as the certification bodies; and the management of the scheme.	Light physical centre in collaboration with the management.
Link to other physical centres of mandatory EPC	The physical centre should also be a point of contact for similar centres in MS dealing with the mandatory EPC scheme. This will allow the creation of synergies with governing structures of existing national and internationally operating schemes.	Light physical centre.
Collect, review and disseminate data	Tasks connected to the maintenance of the online platform and data management.	Light physical centre.
Link to other online platforms and databases	The physical centre should explore ways to connect its online platform to other certification platforms and databases.	Light physical centre together with management and with support of the working group and EC.
Marketing	The light physical centre should also be a focal point for marketing activities and distribution and communication of strategies developed by the manager and scheme owner.	Light physical centre together with management and with support of EC.

8.2.3 Step 3: Certification and labelling process

The scheme will need a certification process setting up. This process deals with the question of who assesses the performance of the building and in what form and how, the certificate or label is issued. For green schemes the certification process is typically outsourced to a certification body or is delivered through accredited Energy Assessors[97] as it requires specific expertise and competencies. This

[97] Accredited Energy Assessors perform energy survey or assessment according to governmental guideline (often inputs the observations into software program to determine the energy rating)

set up also avoids conflicts of interest that may arise when the scheme owner carries out certifications themselves, e.g. the scheme owner may have an incentive to have as many parties as possible carry its label and may therefore award labels without adhering to the entire certification process.

In order to ascertain that a certification body possesses the required expertise and competence, certification bodies typically need to be accredited to allow them to certify parties for a certain label. The process of verification often adds significant costs to the running of a certification scheme.

To avoid these increased running costs, certification can be done through so called first party verification, where the scheme user fills in the data and prints out the label himself. The option exists for this process to be verified on a selected basis (i.e. a certain sample are audited) by a third party.

Three main options exist for the new certification scheme, based on what has proven to be successful for other certification schemes.

Table 8-4 Overview of key certification options for the voluntary common EU scheme

Certification & Verification Options	How	Who	Positives & Negatives
First-party verification	The online portal provides a guidance document with requirements + template to get the certification. Users fill the templates online with their building values and print the label, free of cost.	No bodies required. (If there is no sample verified).	✓ Low costs due to online tool + pre-set requirements. ✓ Straight forward for users. - Least effective. - Less credible.
Third party certification	For each request for certificate a certification body/assessor performs an audit to verify whether the building meets the requirements of the scheme. Based on the audit results, the certification body makes a certification decision. A positive certification decision leads to the issuance of the right to carry the label. This option would have a fee.	**Certification body**, can be done in-house by the scheme owner or outsourced to existing certification bodies. **Accreditation body** (for accreditation of certification bodies), can be done in-house by the scheme owner or outsourced.	✓ Most effective. ✓ Considered reliable by users. ✓ Most Member States have certification bodies/assessors in place for national schemes, which can also become accredited for the voluntary common EU scheme. - Higher investment. - Higher operation costs (which are transferred to the client). - Recognition of qualifications needed.
Market surveillance	Label can be issued without any third party verification but there are random checks. Each MS would	**National contact points for market surveillance**, this can	- High operation costs (likely to be met by MS).

Certification & Verification Options	How	Who	Positives & Negatives
	have a national contact point to do these random checks. This could be linked to the national EPC system.	be the GBCs (or designed by the MSs, as for product market surveillance).	

Recommendation for certification and labelling process

We recommend a third party certification process, ideally integrating certification bodies or energy assessors already experienced with building certification and possibly the national EPC systems throughout the Member States. This approach allows for advantage to be taken of the potential synergies and links between the voluntary common EU scheme and the national EPC systems. Through such links, it should become easier to manage and support the scheme as auditors will be familiar with both systems. The voluntary common EU scheme entering into the market can then also rely on experienced certifiers and will gain more credibility and relevance among the other schemes in the market. In Member States where the certification process is unclear or difficult to link to the scheme, the manager and owner will need to establish a process that can ideally be connected to schemes in other Member States.

Tasks under Step 3: Certification and labelling process

The following task will need to be carried out when setting up the certification and labelling process.

Sub-Task	Description	Task owner
Establish link / connection to certification bodies	The scheme owner and manager will have to establish a link to other certification bodies to identify suitable institutions to carry out the certification.	EC together with the light physical centre.
Establish criteria for awarding certification	As part of the technical development of the scheme it will be essential to establish the awarding criteria for certification and communicating these to certifiers.	EC together with working group.
Training design and accreditation of assessors	An important task under this step will be the training of assessors and deciding on the type of training and accreditation.	EC supported by the management and working group and certification bodies.

8.2.4 Step 4: Testing phase

After the key questions regarding the management and structural set up of the voluntary common EU scheme have been addressed one would move from the planning phase to implementation. This deals with the roll out of the scheme, provision of training for assessors, awareness raising as well as data collection, review and dissemination.

The diversity of the non-residential building sector, as well as the findings from the stakeholder interview process, suggest that an 18 month pilot phase should be carried out. This length is suggested to be in line with the design build cycle for renovation projects and with the aim of capturing at least one summer/winter cycle for energy performance data. It is advisable to start the pilot phase with a

limited range of building types e.g. office buildings and hotels as another non-residential building type soon after the first introduction of the voluntary EU common scheme. This recommendation is based on the fact that most stakeholders identified these markets as the most in need of uniform calculation methodologies. This is also consistent with the earlier recommendations that the development of a voluntary common EU certification scheme would gain by initially focusing on a limited number of building types. A pilot study is also useful to address any problems that emerge through practical use of the calculation methodology and the running of the scheme.

At the end of the pilot phase an evaluation of whether further non-residential building types should be included or if the scheme needs further adjusting (in terms of organisational or technical issues) can be made.

In addition to offices, hotels have been identified as a non-residential building type that wold be well suited to a pilot phase. The reasons for this suitability include that they are interesting for investors and property owners but are also frequented by the public and have a high level of standardisation of services. Certification labels would be highly visible in hotels which could help raise awareness for building certification and energy performance in general and the voluntary common scheme in particular.

Tasks under Step 4: the pilot phase

Several tasks will need to be carried out during the pilot phase of the scheme involving all parties concerned with the operational structure of the scheme. The aim is to ensure that learning from the pilot phase is maximised and effective measures are taken to improve the voluntary common EU scheme before it is applied to other non-residential building types and to ensure it remains credible in the market.

Sub-Task	Description	Task owner
Training of assessors	Within the implementation phase the previously designed training will need to be carried out. Courses, trainers and training facilities will also need to be identified.	Certification body together with scheme management
Raise awareness	The carrying out of marketing campaigns and informing the public and stakeholders of the existence of the voluntary common EU scheme.	Joint collaboration between EC, Member States, (light) physical centre and the working group/Concerted Actions/Stakeholder group.
Collect, review and disseminate data	In order to understand and improve the scheme during and after the testing phase, data will need to be collected, reviewed and disseminated.	(Light) physical centre with support from the EC and the technical working group.

8.2.5 Step 5: Verification, monitoring and surveillance

A monitoring/ verification system is needed to gain scheme credibility. This is relevant for an online tool as well as for the training of assessors. The chosen systems are dependent on the operational structure of the scheme. If it takes the form of a light physical centre combined with an electronic network, quality control should be carefully designed and include quality insurance task for online

platforms as well as for the physical parts mainly the running of the secretariat and the energy assessors.

The table below lists some options of the quality tasks that should be considered for the operation of the scheme, based on examples described in Jensen et al. (2007).

Sub-task	Description	Task owner
Electronic screening	Statistical screening of the data in the database to locate and assess the statistical outliers.	(Light) physical centre
Manual screening	Analyses of the development and trends in the reported labels.	(Light) physical centre
Desktop control	A small percentage (e.g. 5%) of the reported labels are taken randomly from the database and checked to assess whether general information is correct. Defective labels can be selected for technical auditing.	(Light) physical centre, working group.
Technical auditing	Field control of an even smaller percentage (e.g. 0.5%) of the reported labels. This is done on the premises by a technical auditor. The auditor carries out a new label and compares it to the audited one. Actions should be taken if the audited label is not acceptable when compared to the new label.	(Light) physical centre, external auditors.
Verification and surveillance	The setting up of a verification and surveillance system to ensure quality of the process.	EC in close collaboration with the technical working group/Stakeholder group

The quality control system will have to be developed in further detail by the future scheme operator. They can build their approach on practices currently used by other certification schemes as well as methods commonly used by certification bodies.

8.2.6 Step 6: Periodic review and adoption of the technical method

Periodic review and revision of the method is an essential part of the running the scheme. Periodically adapting the set of default CEN values based on experience gained in practice will increase the utility of the scheme for all regions in Europe. Regular updates of the CEN EPB method, e.g. related to new or improved technologies, also need to be taken up in the scheme. Other main issues that need periodic review are the benchmarks and the common assessment protocol.

The most sensible solution appears to be if the revisions are done by the same group that developed the technical parts of the voluntary common EU scheme. Therefore, as has been described in detail under Step 1, attaching an independent working group or round table of different building sector stakeholders and experts to the overall management structure of the scheme is advisable. Irrespective of the setup of the working group or dedicated stakeholder meeting we advise that an active role for CEN is incorporated in the revision process to ensure the consistency with the CEN EPB methodology. Including CEN as well as the national experts that are responsible for the development of the EPC methodology in the revision process will allow the voluntary common EU scheme to lead the further development of the national EPC schemes.

8.2.7 Operation and certification costs

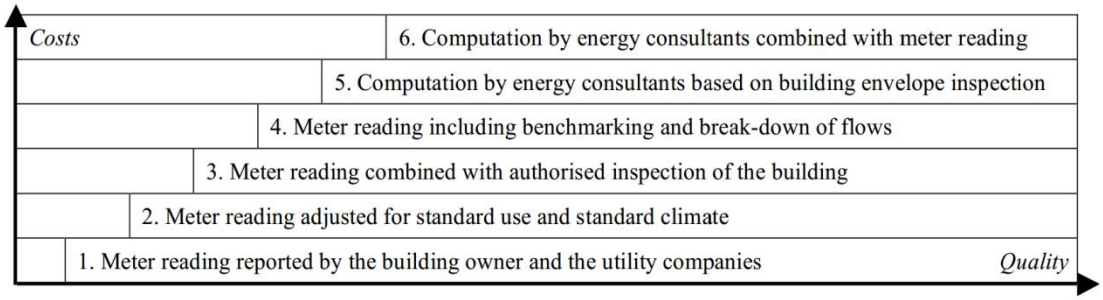
In addition to the development costs described earlier under chapter 5.1.5, the **costs associated with operating** the scheme have to be taken into consideration when setting up a voluntary common EU certification scheme. Costs arising during the operation of a scheme are connected to aspects such as[98]:

- Data collection and availability.
- Expertise requirements.
- Labelling application and license costs (*where applicable*).
- Management, monitoring and verification costs (*where applicable*).
- Promotion and marketing costs.
- Training.
- Software tools.

Estimating these costs is difficult as they vary widely and depend, amongst other things, on the scheme design and complexity. For example, in Denmark the energy certification scheme is designed to be cost neutral and independent of the Danish tax payers. A fee structure provides the income to cover costs of operating the secretariat, technical auditor, education of consultants, etc.

The image below illustrates the trade- off between cost and quality, where the lower steps of the staircase show an approach based only on meter reading with the higher steps involving calculations and more manpower but providing better, more complete information. This comparison directly relates to whether the scheme uses an asset rating or an operational rating. An asset rating mostly relies on computation and an operational rating mostly relies on meter reading. Each step towards the top of the stairs requires more educated consultants and a more developed secretariat to work out and to take care of the labels. Furthermore, each new step represents an increased level of expenses (which might have an impact in terms of the uptake of a scheme).

Figure 8-2 Six stairs of complexity regarding cost and quality for energy certification schemes



Source: Jensen, Wittchen & Hansen (2007). Development of a 2nd generation energy certificate scheme – Danish experience. ECEEE 2007 Summer Study.

The **certification costs** under the voluntary common EU scheme will depend on the scope (type of building, how many indicators, etc.) and assessment process (who can assess, calculations needed and their difficulty, etc.) of this new framework. Auditing costs will vary, for example, according to the size and type of the building, and will depend on the extent to which site visits are required versus desk-based audits. Assuming that the voluntary common EU scheme will need to be a simpler and cheaper

[98] Ecofys (2008). Development of a Biofuel Label: Feasibility Study. A report by Ecofys and E4tech

framework compared to BREEAM and LEED, certification costs are expected to be significantly lower than for these schemes. Information on certification costs are described in a greater detail in section 5.1.5 of this report.

8.2.8 Biofuel Logos – a best practice example

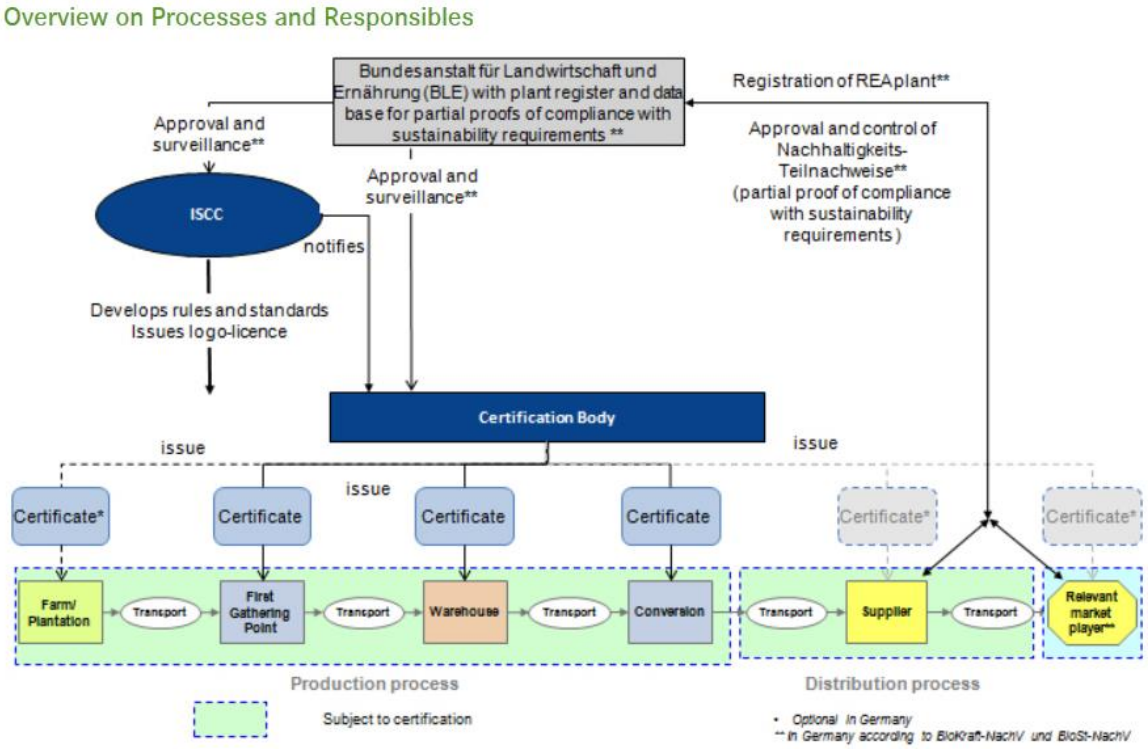
The previous sections highlighted some options for design of a voluntary common EU certification scheme and demonstrated the range of options that exist for the operational structure. It is useful to examine an EU certification scheme which is working well in another sector. The European Commission's recently created seven biofuels logos offer a good example of how a certification scheme required by an EU Directive operates.

The seven biofuels logos are used to certify the quality (sustainability) of biofuel in various parts of Europe. Each logo represents a certification scheme which is operated in a different way. Most of the certification schemes are connected to initiatives or non-profit organisation which are often made up of stakeholder groups and manage the scheme and set up technical working groups which formulate and revise the standards and rules used by the certification. Some of the schemes use an approach of creating these working groups at a national level to analyse and adjust standards in accordance to the conditions in place in that country. Both these approaches seem to offer an approach that it transferable to building certification , as concerns have been raised by some Member States that national circumstances might not be sufficiently taken into account under a common voluntary EU scheme for non-residential buildings.

With respect to carrying out the certification, most biofuels logos rely on approved certification bodies. These can be companies operating on an international basis, such as the TÜV Rheinland that certifies across various sectors as well as other national certification bodies. This is another approach that seems feasible for a voluntary common EU building certification scheme, as several organisations exist that could be approved as certifiers for a voluntary common EU scheme.

Of the seven biofuel logos, the International Sustainability & Carbon Certification (ISCC) appears to operate in a way that could be most readily applied to a voluntary common EU certification scheme for non- residential buildings. **Figure 8-3** shows the structure of the ISCC. A similar structure could be applied to a voluntary common EU scheme for non-residential buildings under EC surveillance as has been outlined in the previous sections.

Figure 8-3 Example from ISCC Bio logo: Process and a responsible structure[99]



Within the ISCC, certifications are conducted by independent certification bodies that perform the assessments based on ISCC system documents, procedures and checklists. A similar approach could be adopted under a voluntary common EU scheme with the help of guidance documents or calculation tools. The ISCC Association is connected to the ISCC certification scheme. Members of the ISCC network are active promoters of sustainability in the biomass sector; they provide support to stakeholders as well as a forum for a balanced stakeholder dialogue. The association is also responsible for establishing technical committees for the discussion of relevant issues and for promoting the continuous improvement of the ISCC certification scheme by functioning as a link between stakeholders and the ISCC System.

A similar set up could be envisaged for the voluntary common EU scheme; where a working group or round table could support the Commission, which functions as the overall surveillance body, in the promotion and ongoing revision of the scheme.

It is more challenging to compare other forms of labelling currently used within the EU to the case of the voluntary common EU scheme. While the Ecodesign Directive uses CE marks for labelling, the largest discrepancy is with the mandatory energy labelling, for which implementation falls under the responsibility of the individual Member States. This approach does not seem to be suitable for a voluntary common EU scheme, as several MSs are already struggling with their mandatory EPC systems and further burden should be avoided. Nevertheless these systems can be looked at for guidance on the set up of third party verification and market surveillance. In this regard, in the next phase of scheme development it may also be interesting to further explore best practices from different sectors that

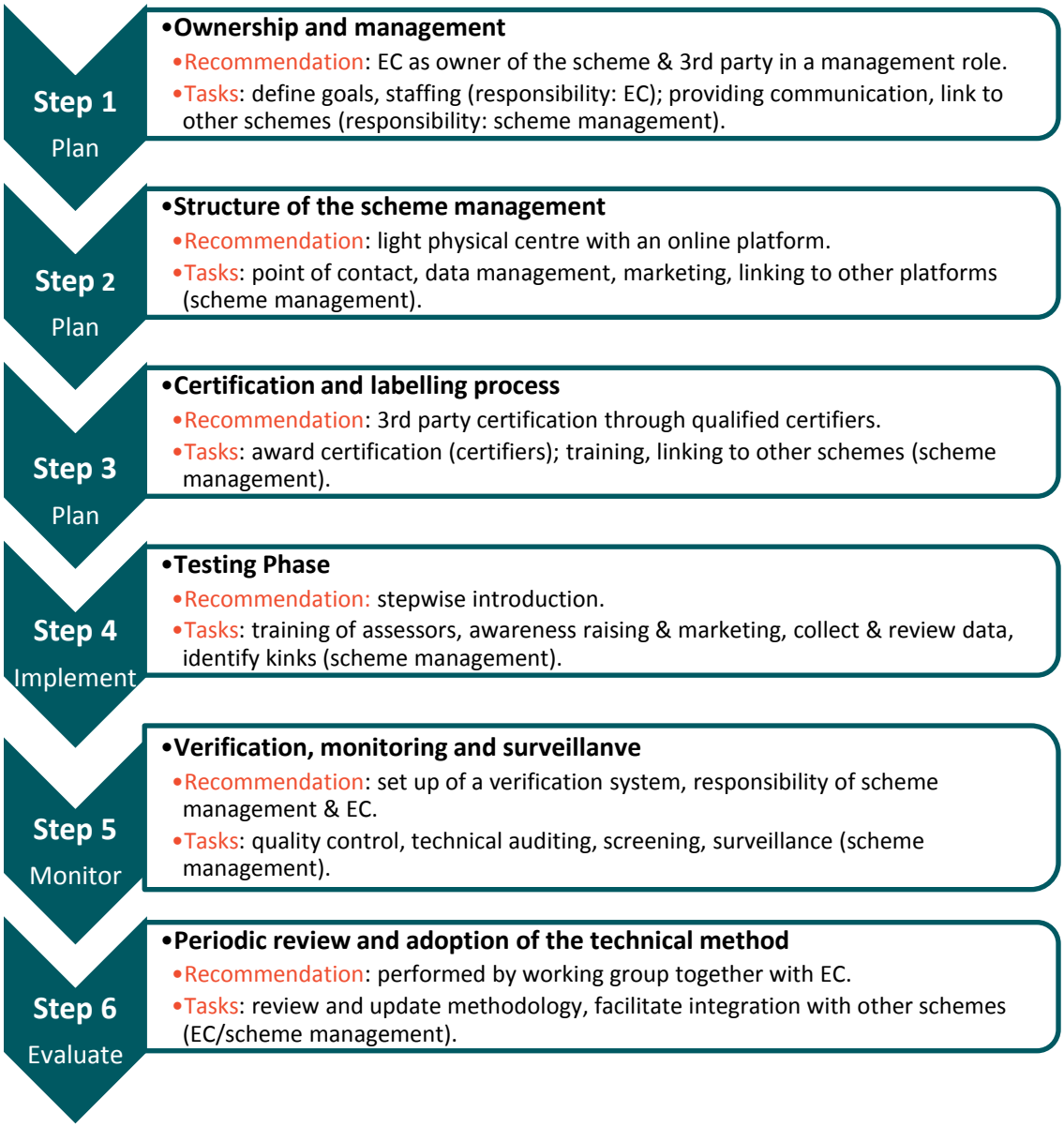
[99] http://www.iscc-system.org/en/

carry out checks, certification and labelling connected to safety issues, in appliances but also machinery. The heating industry involves the frequent use of dangerous gases and therefore as an industry it is familiar with third party verification and the setup of such processes.

8.3 Summary overview of suggestions for the voluntary common EU Scheme

The following figure outlines a roadmap for the implementation of the structure and organisation of a voluntary common EU certification scheme for non-residential buildings. It summarises the six steps which are discussed in detail in the previous sub-chapters and highlights the recommendations as well as the main tasks connected to each step. It follows the policy cycle *Plan*, *Implement*, *Monitor* and *Evaluate* described in Figure 8-1, with the main tasks falling under the *planning* phase.

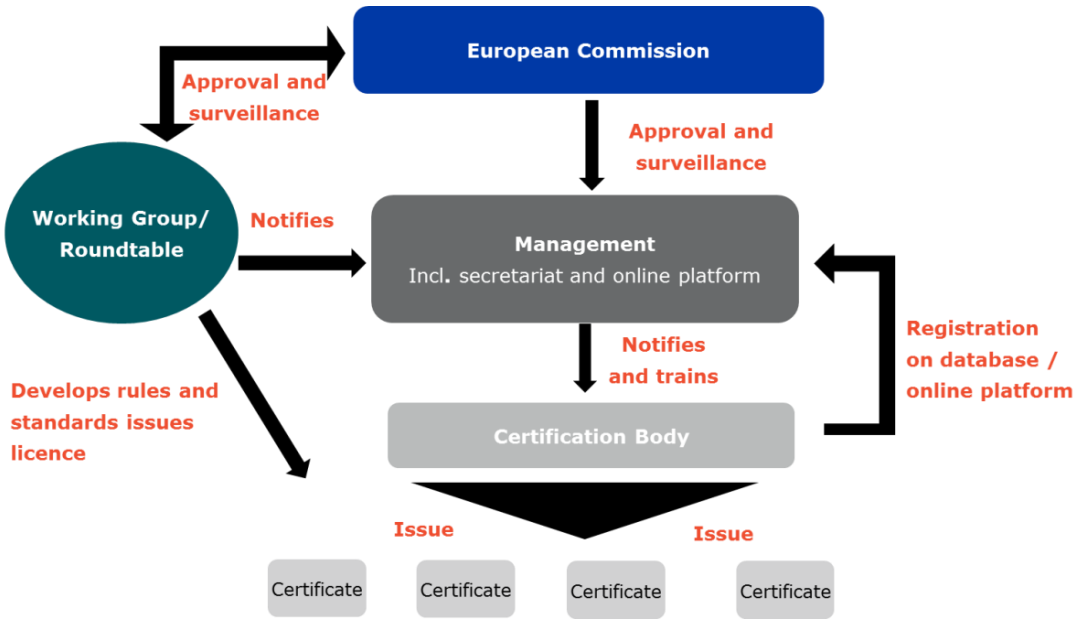
Figure 8-4 Roadmap to roll out of scheme



It is also important to consider the optimal operation structure for the voluntary common EU certification scheme. Figure 8-5 gives a schematic overview of a proposed operational structure,

showing the different parties involved and their responsibilities. The purposed structure follows the set-up of other operational structures currently in place in other certification schemes.

Figure 8-5 Schematic overview for a possible operational structure of a voluntary common EU certification scheme



Source: consultant's analysis

The following points summarise the analysis and results of this project:

- ✓ **Technical development of the scheme** to be done by the European Commission with an active role for CEN and in consultation with private and public stakeholders. The establishment of a working group/ roundtable is proposed to plan and oversee the implementation as well as support the operation of the scheme and its periodic review to guarantee consistency with the existing and future updates to the CEN EPB methodology. This working group can also take the form of a more specialised expert meeting with stakeholders.

- ✓ **The development cost** of the voluntary common EU scheme is proposed to be borne by the EU and how the scheme operates will depend on its complexity.

- ✓ **The label design** should be simple, using a rating system approach which is already recognised and accepted via its use in the energy labelling of consumer goods.

- ✓ **Ownership & scheme management** - We suggest that the operating structure consists of a third party at first. We propose an exploration of potential for synergies between the voluntary common EU scheme and the existing national schemes (e.g. national EPC) in terms of links with respect to operation and certification.

- ✓ **Management structure of the scheme -** We suggest a light physical centre with an electronic network. This would allow for some support and follow up with a physical location to act as a secretariat but would avoid incurring high overhead costs. If there is enough support from the

MS, we suggest eventually making the link to national EPC mandatory, through revision and updating of the different methodologies and operational structures (due to the synergies which should exist).

- ✓ **Technical operation of the scheme -** We suggest that the MSs should be allowed to make a link between the voluntary common EU scheme and the mandatory national EPC as this provides the largest value added and reflects the needs and wants of the market.

- ✓ **Certification and labelling process -** We suggest a third party certification process using certification bodies or energy assessors that already have experience in the MSs. If the option of requesting users to complete online templates to produce their own labels is selected we suggest that third party verification/ monitoring of the label is put in place in order to maintain the credibility of the system.

- ✓ **Testing phase** – Before rolling-out the scheme throughout the EU for all non-residential building types, an 18 month pilot phase is recommended. This pilot phase will allow problems with the system to be identified and corrected. The pilot phase should focus on a limited number of building types e.g. offices and hotels.

- ✓ **Verification, monitoring and surveillance -** We suggest that the EC together with the scheme management and the working group design a verification and monitoring system that can build on existing processes and best practices from other schemes.

- ✓ **Periodic review and adoption of the technical method** – In addition to a pilot phase that will help with the development of the technical method, periodic review and revision of the method is an essential part of the running of the scheme and should be done in close collaboration with the technical working group/ expert stakeholder meetings.

With this roadmap detailing the tasks needed to be performed to set up the organisational part of the voluntary common EU certification scheme the Commission has the information required to start the second phase. The technical details will need to be further clarified and designed and the potential actors, stakeholders and other parties that are needed to run the scheme will need to be identified.

Annex A: Use of Voluntary Building Certification Schemes across EU MS

This annex presents a country analysis regarding the use of voluntary building certification schemes across EU Member States.

1. Western Europe – UK, IE, France, Germany, the Netherlands, Luxembourg, Belgium

United Kingdom

The dominant scheme in the UK in non-domestic energy and environmental certification is BREEAM. There are a number of reasons for this:

- The scheme has been around for a long time, having started in 1990, so it has had a long time to develop market recognition.
- The scheme was defined by the Building Research Establishment (BRE) who were the government's organisation for all construction issues (they were largely privatised in the 1990s but they still have a strong influence on UK construction policy). This gave the scheme a lot of credibility amongst the traditionally somewhat conservative construction industry.
- The assessments that the scheme requires are a source of income for consultancy companies, so these consultancy companies have acted as promoters for the scheme.
- Local authorities are under pressure from central government to encourage energy efficiency and reduced environmental impact. One of the most effective ways in which they can influence private development is via the planning system. This has resulted in large numbers of local authorities (70% of large cities in the UK[100]) requiring 'good' or 'very good' BREEAM ratings as a condition for planning consent.
- There is customer and stakeholder pressure on many companies to demonstrate their green credentials. A way of doing this for many companies is to include a policy of achieving a high BREEAM rating on their new buildings.
- BRE have kept BREEAM up to date and evolving over time, with clear efforts to collect stakeholder views on how it could be improved and via the production of variants for specific building types (hospitals, prisons, etc.) rather than its original office only focus. The development of variants has enabled them to increase their potential market size.

The BRE website Greenbooklive[101] provides statistics of BREEAM uptake by country. For the UK this quotes 3,134 since 2008. It is interesting to compare this figure with the information that is made available on the number of non-domestic EPCs and Display Energy Certificates (DECs) lodged[102]. This shows that to date (October 2013) since the first requirement for them in 2008 (with significant expansion in the numbers of buildings that needed one in following years) there have been 457,504 Non Domestic EPCs lodged and 168,082 Display Energy Certificates. Although it would not be completely fair to simply compare the numbers of BREEAM rated buildings with the number of DECs and EPCs, (because DECS and EPCS are required whenever a building is sold or rented, as well as when they are completed),

[100] See the BRE supported study:
http://www.schneider-electric.co.uk/documents/buildings/breeam/The_Value_of_BREEAM.pdf

[101] http://www.greenbooklive.com/search/scheme.jsp?id=202

[102] See https://www.ndepcregister.com/lodgementStats.html

the difference in scale does illustrate how many buildings are built (or change owners – when renovation is most likely) that are not BREEAM certified.

LEED uptake in the UK appears relatively low in comparison to BREEAM. The US Green building Council LEED register shows 80 buildings registered for LEED in the UK. This is probably related to the dominance of BREEAM and the perception that LEED is an American scheme (and therefore less well suited to the UK than BREEAM).

There is a growing recognition of the Passivehaus approach in the UK but this is much more common in the domestic than non-domestic sector. It should also be noted that the BREAAM equivalent for housing (Ecohomes) is much more widespread than Passivehuas. There are some examples of non-domestic buildings built to the Passivehaus standard, One of the UK assessors mentions 20 buildings he has certified[103] including 5 schools, 2 offices and a community centre.

Ireland

The market for building certification in Ireland remains relatively small. The Irish Green Building council supported University College Dublin to report[104] on building assessment methods in general and for Ireland in particular. The report states "The slow growth of environmental assessment of buildings has been led by market forces as a voluntary mechanism for effecting sustainable development to obtain market advantage. There is little evidence of how environmental assessment supports national policy and what role it could have in effecting real change." The same report describes how some parts of the public sector have taken a positive view of BREEAM, for example the Office for Public works paid for a number of its buildings to be assessed under BREEAM and included a target for its new buildings to achieve a good or very good rating. However other parts of the public sector were less enthusiastic, for example the department of Education concluded that the use of BREEAM for schools would be poor value for money.

The construction industry in Ireland has many similarities to that in the UK – in terms of practices, legislative structures and active players. This has meant that the BREEAM scheme has had some uptake in Ireland. The BREEEAM database quotes only 8 BREEAM certified buildings in Ireland. LEED appears to have a slightly higher share of the small building certification market in Ireland with the US Green Building Council LEED directory[105] showing 18 LEED certified buildings in Ireland. Brophy (2011) quotes data obtained from the BRE indicating 17 certified and 44 registered BREEAM buildings, and the GBC indicated two certified and 10 registered LEED projects. Brophy (2011) describes how Ireland's Industrial Development Authority (which is charged with attracting inward investment into Ireland), compared the BREEAM and LEED systems and appeared to marginally favour the LEED system because of its familiarity to American companies (80% of IDA's clients) and because it was more accessible to the design team (BREEAM can only be acquired through a licensed assessor). In 2009 the IDA adopted the principles of LEED as the baseline for its future building designs for both manufacturing and office buildings.

[103] See: http://www.peterwarm.co.uk/

[104] Building Environmental Assessment for Ireland. Exploratory study. Brophy, Vivienne. UCD Energy Research Group (2011). (with the Irish Green Building Council) http://erg.ucd.ie/UCDERG/pdfs/IGBC%20FINAL%20Full%20.pdf

[105] http://www.usgbc.org/projects?keys=&=Search

Brophy (2011) also quotes Hendrick (2012) "who undertook a survey of Irish building industry use of environmental assessment methods which indicated that building environmental assessment was being utilised to a greater extent than the published statistics would suggest. According to the survey data BREEAM has market dominance, having about two thirds of the assessed large budget, new construction in Ireland, with LEED having the other one third. The respondents were primarily architects, who indicated the main benefit of the assessment method was improved design due to the focussed and early design team decision-making. The most prevalent reason given by respondents for using the assessment method was marketing value, followed closely by improving building performance and specifying building performance."

Brophy (2011) reported a discussion at the 2012 Better Building International Conference 'Valuing Green Building' session. "There appeared to be disagreement as to whether there was actually a green premium for rent or investment associated with better environmental performance". Two property professionals agreed that it had not yet been demonstrated in Ireland. Another property investor argued that this was irrelevant as the 'brown' discount for developers and buildings with poor environmental records was far more significant – reportedly large investment funds are now only lending to developers with credible records in corporate social responsibility and sustainability. (Hendrick, 2011 and Whoriskey, 2011) suggest that users perceive neither BREEAM or LEED as more suitable for the assessment of Irish buildings. However, among users it is accepted that while LEED is valuable for comparative purposes with international (and in particular American) buildings, BREEAM is more in line with European and Irish Building Regulation requirements and Irish climatic conditions.

France

At the moment, several certification schemes for buildings are used in France. The following table shows the level of take-up of the different schemes in France:

Table A-1 Use of building certification schemes in France

Certification scheme	Country	N° certificates	Square meters	Scope
HQE (Non-residential)	FR	1 200	16 000 000	Eco-construction, Eco-Management, Comfort and Health
HQE (Residential)	FR	229 000	20 000 000	Eco-construction, Eco-Management, Comfort and Health
GreenBuilding programme	EU	2	NA	Energy
LEED	US/Intl	13 (+29 registered)	NA	Sustainability; Water efficiency; Energy performance; Materials & resources; Indoor environmental quality
BREEAM	UK/Intl	201	NA	Environmental performance
Passivhaus	DE/Intl	54	20 407	Energy
Minergie	CH/Intl	155 (+43 provisional)	73 261 (+81 928)	Energy
Effinergie	FR	NA	NA	Energy
HPE & THPE	FR	NA	NA	Energy

Effinergie, HPE & THPE are in line with existing French regulations[106]:

Other developments

- The UK based Sustainable Building Organisation *BRE Global*, the French *CSTB (*Centre Scientifique et Technique du Bâtiment) and its certification body *Certivéa* have signed an MOU 2009 to align the Environmental Building Certification Schemes *BREEAM* and *HQE*, developing one unique certification scheme for the French market. There appears to be no subsequent progress on this issue.
- The Sustainable Building (SB) Alliance is an international non-profit organisation aiming to accelerate the adoption of sustainable building practices through the promotion of shared indicators for building performance assessment and rating. The Sustainable Building Alliance was initiated in 2008 and officially established in 2009 by BRE (UK), CSTB (France), FCAV (Brazil), ITC CNR (Italy), QUALITEL(France) and VTT (Finland).

The Netherlands

The main certification schemes for buildings in The Netherlands are BREEAM-NL, GreenCalc+ and GPR-Gebouw. BREEAM-NL is the Dutch adaptation of the original BREEAM scheme by the BRE. In addition to the schemes for new (BREEAM-NL) and existing buildings (BREEAM -In Use), there are also schemes for new to development areas (BREEAM-NL Gebied), demolition (BREEAM-NL Sloop en Demontage) and infrastructure (BREEAM-NL Infra). Like BREEAM, GPR gebouw and GreenCalc+ have a whole impact approach, although the focus is not on the same areas as in BREEAM. See table below.

BREEAM-NL is the only one of these schemes that requires an independent and certified assessor to obtain a certificate, although GPR-gebouw does make use of experts who can check the results and calculations. The outcome of all schemes is a comparative label. Although GPR-Gebouw and GreenCalc+ have existed longer than BREEAM-NL (1195, 1996 and 2009 respectively), BREEAM-NL uses parts of the calculations in GPR-Gebouw / GreenCalc+ for one of the credits. GreenCalc+ was originally developed by a foundation but the ownership transferred to the Dutch Green Building Council. BREEAM-NL is gaining in popularity in the Dutch market.

Table A-2 Scope of main schemes in The Netherlands

Scheme	Scope
BREEAM-NL	Energy use Water use Materials Indoor environment quality Emissions/Pollution Land use and Ecology Transportation/Mobility Health and wellbeing Waste
GPR Gebouw	Energy use Health and wellbeing

[106] http://www.projetvert.fr/labels-energetique/label-hpe-thpe/#!prettyPhoto

Scheme	Scope
	Environment Quality of usage (*gebruikskwaliteit*) Value in future (*toekomstwaarde*)
GreenCalc+	Energy use Water use Materials Transportation/Mobility

Germany

As described earlier in this report, Germany is home to two voluntary certification schemes currently in use throughout Europe. DGNB and Passivhaus both have broad acceptance and uptake in Germany and are the most accepted rating systems in Germany. Over half of all existing Passivehaus certified buildings are found in Germany. Given the international character of business in Germany there is also a strong presence of LEED registered and certified buildings. It is expected that upon further investigation the use of LEED in Germany is largely because it more familiar to international companies and organisations which aim to please both local stakeholders but also their domestic markets. It is expected that Energy Star certified buildings are also found in Germany given the large US government presence in the country.

Luxembourg

Up to 2012 16% of the existing building stock was certified properties in Luxembourg (2012). However, until 2013, green building certification was non-existent for residential buildings; the certification market was mostly for new non-residential buildings. [107] In 2013 the Ministry of Housing announced the launch of the GBC to cover residential buildings. [108] Over 72% of certified buildings are new projects; with the remaining 28% split between renovations, in-use, and extension projects[109].

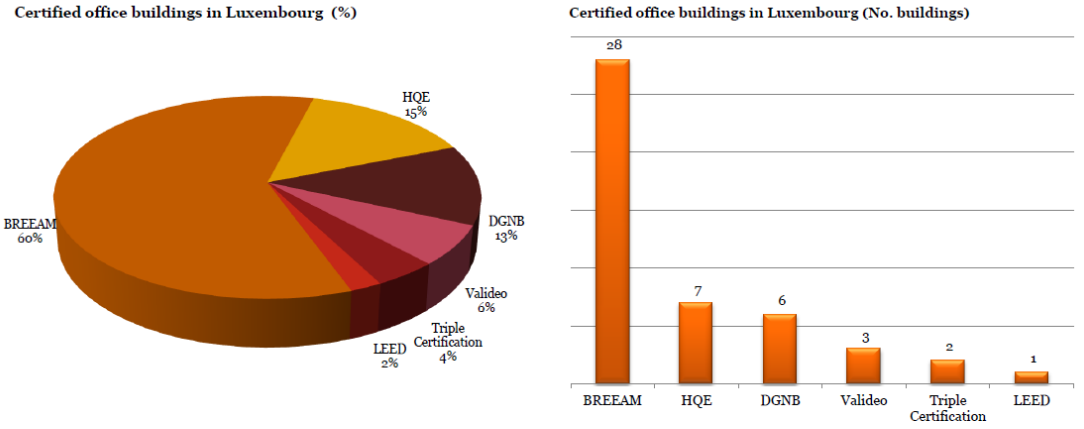
The main certification scheme used in Luxembourg (for office buildings) is BREEAM, though others including HQE, DGNB and LEED are also used. Over 70% of the certified buildings are new buildings. The figure below presents the details regarding the certified buildings in Luxembourg.

[107] Source: Tom Eischen, Ministry of the Economy and Foreign Trade Luxembourg presentation (2013), Green building certification and national energy performance certification

[108] Source: Tom Eischen, Ministry of the Economy and Foreign Trade Luxembourg presentation (2013), Green building certification and national energy performance certification

[109] PwC (2013) A comparison of green building certifications in Europe: How does it apply to practice in Luxembourg

Figure A-1 Certified buildings in Luxembourg: figures



** The data presented in this section covers certified buildings for which information is publicly available as well as those buildings that will be certified in the future and for which PwC has access to confidential information.*

Copyright PwC, novembre 2012

Source: PwC (2013) A comparison of green building certifications in Europe: How does it apply to practice in Luxembourg

Belgium

Currently for non-residential buildings, the main leading voluntary schemes are BREEAM and LEED taking between 80 and 90% of the market, while Valideo and HQE have a limited presence. Mandatory schemes for non-residential are still being developed and will only be ready by 2016; at the moment only some schools and offices have been certified. Interesting is that there is a tendency between the three regions to work more and more together on a uniform scheme for the country, also on the request of the branch organisations (represented by WTCB).

From the interviews with financing providers we also learnt that in the past 3 to 5 years all (big) projects for new non-residential buildings had certifications in place.

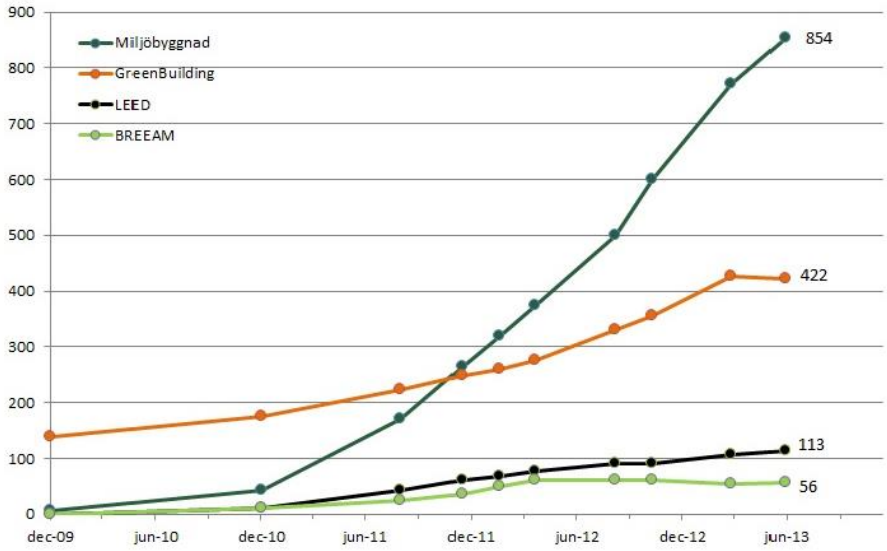
2. Nordic countries - Sweden, Denmark and Finland

Sweden

The Swedish voluntary certification market for buildings is dominated by three *environmental* performance certification schemes: Miljöbyggnad, BREEAM and LEED, and, one *energy* performance certification scheme: the European Green Building Programme. By June 2013, the four schemes had 1445 certified or registered buildings. Miljöbyggnad is the largest scheme with nearly 60 % of the market.[110] The second largest is the EU's Green Building with 29 % of the market, third LEED with 8 % of the market, and finally BREEAM with 4 % of the market. There has been a surge in interest in green building certifications over the last four years. Miljöbyggnad, in particular, has grown from about 50 buildings certified or registered in 2010 to over 850 in 2013 (see graph below).

[110] Estimated by the Swedish Green Building Council (SGBC)

Figure A-2 Number of registered and certified buildings in Sweden (source: SGBC)



The most popular energy performance certificate is the EU's Green Building and by July 2013, around 422 buildings had received the certificate. Costs are relatively low compared to the more comprehensive environmental performance certificates and the certificate can be communicated across all of Europe.[111]

There is more competition among the broader environmental performance schemes, which all contain criteria on energy. The reason for Miljöbyggnad's popularity among the environmental performance certificates could be **the less stringent and more easily applicable system under Swedish conditions than BREEAM and LEED, with 15 checkpoints compared to BREAAM and LEED's that each apply 50 checkpoints**.[112] It was developed in 2005 by Swedish companies and researchers under the national multi-stakeholder "Bygga, bo och förvalta för framtiden" dialogue on sustainable buildings and constructions (also called 'Bygga-bo dialogen').[113] The certification system conforms to Swedish building standards, regulation and practice which probably makes it more easily accessible to architects and contractors with experience and knowledge about the national framework. One caveat in the numbers is that registration does not mean certification, i.e. because a building has been registered does not imply that it will be certified at a later stage. In a 2013 report by LÅGANbygg, a green building support programme, the actual number of certified buildings by scheme is much lower, namely: Greenbuilding – 291 buildings, Miljöbyggnad – 49 buildings, LEED – 33 buildings, BREEAM – 14 buildings.[114]

The Swedish market for voluntary certificates for green buildings is vanishingly small compared to the overall building rate and current stock. Nevertheless, registrations and certifications are growing rapidly, in particular the national environmental performance scheme Miljöbyggnad and the European

[111] http://www.sgbc.se/avgifter-i-greenbuilding

[112] SGBC (2012) Presentation ' Miljöbyggnad compared to BREEAM and time for development'. Available here: http://www.sgbc.se/component/docman/doc_download/194-ws-a1-miljobyggnad-lindakjallen?Itemid=157

[113] See: Boverket, 'Bygga-bo-dialogen för hållbart byggande och förvaltande', http://www.boverket.se/Global/Bygga_o_forvalta/Dokument/Bygga-Bo-Dialogen/Dokument-lankar/Informationsbroschyrer/Bygga-bo-dialogen_screen_sv.pdf

[114] Lågan Bygg (2013) Energi- och Miljöklassning av byggnader i Sverige. Written by Bengt Dahlgren AB och CIT Energy Management AB.

GreenBuilding energy performance certification. Other voluntary standards exists, such as FEBY12 and Svanen, but these are either very small or focus almost completely on residential houses. In the numbers provided above, it should be noted that the separation between residential and non-residential has not been made. Except for GreenBuildings, all the certification schemes are available for both residential and non-residential buildings.

Denmark

Denmark's has, according to its government, the world's most stringent energy efficiency regulations for new buildings.[115] Different certification schemes has been used in Denmark since the1980s and mandatory energy certifications for smaller buildings and on a regular basis for larger buildings have been in place since 1997. Denmark had certification schemes preceding the EPBD and upcoming regulation is highly geared towards low energy buildings in line with the EU demands for NZEBs.[116] The mandatory certification system for energy performance has recently been complemented with voluntary schemes with a more comprehensive, environmental performance, scope. Voluntary certification schemes are in this sense a rather recent and emerging instrument in the Danish building industry. There is for example no Danish version of the BREEAM standard (which is the case in its neighbour countries Sweden, Germany and Norway) and the LEED project database only contains 21 buildings in Denmark.

In 2010, the building sector decided to establish a Danish Green Building Council (DK-GBC)[117] and develop a certification system suitable for the Danish market. After a number of workshops, test-cases and large studies comparing international certification systems including LEED, BREEAM, DGNB and HQE[118], the choice fell on the German DGNB. It was considered the most relevant for the existing Danish building code and conditions, as well as the most comprehensive assessment of the building.

It took nearly two years to develop the Danish version of the DGNB and it was formally launched on 24 May, 2012. To date, 10 buildings have been certified with the new system of which five buildings have reached the pre-certification stage whereas five have been awarded the full certificate.[119] There is also an ongoing pilot programme looking into the possibility of certifying entire parts of a city.

The table below shows the costs for DGNB pre-certification and certification:

Table A-3 Estimated costs for new non-residential buildings certifications in DKK,

	DK-DGNB
Pre-certification	14 900 – 96 860
Certification	22 350 – 208 630

Source: (source: DK-GBC, http://www.dk-gbc.dk/media/98071/certificeringssatser_for_dgnb_juli2013.pdf)

[115] Regeringen (2009) Strategi for reduktion af energiforbruget i bygninger. April 2009 (http://erhvervsstyrelsen.dk/file/43439/)

[116] BuildUp (2012) EPBD implementation in Denmark: Status at end of 2012. (http://www.epbd-ca.eu/country-information)

[117] SBI (2009) Green Building Council nu også i Danmark. (http://www.sbi.dk/miljo-og-energi/lavenergibyggeri/green-building-council-certificering-af-beredygtigt-byggeri/green-building-council-nu-ogsa-i-danmark)

[118] E.g. Birgisdottir, H., K. Hansen, K. Haugbølle, P. Hesdorf, I. S. Olsen and S. Mortensen (2010) Bæredygtigt bygger: Afprøvning af certificeringsordninger til måling af bæredygtighed i byggeri. Byggeriets Evaluerings Center. (http://www.byggeevaluering.dk/media/5430/baeredygtighed_hr_inkl_uk.pdf)

[119] DK-GBC, http://www.dk-gbc.dk/certificering/dgnb-certificeret-byggeri-i-danmark.aspx

Note: price depends on size of building and whether the candidate is a DK-GBC member or not

Due to the nascent stage of the Danish voluntary certification scheme, we lack information on further costs and experiences with implementation.

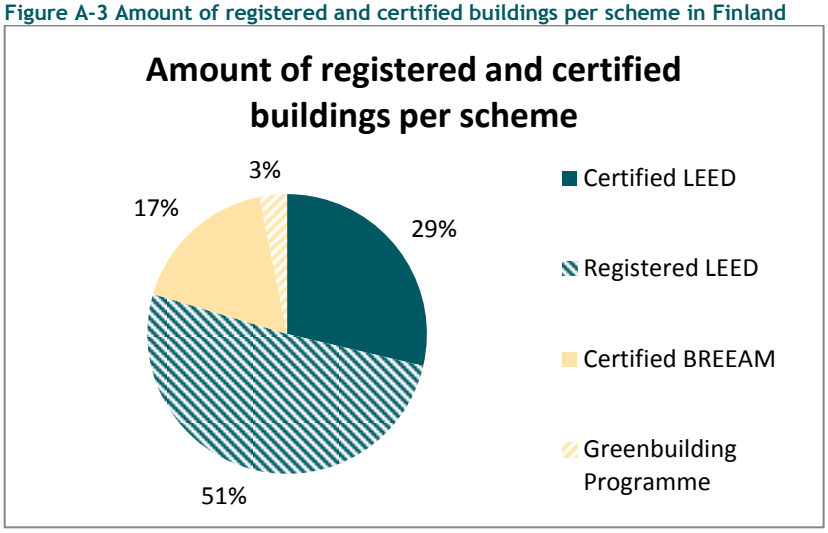
Finland

At the end of 2008 there were 1.421.188 buildings in Finland, in total good for a floor area of 422 million square meters. Residential buildings make up 85% of the total building stock; the other 15% is mainly used for commercial and industrial purposes[120]. Relative to the floor area, the share of residential buildings of the total floor area was 64 % and non-residential buildings respectively 36 %.

At the moment, several building certification schemes are used in Finland. These include a mandatory scheme for residential buildings (transposition of the EPBD)[121], and three voluntary schemes of which two are international (LEED, BREEAM) and one is European (GreenBuilding Programme). Only the Green Building Programme is solely focused on non-residential buildings.

LEED is leading in the Finish market with 125 certifications/registered buildings there. BREEAM and the Green Building Programme have a much smaller market share. BREEAM has 27 and the Green Building Programme has 5 certifications/registered buildings in Finland. Overall, the amount of buildings registered and certified at the national level is quite low, amounting to less than 200 buildings.

Figure A-3 Amount of registered and certified buildings per scheme in Finland



Regarding the development over time of the different schemes[122], we can see the following:

[120] BDRI (2012). Building typologies in the Nordic countries

[121] Spain (partly) transposed the EPBD through the Royal Decree 47/2007 which approved a basic procedure for the EE certification of new buildings (not considering existing buildings). A new Royal Decree 235/2013 approved a basic procedure for the EE certification of buildings (not considering existing buildings).

[122] Only available data

Table A-4 Certification in Finland

	2002	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Certified LEED					3	4	7	13	18				**45**
Certified BREEAM					20	2	2	2	1				**27**
Green Building Programme			1	1	1	1		1					**5**

3. Southern Europe - Spain, Italy, Portugal, Malta, Greece and Cyprus

Spain

Spain has 2689 million m^2 of buildings, of which 86% is residential buildings and 14% intended for other uses, mainly administrative and commercial[123]. The 25 million dwellings[124] account for 17% of Spanish final energy consumption[125]. The tertiary sector, on the other hand, accounts for 9% of final energy consumption[126]. Currently, 44% of existing residential buildings in Spain are from before 1980 and are likely to have lower energy efficiency than modern buildings[127]. The current rate of refurbishment of residential buildings is 0.3% per year[128]. As in Europe, there is substantial potential for energy efficiency savings in the built environment in Spain. Data on this potential is available from various sources[129].

Several certification schemes for buildings are currently used in Spain. These include a mandatory scheme for residential buildings (transposition of the EPBD)[130], and **six voluntary schemes of which four are international (LEED, BREEAM, Minergie and Passivhaus), one European (GreenBuilding Programme) and one was developed in Spain by their Green Building Council (GBCe Verde).** GBCe Verde is actually an adaptation of LEED to the Spanish context; however, both certification schemes co-exist and are led by the Spanish Green Building Council.

Only two of the voluntary schemes are focused only on energy performance (Passivhaus and the GreenBuilding Programme); while the rest (GBCe Verde, LEED and BREEAM) cover additional environmental aspects. Furthermore, their coverage is very similar as they all cover both new and existing buildings[131] as well as residential and non-residential buildings. Only the GreenBuilding Programme is only focused on non-residential buildings.

[123] MITyC & IDAE, 2010. 'Spain's 2nd National Energy Efficiency Action Plan: 2011-2020—NEEAP'

[124] MF, 2011. Plan de ahorro, eficiencia energética y reducción de emisiones en el transporte y la vivienda.

[125] IDAE and Eurostat, 2011. Análisis del consumo energético del sector residencial en España—Informe final.

[126] IDAE, 2011. Balances energyos anuales. Periodo 1990-2010.

[127] IDAE and Eurostat, 2011. Análisis del consumo energético del sector residencial en España—Informe final.

[128] WWF, 2012. Retos y oportunidades de financiación para la rehabilitación energética de viviendas en España.

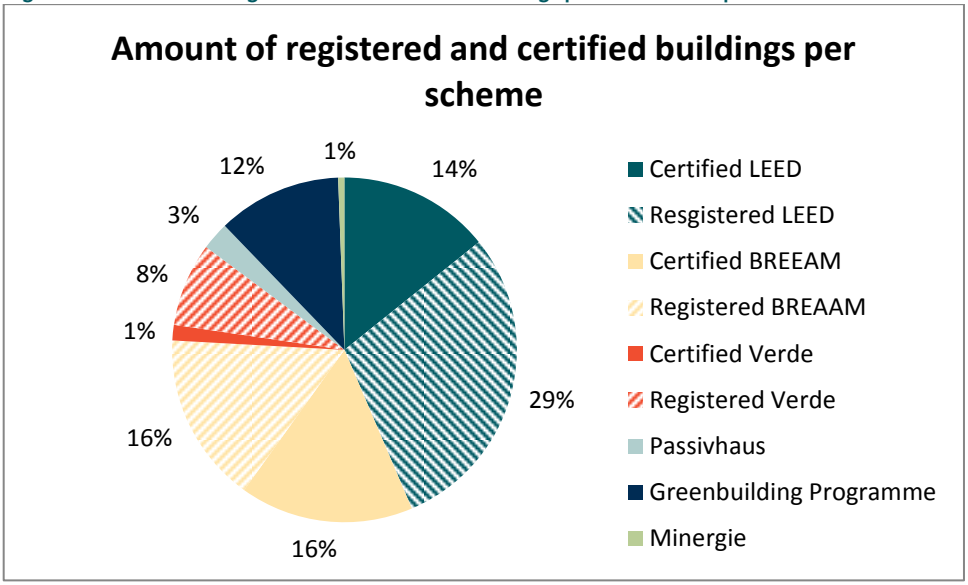
[129] WWF, 2010. Potencial de ahorro energético y de reducción de emisiones de CO2 del parque residencial existente en España en 2020. WWF/Adena, Madrid; Economics for Energy, 2011. Potencial económico de la reducción de la demanda de energía en España; and Fraunhofer and Partners, 2009. Study on the Energy Savings Potentials in EU
Member States, Candidate Countries and EEA Countries. Final Report for the European Commission Directorate-General Energy and Transport. EC Service Contract Number TREN/D1/239-2006/S07.66640.

[130] Spain (partly) transposed the EPBD through the Royal Decree 47/2007 which approved a basic procedure for the EE certification of new buildings (not considering existing buildings). A new Royal Decree 235/2013 approved a basic procedure for the EE certification of buildings (not considering existing buildings).

[131] Passivhaus is more oriented – but not limited- to new buildings.

LEED and BREEAM are leading the market: LEED has 150 and BREEAM has 111 certifications/registered buildings in Spain. Verde and the Greenbuilding Programme have a much smaller market share. Minergie and Passivhaus are almost negligible. Overall, the total amount of buildings registered and certified at the national level is quite low, amounting to less than 350 buildings.

Figure A-4 Number of registered and certified buildings per scheme in Spain



Regarding the development of the different schemes over time[132], we can see the following:

Table A-5 Development of certification over time in Spain

	2002	2005	2006	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Certified LEED[133]			1		1	9	8	11	19				**49**
Certified BREEAM[134]						3	6	8	16	8	8	7	**56**
Registered BREAAM						0	2	10	43	0	0	0	**55**
Certified Verde								4	1				**5**
Registered Verde	2	3		4		1	6	3	8				**27**

Italy

In Italy there are six voluntary schemes in use: CasaClima, ITACA, BREEAM, LEED, Passive House and Minergy. All of these voluntary schemes have a very low market share amongst certified non-residential buildings (below 25%). Two of the schemes, ITACA and CasaClima, have been developed in Italy.

ITACA started with accreditation (Italian Accreditation Body) in 1996, the implementation of the national system of accreditation and certification on a voluntary basis, in support of regional policies for the environmental sustainability of buildings. This agreement, approved by the Conference of Regions and Autonomous Provinces, has the objective of ensuring the independence, impartiality and

[132] Only available data

[133] http://www.usgbc.org/projects/

[134] http://www.breeam.es/certificar-proyectos/proyectos

competence of those who assess the conformity of the certification based on Protocol Itaca with the reference standards. Ownership consists of the Institute for Innovation and Transparency of Procurement and Environmental Compatibility - ITACA, an association between the regions and the autonomous provinces of Trento and Bolzano.

The CasaClima certification was the first in Italy to introduce an energy rating for buildings and it is mandatory in the Province of Bolzano, while outside the province it is voluntary. Since 2002 this initiative has aimed to save energy and create a cultural change in the way people think – making KlimaHaus synonymous with health and wellbeing. Buildings designed according to the KlimaHaus standards can save up to 90% of the energy compared to traditionally built residences - thereby resulting in CO_2 reductions and financial savings. The Casaclima-Klimahaus is a combination of the LEED certification system and the standard energy efficiency certification in Middle and Northern Europe.

Portugal and Malta

In Portugal there are three active voluntary schemes: LEED, BREEAM and the International Passive House Association. All of these schemes have a limited uptake. LEED is currently leading with a total of 11 certifications. BREEAM and the International Passive House Association only have two certifications each.

In Malta, voluntary certification schemes are not much used. This is indicated by the number of certified buildings Malta has. Malta currently has two voluntary schemes in use: LEED and BREEAM. LEED has a total of three certified buildings and LEED only one.

Greece and Cyprus

Greece has an active local green building council but lacks a domestic rating system. Stakeholders in Greece are currently utilising the US Green Building Council's LEED rating system. The domestic Green building council in Greece primarily focusses on education and outreach to architects, engineers and other stakeholders. At this time there appears to be very little activity on-going in Cyprus with no apparent registered or certified projects in any of the major international schemes.

4. Baltic states - Estonia, Latvia and Lithuania

Unlike in the Western and Nordic regions of Europe, voluntary certification schemes are little used in the Baltic states. This is shown by the very low number of certified buildings. In total, there are five officially certified buildings in both Estonia as Lithuania. In Latvia there are only two. However, efforts are being made to promote schemes. For example, Lithuania is considering establishing a voluntary national certification scheme for the local market. The aim is to set up a scheme which is cheap and simple in terms of registration, administration, assessment, etc. (in comparison with international schemes) which could effectively serve the private sector (both residential and non-residential). This is currently at a conceptual stage with the market need for such a scheme under exploration until Jan/Feb 2014. This indicates that market needs may not be satisfied in Lithuania, i.e. international certifications such as BREEAM are too costly and complex for local companies to obtain, but a local scheme with a reasonable price and less complex administration could be used by local businesses (e.g. mainstream office buildings) and would provide them with a unique opportunity to differentiate themselves from the rest of the market).

There are active discussions in the Baltics at the ministerial level on certification of buildings. One of the discussion points considered during the seminar on Sep 2013 was the following: how to define the common process of measurements and levels of quality of buildings (if it possible to harmonise). So it could be postulated that a need for some convergence regarding the mandatory EPC of buildings is emerging in the Baltics.

5. Central and Eastern Europe – Poland, Czech Republic, Slovakia, Bulgaria, Romania, Slovenia, and Hungary

Poland

In Poland, there are five voluntary schemes in use: LEED, BREEAM, DGNB, GreenBuilding and Passive Haus. However, all of these voluntary schemes have a very low market share amongst certified non-residential buildings (below 25%). One of the reasons might be the fact that these schemes entered the market only in 2010. The main certification schemes used is the mandatory EPBD scheme.

Regarding LEED, there are currently 6 certified buildings, and 31 buildings in the process of certification. The main customers are Property Developers, Real Estate Sales/ companies, Architecture and Engineering firms, Building owners & tenants. BREEAM currently has 15 certified buildings and its share is increasing. DGNB has just started in Poland (2012), and there is not yet a building certified via it. There are five buildings certified under the EU Green Building Programme. Its main clients are building owners, tenants and municipalities.

Czech Republic

The Czech Republic has a total of three voluntary schemes in place. Two of them, LEED and BREEAM, focus on the non-residential buildings market. With a total uptake of 24 buildings BREEAM has approximately two thirds of the certifications in the non-residential market. LEED fulfills the remaining third, with a total uptake of 9 buildings.

Next to these two international schemes the Czech Republic also has a national scheme in place: SBToolCZ. SBToolCZ mainly focuses on the residential market. Currently their uptake in the residential sector consists of 19 certified buildings. They also have two non-residential projects under assessment

Hungary

There are two widely used certification systems in Hungary: BREEAM and LEED. The total floor area of green buildings in Budapest, including certificates granted for new buildings as well as existing buildings, totaled 262,000 sq m at the end of 2012; 8.2% of the total modern Budapest office stock. Looking at the developments currently under construction or those set to launch shortly, by the end of 2014, with expected completion of four BREEAM certified buildings and two LEED - certified buildings, comprising a total 112,000 m^2 of new green office space in the city[135].
In addition to office buildings, green shopping centers have also started appearing around the country. The first green retail projects in Hungary were the Campona and Pólus Centre malls. Both secured the BREEAM In - Use “Good” certification, based on their environmentally friendly operations. The recently

135

http://www.colliers.com/~/media/files/emea/hungary/research/market%20reports/2012/2012h2/hungary_mid%20year%202012_sustainable_eng.pdf

opened Szeged Árkád shopping centre achieved the gold certification of Germany's DGNB, while the Hegyvidék Center, currently under construction in Budapest's 12th district, achieved a BREEAM "Very good" pre - certification.

Slovakia, Bulgaria, Romania and Slovenia

International and European schemes such as BREEAM and LEED have a very marginal presence and uptake if any. The reasons may vary between low awareness of the existence of the schemes at all, low knowledge of the schemes in the real estate market as a whole and therefore little point in being certified.

Annex B: Methodology for the Selection of Leading Schemes

Key Performance Indicators

There is a multitude of variables that could influence the market success of certification scheme. Thus, it is very important to define a group of variables which define the "market success" and can be used to distinguish a set of successful certification schemes from the rest for their in depth analysis at the next stage.

Number of countries having adopted or applied the scheme

Rationale: International acceptance of a scheme in the countries other than its origin is an important indicator of its economic success, flexibility, its simplicity of understanding and operation. It indicates that the scheme can be adapted to local conditions of a number of countries (both in terms of technical assessment (e.g. local bldg. materials, construction typologies etc.) and in terms of administrative environment (e.g. the operation of the scheme, quality assurance, education of assessors etc.)
Indicator: ranked according to number of countries mentioned in the data sheet during the data collection phase.

Trend of market share in last 5 years

Rationale: Market share is a key indicator of market competitiveness—that is, how well a scheme is doing against its competitors. An increase in market share in last 5 years shows that a scheme has at least kept its position in the market and preferred over others as a reliable, well known tool for building performance certification.
Indicator: ranked according to decreasing/constant/increasing market trend as mentioned in the datasheet during the data collection phase.

Diversity of customer profile

Rationale: It is important that a certification scheme is well valued by the majority of the members of the value chain in construction industry. The acceptance by a diverse set of professionals representing a number of sectors in the construction industry is an indicator how well the scheme is suited to the needs of various stakeholders, thus presents a chance of market success.
Indicator: ranked according to number of customer types as mentioned in the datasheet during the data collection phase.

Creating brands/market awareness.

Rationale: It is the extent to which the brand, the name of the certification scheme is recognized by the potential customers, in discussions in professional field, etc. It indicates how well the scheme is known and recognised within the field.
Indicator: ranked according to number of web search results for the name of the certification scheme.

Methodology for Performance Scoring

An interval scale is used for the ranking of the schemes. Interval scales take the notion of ranking items in order of one step further. Since the distance between adjacent points on the scale is equal the interval between each value on the scale is the same. For example the difference between 1 and 2 on an interval scale is the same as the difference between 2 and 3.

We note that ranking can play a valuable role in drawing attention to unusually good or poor performance, thus providing a mechanism for setting priorities for case studies or detailed investigation.

Indicator scoring

We have created a 3-point scale used as presented in Table B-1. The ranking is based on the following numerical indicators corresponding to level of achievement and market success as follows:

1= unsatisfactory: rarely demonstrates achievement; requires significant and immediate improvement
2= effective: consistently demonstrates achievement
3= highly effective: demonstrates significant achievement

In the cases where data is not available on a specific performance indicator the average score of all schemes for that particular performance indicator is assigned (e.g. market trend).

Table B-1: Performance indicator categories and respective scoring

Scores	Number of countries having adopted or applied the scheme	Trend of market share in last 5 years	Diversity of customer profile	Awareness
Unsatisfactory Score: 1	Number of countries other than origin is <5	Decreasing	Number of customer types is <3	Number of web search results is <500000
Effective Score: 2	Number of countries other than origin is 5-10	Constant	Number of customer types is 3-6	Number of web search results is 500000-1000000
Highly effective Score: 3	Number of countries other than origin is ≥10	increasing	Number of customer types is ≥6	Number of web search results is >1000000

Total impact score

The impact scale is calculated by multiplying the criterion scores of each performance indicator for each scheme in the datasheet. Consequently each scheme is ranked with a single impact score based on its achievement over the performance indicators. The impact score reflects the overall evaluation with a numerical indicator for each individual criterion. The impact score enables considering the strengths and weaknesses within each criterion. The maximum impact score that a scheme can get is 81 and the minimum impact score is 1.

Identification of Leading Voluntary Certification Schemes

Based on the methodology described above 22 schemes were ranked according to performance indicators based on the information collected in Task 1 of the project.

The individual scores and total impact scores are presented in Table B-2. The total impact scores indicate two cut points; a drop from 24 to 12 and another drop from 6 to 3. Therefore three distinct clusters of voluntary certification schemes are identified representing high, medium and low market impact.

The total impact score showed that six schemes provides a cluster of leading schemes which perform significantly better in scoring than the rest of the analysed schemes. Those are analysed in further detail through detailed Fiche and SWOT analysis.

Table B-2 Ranking of existing voluntary building certification schemes

Market Success Ranking	Certification Scheme	Country of Origin	Ranking: Number of countries having adopted or applied the scheme	Ranking: Trend of market share in last 5 years	Ranking: Diversity of customer profile	Ranking: Awareness	Total ranking score by multiplication
1st Cluster - High Market Success	LEED	United States of America	3	3	3	3	**81**
	BREEAM	United Kingdom	3	2	3	3	**54**
	DGNB	Germany	3	3	2	2	**36**
	Passive house certification	Germany	3	3	2	2	**36**
	Minergie	Italy (Switzerland)	2	3	2	3	**36**
	HQE	France	2	3	2	2	**24**
2nd Cluster - Medium Marker Success	ÖGNI	Austria	2	3	2	1	**12**
	DK-DGNB	Denmark	1	3	2	2	**12**
	CasaClima (KlimaHaus)	Italy	1	3	2	2	**12**
	Non Domestic Energy Perfromance Register	United Kingdom	1	3	2	2	**12**
	GreenBuilding	Finland	3	3	1	1	**9**
	Energy Star	United States of America	3	1	1	3	**9**
	TQB2010	Austria	1	3	2	1	**6**
	klima:aktiv Gebäudestandard (k:a haus)	Austria	1	3	2	1	**6**
	CasaClima Nature	Italy	1	3	2	1	**6**
	Miljöbyggnad	Sweden	1	3	2	1	**6**
3rd Cluster - Low Market Success	SBTool ICZ	Czech Republic	1	3	1	1	**3**
	VERDE	Spain	1	2	2	1	**4**
	FEBY12	Sweden	1	2	2	1	**4**
	ITACA Protocol	Italy	1	1	2	1	**2**
	GPR Gebouw	Netherlands	1	1	2	1	**2**
	GreenCalc+	Netherlands	1	1	1	1	**1**

Annex C: Leading Scheme Fiches

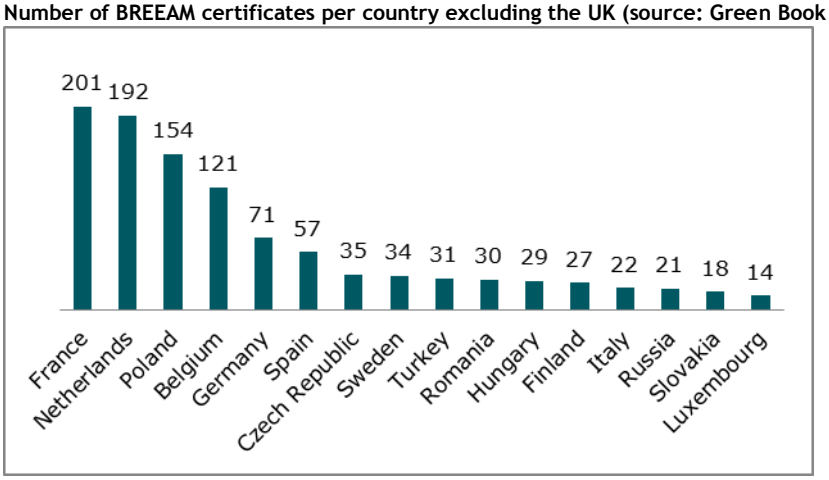
1. BREEAM

Introduction

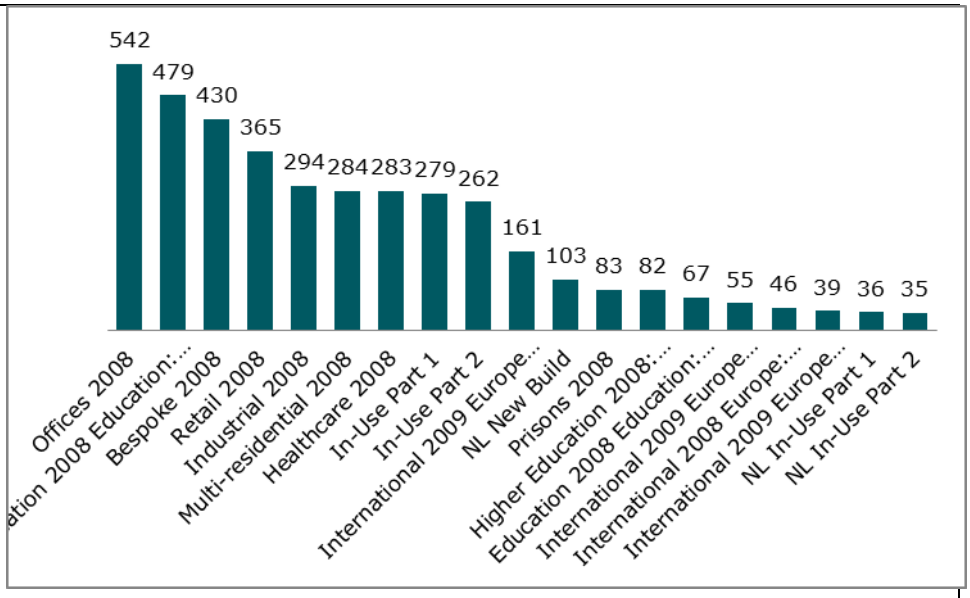
Scheme Name	Building Research Establishment Environmental Assessment Method (BREEAM)	
Scheme Owner	Building Research Establishment (BRE)	
Brief overview	**Country of origin**	UK
	Year of creation	1990
	Type of Labelling	Comparative
	Scope in terms of building type	Originally focussed on offices but has developed variants for other building types. – Education, Industrial, Bespoke. Retail, Commercial, Offices, Healthcare, Courts and Prisons, Community (regeneration focus) Mostly used for new buildings, but an 'in use' version exists.
	Scope in terms of assessment	Sustainability
	Performance rating	As designed (but in use version is 'in use')
	Customer profile	Mainly developers and owners.
	Performance assessment method	Modelled (in use version is measured).
	Rating scale and weighting system	Aspects (and weightings towards the overall score) are : Management 12%, Health & Wellbeing 15%, Energy 19%, Transport 8%, Water 6%, Materials 12.5%, Waste 7.5%, Land Use & Ecology 10%, Pollution 10% These weightings vary between the national versions – to reflect national resources and priorities, e.g.: water would be higher in dry climates. Each building gets a score on the following ranking: Pass ≥ 30, Good ≥ 45, Very Good ≥ 55, Excellent ≥ 70, Outstanding ≥ 85 BREEAM International schemes also use star rating system. 1 Star 30%, 2 Stars 45%, 3 Stars 55%, 4 Stars 70%, 5 Stars 85%
	Certification costs	Varies by size and type of building. The certification is carried out by consultants who are obliged to undergo BRE training (and pay an annual fee to remain 'qualified'). BRE charge a fee for each certification. The consultant charges the client for their own time,

		costs and profit margin on top of this fee. Estimated cost for a 20,000 m^2 office is €4,900. This does not include any costs for the time of the construction team in providing the information for the assessor. It also excludes any costs of modifying the design and building to achieve a target score.

Operation and management in market

Market size	From our analysis it appears that the most used certification scheme in Europe is BREEAM. BREEAM is used in a range of formats from country specific schemes, adapted for local conditions, to international schemes intended for the certification of individual projects anywhere in the world. Specific schemes are included in: the UK, Germany, the Netherlands, Norway, Spain, Sweden and Austria. The scheme overall uptake is increasing. For example, more than 5,000 buildings were registered for assessment in 2008 (of which 680 got certified) compared to1600 in 2007 (of which 362 were certified). The graph below shows the number of certifications in different countries. **Number of BREEAM certificates per country excluding the UK (source: Green Book Live[136])**  BREEAM dominates in the UK with over 3 000 certificates and is also present to a lesser extent (less than 10 certificates) in the following countries: Ireland, Bulgaria, Austria, Norway, Russia, Brazil, Switzerland, Denmark, Iceland, China, Greece, Lebanon, Lithuania, Portugal, Serbia, Argentina, Malta, Monaco and Slovenia. BREEAM has a number of different building use specific types, the split between these types is shown below: **Number of BREEAM certificates per scheme[137] (source: Green Book Live[138])**

[136] http://www.greenbooklive.com/

	
Monitoring and compliance mechanism	The developers typically request the construction team to appoint a BREEAM assessor. The BREEAM assessor has to be trained and accredited by BRE (or their agents) and is independent from the rest of the design and build team. BRE quality check a sample of the audits.
Marketing strategies and budget	BRE first developed the scheme for their own use on offices in the UK- at a time when they were only recently privatised. They began allowing other consultants to assess buildings and award certificates in the late nineties. They began expanding into other countries in the late nineties
Communication and distribution strategies	BRE provide training (at a cost) to individuals within consultancy firms to carry out assessments. BRE advertise and promote BREEAM themselves. Many consultancies also promote BREEAM assessments as a service they can offer.
Link to financial instruments	In the UK many local authorities specify a certain BREEAM score as a requirement for planning permission on new developments.
Administrative resources/ costs	n.a.
Means of market operation	BRE trained (and registered) consultants complete the calculation and assess the building. BRE (or their agent) awards the certificate, based on this assessment (scores are audited).
Management of the scheme	BREEAM is used in a range of formats from country specific schemes, adapted for local conditions, to international schemes intended for the certification of individual projects anywhere in the world. Specific schemes include: UK, DE, NL, NO, ES, SE, AT BRE Global is the National Scheme Operator (NSO) for the UK and broader International and European schemes (BREEAM), the Dutch GBC is the NSO for the Netherlands (BREEAM NL), the Instituto Tecnológico de Galicia is the NSO for Spain(BREEAM ES), the Norwegian GBC is the NSO for Norway (BREEAM NOR) and DIFNI is the NSO for Germany (BREEAM DE). The Swedish GBC is developing BREEAM SE for Sweden. BRE derive income from training and registering assessors as well as charging a fee for each

[137] Only main schemes shown (excluding those with less than 25 certificates).

[138] http://www.greenbooklive.com/

	certification.

Positioning in the market

Expected uptake/ developments	Growth in uptake of BREEAM has been steady. BRE still think it can grow, and have internal targets that reflect this. Uptake of BREEAM in use has been low to date, again they think and hope that this can grow. New construction BREEAM scheme may not grow as much. Maybe refurbishment and in use will grow more. New build is mature so they expect the growth to flatten off. The importance of new publically procured buildings on demand also suggests a flattening off (as public expenditure is expected to remain depressed). The refurbishment market has more growth potential, in the UK and internationally, this remains an area with large potential for energy savings (and is therefore likely to be a policy target) which should help growth.
View on the EU wide scheme	View depends on the scope. Danger of scheme fatigue, the mandatory national EPC is well known, also (in the UK) ESOS scheme and Green deal links. The end consumer is getting confused. A method underneath might be useful. Perception of some deficiencies in UK EPC method, as it doesn't recognise some situations - but this would be hard to standardise across EU - likely to get worse if averaged to cope with all MSs. Could be a barrier to take up in MSs with well-developed national EPC, though this is likely to be less of a concern in those MSs with less robust mandatory EPC methodologies. It might be hard to market a new scheme as being better than the national mandatory EPC - this may offend the MSs - though they could of course choose to adopt the new methodology as their own. If the new scheme is just energy they would not perceive it to be direct competition for BREEAM, because they feel that not many of the BREEAM users want an energy only scheme, if they do want this they don't use BREEAM. CSR is a big international corporate driver, so to comply with this they need to look wider than energy alone. It depends on the customer specific drivers. BRE also operate an energy use benchmarking facility – enables property owners/occupiers to compare the energy use of their buildings with other comparable sites. Somewhat sceptical of any unmet demand for a wider scope environmental assessment tool / method. If its scope was wider it could cause confusion in an already busy market place. There is a chance that if a new offer which was very low cost (but credible) could be developed there may be a market gap. There is also potential overlap with the DECC (UK) proposal for the ESOS (Energy supplier obligation part of the EED), there are proposals in this for building rating schemes, linked to financial incentives to improve building energy performance. The UK is currently going through the consultation process for this there have been concerns raised about the risk of new additional schemes entering an already crowded market. There are already compliance problems with the mandatory EPC, and if a new voluntary scheme (of a similar nature) was introduced

	there may well be very low take up.
View on integration of the EU wide scheme	They are interested in the CEN methodology and could foresee the possibility of this being used within the BREEAM methodology – if it didn't require the provision / collation of additional information. BREEAM works out the energy score based on performance above the national buildings standard requirement (typically using the same calculation method as the mandatory EPC), so the new methodology would need to offer some benefits above this. If its just a new calculation method they would not expect people to pay to use it - as its just an additional (voluntary) option to statutory (EPC) requirements. Although if it is offered for no cost there is a risk that it would be seen as having no value. If it does something useful - e.g. info to go into BREEAM, or if the rating is recognised (and rewarded) by finance companies – it could become a driver for take up (and justify a charge). If the new scheme covered 'in use' energy consumption it would be possible to include it into the BREEAM in use version, relatively easily. More of a need for a model. Proliferation of schemes, risks scheme fatigue, unlikely to be seen as a good idea by the market. BRE (and others) are always interested in the idea of a common EU approach. The model in BREEAM has had to do this to a certain extent to work in other MSs - but this (the difference to the national standard) - has not been popular with some national scheme operators (e.g. in Germany). Building into existing schemes will be better for a new voluntary scheme. BRE already look at the national (EPBD mandatory) schemes to assess comparability - there is a lack of comparability which makes conversion from one to the other not possible. They have experience of building the calculation to switch between national methodologies. From BRE's perspective a common framework (rather than an exact methodology) would be more useful - this would allow some flexibility in application between the MSs. The current lack of comparability is a problem and a barrier to cross EU activity. The idea of an underpinning methodology would be useful, but much less sure of the value of a new 'scheme'. The method could be used in other existing schemes, or set up a stand-alone new option (if the demand is there) BRE could and would operate the scheme for a fee (as would others – there are lots of potential operators).

SWOT Analysis

Strengths (internal, positive factors)	Weaknesses (internal, negative factors)
International recognition and acceptance among clientele Long term customer relationships Availability of large pool of experts for certification and ability to expand assessor base Marketing via assessors – helps reach, distribution, awareness. Local versions / presence Links to spatial planning guidance in the UK.	Cost Relative complexity – needs assessor Administrative process Difficulty of process, not clear to consumer Lack of energy benchmarking utility (in all but 'in use' version. Niche appeal – limited to building owners / occupiers most interested in obtaining a 'badge'. Limited links to legislative requirements (in most MSs)
Opportunities (external, positive factors)	**Threats (external, negative factors)**

A developing market, growing demand for certification A new international market Supporting government policies Future possibility that properties below a certain energy rating will not be legally lettable (as is going to happen in the UK from 2018) – focussing spotlight on need to improve the building stock.	Lower cost alternatives Market demand flattening for new build schemes. Developing energy benchmarking schemes could be more attractive to large property portfolio owners as they are cheaper to get and provide more practically useful information (e.g. NABERS scheme, US Energy star).

Synthesis

BREEAM has the highest EU take up for a voluntary environmental certification scheme for non-domestic buildings. It is mainly used for new buildings. The customers who choose it want the image and brand enhancement benefits as well as the energy and environmental savings. An 'in use' version is available but is not much used.

It is the oldest scheme and has been steadily developed over 20 years, from its origins in the UK to cover virtually the entire EU, through a combination of MS specific versions and a generic 'international' version. Uptake is highest in the UK, with relatively low take up in other countries. Though in most countries where there is any take of voluntary building certification schemes it has a healthy share of this demand. The expansion has been helped by the model of allowing assessors to offer the certification as a commercial service. The first mover position of the scheme (and credibility of its source) is also very helpful.

In comparison to the number of buildings that could use BREEAM, (particularly existing buildings) take up is a very small fraction of potential. This is a good indication that the majority of building owners will only do what they are legally obliged to do and are not willing to pay for additional, voluntary certification schemes.

If the EC developed a scheme with a wider scope than just energy this would be seen as a potential competitor to BREEAM, particularly if it was low / no cost. However, BRE feel that this would risk causing market confusion and 'scheme fatigue'. It would be possible to use a standardised calculation of expected energy consumption of buildings (such as CEN are developing) within the BREEAM methodology; this would be much easier if it required no additional data collection in comparison to the existing (SBM) approach. If the approach included 'in use' energy benchmarks these could be included within the BREEAM 'in use' version.

2. LEED

Introduction

Scheme Name	Leadership in Energy and Environmental Design (LEED)	
Scheme Owner	US Green Building Council (1993)	
Brief overview	**Country of origin**	United States of America
	Year of creation	1998
	Type of Labelling	Comparative Label
	Scope in terms of building type	All building types: New and existing buildings, major renovations,

		Public and private buildings
	Scope in terms of assessment	Sustainability Rating **Assessment categories** • Sustainable Sites • Water Efficiency • Energy and Atmosphere • Material and Resources • Indoor Environmental Quality • Innovation & Design – additional points • Regional Credits – additional points
	Performance rating	Offers third party validation of a project's green features and verifies that the building is operating exactly the way it was designed to. LEED-NC, -CS, -CI: Assessment of the relevant criteria after the design phase and the commissioning; certificate on completion pre-certificate is possible in the case of LEED-CS
	Customer profile	developers/building owners/building users/real estate agents/architecture and engineering firms
	Performance assessment method	Modelled. This energy model must follow the modelling methodologies outlined in Appendix G of the ASHRAE 90.1 building energy standard.
	Rating scale and weighting system	predefined minimum criteria (prerequisites) in all categories no weighting; set number of points for criteria **Rating Scale:** certified (≥ 40 points) silver (≥ 50 points) gold (≥ 60 points) platinum (≥ 80 points)
	Certification costs	Certification fee: 3 000 – 25 000 EUR Project coordination and assessment: 75 000 – 100 000 EUR + 20 000 EUR (calculations)[139]

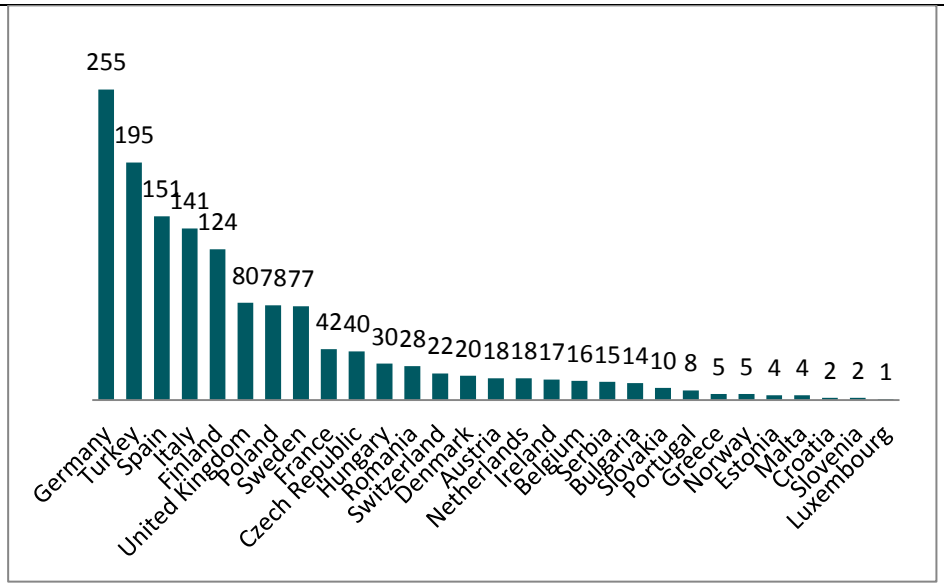
Operation and management in market

Market size	LEED is applied widely in US and over 30 countries. There are over 7 000 certified projects, over 140 km2 of building area. Total number of certified projects in EU : 324, Market share within the projects in EU: 3.4%[140] The use of LEED in Europe is shown below. This is, however, only a selection of those certifications in European countries. LEED is present in many different countries around the world amounting to over 45 000 certifications/registrations in over 100 countries. **Number of LEED certificates per country in Europe (source: US GBC[141])**

[139] http://omvarldsbevakning.byggtjanst.se/Artiklar/2013/september/Tips-i-miljoklassningsdjungeln/ for Miljobyggnad

[140] RICS, "Going for Green, Sustainable Building Certification Statistics Europe", September 2013

[141] http://www.usgbc.org/

	
Monitoring and compliance mechanism	Certification performed by Green Building Certification Institute (GBCI) registered and independent "LEED Accredited Professional"(LEED AP) can support the implementation of the requirements in a project, however, their appointment is not mandatory examination: formal training is not required. The application review and certification process is handled on LEED Online, USGBC's web-based service that employs a series of active PDF forms to allow project teams to fill out credit forms and upload supporting documentation online. The GBCI also utilizes LEED Online to conduct their reviews
Marketing strategies and budget	Spends approx. 19% of its total expenditures for Conference ($9,513,580 in 2012) and 3% for Education services ($3,040,979 in 2012)[142].
Communication and distribution strategies	Each year, USGBC's organizes and hosts the world's largest conference and expo dedicated to green building- Greenbuild International Conference & Expo. Tens of thousands of professionals from all over the world attend USGBC's event and participate in workshops and seminars. LEED certifies buildings receive a listing in the online LEED project directory, searched by thousands of people every week, and marketing support from USGBC's in-house experts to maximize their achievements.
Link to financial instruments	Many federal, state, and local governments and school districts have adopted various types of LEED initiatives and incentives. A full listing of government and school LEED initiatives can be found online and is updated regularly.[143]
Administrative resources/ costs	As of 2012 there are 196,537 LEED professional credential holders. USGBC invests over $30 million a year to maintain, operate and improve LEED and its customer delivery.[144]
Means of market operation	LEED certification is granted by the Green Building Certification Institute (GBCI), which handles the third-party verification of a project's compliance with the LEED requirements. USGBC's Green Building Certification Institute (GBCI) offers various accreditations to people who demonstrate knowledge of the LEED rating system, including LEED Accredited Professional (LEED AP), LEED Green Associate,[10] and since 2011, LEED Fellows, the highest designation for LEED

[142] http://www.usgbc.org/sites/default/files/USGBC_AR_2012.pdf

[143] http://vinylroofs.org/resources/tax-deductions/index.html

[144] http://www.usgbc.org/leed/why-leed

	professionals. GBCI also certifies projects pursuing LEED.
Management of the scheme	LEED certification scheme is managed by USGBC. They primarily make their revenue from the certification as well as conferences and trainings.

Positioning in the market

Expected uptake/ developments	A continuous increase in market share is expected.
View on the EU wide scheme	NA – no interviews has been done with a LEED operator.
View on integration of the EU wide scheme	NA – no interviews has been done with a LEED operator.

SWOT Analysis

Strengths (internal, positive factors)	**Weaknesses (internal, negative factors)**
• International recognition and acceptance among clients, academic and professionals. • Availability of large pool of experts for certification and ability to expand assessor base • Marketing - reach, distribution, awareness • Ease of process and use-ranked as medium • High profile / well known • Link to financial incentives • Medium complexity of the assessment method	• It is not yet climate-specific, although the newest version hopes to address this weakness partially • Project teams have to go the extra mile to adjust local norms to applicable US standard • High and increasing costs for certification
Opportunities (external, positive factors)	**Threats (external, negative factors)**
• A developing market, growing demand for certification • Supporting government policies • Increasing recognition of certification's market value in addition to environmental benefits attracts real estate market	• Designers may make materials or design choices that gain a LEED point, even though they may not be the most site- or climate-appropriate choice available. In long term this can influence the acceptance of certification as an element pulling construction market to green buildings.

Synthesis

- Leadership in Energy and Environmental Design (LEED) certification is currently one of the most recognized green building certification programs, both nationally and internationally.
- It is used for new and existing buildings covering a wide range of building types from residential to non-residential.
- LEED certification covers five primary categories covering the sustainability of a building. These categories include sustainable sites, water efficiency, energy and atmosphere, materials and resource credits, and indoor environmental quality.

- LEED project managers submit documentation for verification for each LEED credit they pursue after the design phase and again during the construction phase. Credits are reviewed individually by the USGBC.
- The competitive strength of LEED certification scheme is its high perceived reliability and strong international recognition. This is maintained by long years of market presence and conference and information dissemination campaigns carried by USGBC.
- From a builder's perspective, there are two clear benefits to green building: financial gains due to increased building performance and financial

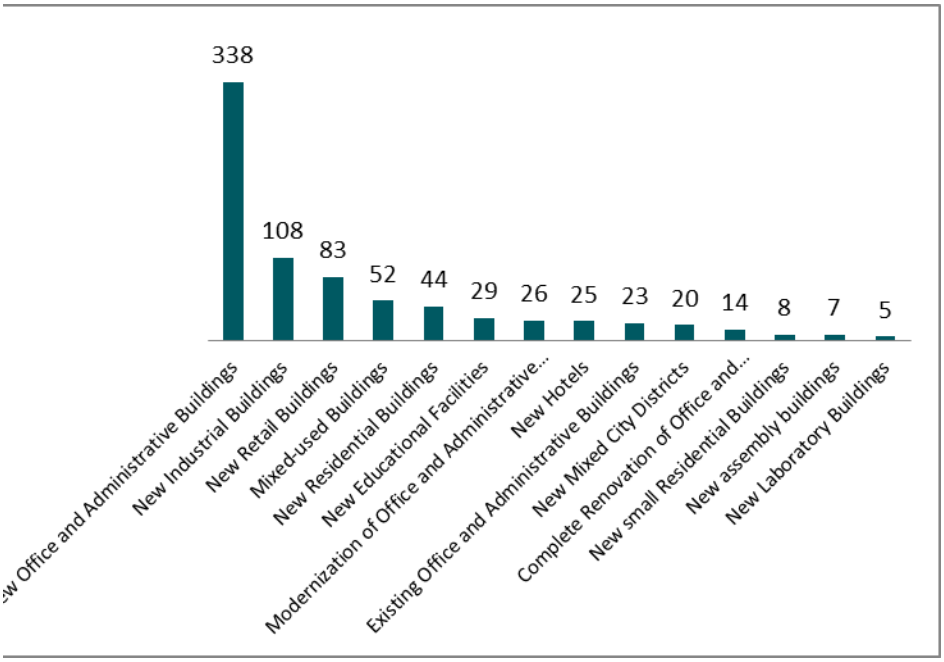
3. DGNB

Introduction

Scheme Name	DGNB certificate	
Scheme Owner	Deutsche Gesellschaft für Nachhaltiges Bauen - German Sustainable Building Council) (DGNB)	
Brief overview	**Country of origin**	Germany
	Year of creation	2007
	Type of Labelling	Comparative label
	Scope in terms of building type	All building types: New and existing buildings, major renovations, Public and private buildings
	Scope in terms of assessment	Whole Environmental Impact **Assessment categories:** • ecological quality • economic quality • socio-cultural and functional quality • technical quality • process quality • site quality
	Performance rating	• design phase: pre-certificate • commissioning: certificate (following completion)
	Customer profile	developers/building owners/architecture and engineering firms/municipalities
	Performance assessment method	Modelled and measured Works from a baseline of national mandatory minimum energy performance and award points for performance above this
	Rating scale and weighting system	weighting of the individual categories, furthermore use of significance factors for criteria **Rating levels:** bronze (≥ 50 %) silver (≥ 65 %) gold (≥ 80 %) **Weighting system:** ecology (22.5%) sociocultural and functional aspect (22.5%) economy (22.5%) technology (22,5 %) processes and site (10%)

	Certification costs	Certification fee: 5 000-15 000 EUR Project coordination/assessment: 50 000-60 000 EUR Extra over costs of making a building green – depends on the grade attained: Low – up to 4% of additional construction cost, < 0.5% planning costs in Germany[145]

Operation and management in market

Market size	Total number of certified projects in EU : 421, Market share within the projects compared to other schemes in EU: 4.4%[146] The DGNB system has over 600 buildings certified in Germany, 50 in Austria, 12 in Luxemburg and 10 in Denmark (plus an additional of 22 certifications in 13 other countries). **Number of DGNB certificates per usage profile[147] (source: DGNB[148])** 
Monitoring and compliance mechanism	Auditors are registered and independent DGNB Auditor training and examination
Marketing strategies and budget	n.a.
Communication and distribution strategies	Except managing the development of DGNB Certification System , DGNB provides knowledge transfer actively with professional audience through DGNB Academy, DGNB Navigator and other public events.

[145] Interview with DGNB

[146] RICS, "Going for Green, Sustainable Building Certification Statistics Europe", September 2013

[147] Excluding those with less than 5 certifications

[148] http://www.dgnb-system.de/en/projects/index.php

Link to financial instruments	n.a.
Administrative resources/ costs	DGNB is a non-profit non-governmental organization with approximately 500 volunteers in DGNB working groups and committees.
Means of market operation	n.a.
Management of the scheme	DGNB is a non-profit non-governmental organization

Positioning in the market

Expected uptake/ developments	DGNB is moving into the existing buildings market. They expect a market increase for voluntary certification schemes based on historical (increasing) trend and observed demand for labels with quality and transparency.
View on the EU wide scheme	They see an EU voluntary certification scheme as a potential competitor in the market. They do not expect a high update for EU voluntary certification scheme.
View on integration of the EU wide scheme	They don't see any added value for EU voluntary scheme. The EU wide energy scheme can/ should be incorporated into the existing national mandatory schemes.

This section is based on the interview with DGNB.

SWOT Analysis

Strengths (internal, positive factors)	**Weaknesses (internal, negative factors)**
• International recognition and acceptance among client • Focus on life cycle performance and project quality • Accepts local adaptation; Flexible system design allows adaptation to country-specific requirements • Results can be compared across international borders • Pre-certification supports risk management • Insures transparency and clear processes • Defines specific performance objectives • Promotes integrated planning and early establishment of communication • High perceived quality and reliability • Initially developed based on German (DIN) norms, was recently updated to be based on European (EN) norms	• DGNB International experts have to go the extra mile to elaborate local DGNB adaptations
Opportunities (external, positive factors)	**Threats (external, negative factors)**

• Follows the provisions in the upcoming European standards EN 15804 and EN 15978 as close as possible and they are therefore well suited to describe the material and building impacts during building lifetime	• Competitors in home market

Synthesis

- DGNB provides a full sustainability assessment scheme available for a wide range of buildings covering new, existing buildings, both publicly or privately owned. Its Whole Environmental Impact includes socio-cultural and economical aspects.
- Since 2007 DGNB presents an increasing market share. This trend is expected to continue due to increasing interest in building certification and awareness.
- The scheme has a competitive advantage as it is based on well trusted DIN and EN norms. Its scope with socio-economic aspects and furthermore assessments provided on micro-climate in urban districts provides a differentiated coverage among other certification schemes.

4. Passivhaus

Introduction

Scheme Name	Passivhaus certification	
Scheme Owner	Passivhaus Institute	
Brief overview	Country of origin	Germany
	Year of creation	1996
	Type of Labelling	Endorsement Label
	Scope in terms of building type	a) Certification scheme ”certified passive house”: New buildings (residential and non-residential, public and private) b) Certification scheme « EnerPhit” and “EnerPhit^{+i}” (retrofit): existing buildings (residential and non-residential, public and private) c) Certification fur separate building elements (roof, facade, etc.) “Certified components”
	Scope in terms of assessment	Energy only. For certification following four criteria are considered: - heating demand - Cooling incl. dehumidify - primary energy demand for heating, cooling, domestic hot water, auxiliray current, domestic electricity - airtightness
	Performance rating	As designed

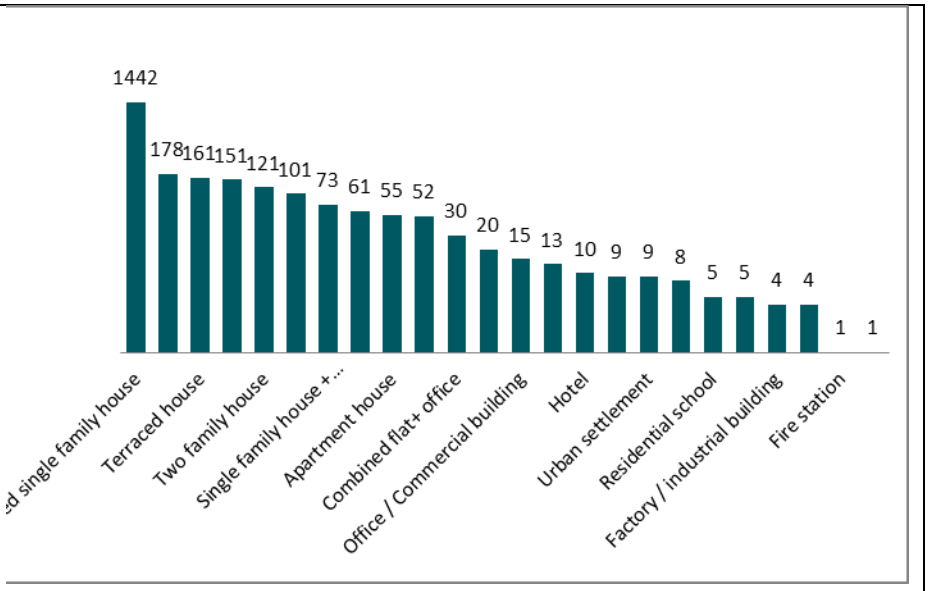
	Customer profile	Developers, building owners, architecture and engineering firms, municipalities.
	Performance assessment method	Modelled
	Rating scale and weighting system	N.A.
	Certification costs	- no fixed prices - depends on the project/object

Operation and management in market

Market size	- non-residential buildings EU: 4200 Units - residential EU: 4700 Units - Total certified objects: 1400 (around 95% in EU) (end of 2013) Around 1 Mio. square meter floor space were certified until 2014. Around 45% are non-residential buildings (estimated). Additionally several buildings/objects were planned and built in passive house standard, which were not certified. *units = projects, i.e one object could also be several terraced houses To date Passivhaus buildings have been designed and built in every European country, Australia, China, Japan, Canada the USA and South America...a research station has been constructed to the Passivhaus standard in Antarctica! Overall there are 2529 Pasivhaus buildings, of which over 1 800 are located in Germany and over 350 in Austria. There are over 50 buildings in France, 30 in the UK, 30 in the USA, 26 in Italy and 148 split over 27 additional countries (mostly European, but also including Canada, Japan, Korea, Chile, China and New Zealand). **Number of Passive Houses per building type (source: Passive House Database[149])[150]**

[149] http://www.passivhausprojekte.de/index.php?lang=en" \l "s_ddc5660b75829853768860cd34c10274

[150] In logarithmic scale

	
Monitoring and compliance mechanism	Certified planners and consultants are able to support the planning process. However, the appointment of a certified planner or consultant is not mandatory for the planning process. Either accredited certifiers are allowed to certify the planned objects which are finally authorized by the PHI or the PHI by themselves check the planning documents and finally certify the object. Additionally PHI certifies building components, i.e. the component meets all requirement of the passive house standard.
Marketing strategies and budget	n.a.
Communication and distribution strategies	- conferences and workshops a) Internationale Passivhaustagungen around 1000 professionals, b)Tage des Passivhauses around 600 professionals c) others - establishes networks organised by Passivhaus Institut a) IG Passivhaus (Network and panel to exchange information relating to passive house) around 2000 professional
Link to financial instruments	Germany: - On national level passive houses are funded for either energy efficient constructions or energy efficient retrofits e.g. by KfW (Kreditanstalt für Wiederaufbau) - there are also various funding schemes on regional level in Germany (municipalities), e.g by grant program “proKlima” Other EU member states: - there are several other funding programmes in member states
Administrative resources/ costs	- ca. 50 persons are working at the Passivhaus Institut - Around 10 persons are working for the certification unit - costs not available
Means of market operation	Pls. see “Monitoring and compliance mechanism”
Management of the scheme	The certification scheme is managed by PHI. They primarily make their revenue from the certification as well as conferences and trainings.

Positioning in the market

Expected uptake/ developments	- A continuous increase in market share is expected. - the passive house certification will be adapted frequently (e.g. new certification categories were introduced to consider new topics like energy production, NZEB
View on the EU wide scheme	There is no need for a new (stand-alone) voluntary certification system on EU level, because there are already sufficient certification systems which are internationally accepted. A new certification system released by the EU will be a competitor for the existing certification system.
View on integration of the EU wide scheme	If it is possible to integrate the certification system into the existing one it could be an option. There could be an added value if the new system will be standardized and comparable EU-wide, although it has to be adapted to the local situation

SWOT Analysis

Strengths (internal, positive factors)	Weaknesses (internal, negative factors)
• International recognition and acceptance among clients, academic and professionals (especially in the EU) • Availability of large pool of experts for certification and ability to expand assessor base • Marketing - reach, distribution, awareness • High profile / well known in the EU • Link to financial incentives • High standard for quality assurance • Specific focus on the energy topic and therefore has set up a high standard# • PHPP as calculation tool shows not only if passed or failed. The tool shows different specific values to optimise (energy advisory)	• Administrative process • Only focused on the energy topic (but local climate conditions are considered) • Only certificated on base of the planning documents
Opportunities (external, positive factors)	**Threats (external, negative factors)**
• A developing market, growing demand for certification • A new international market • Supporting government policies • Industry or consumer trends • Technology development and innovation • Increasing recognition of certification's market value in addition to environmental benefits attracts real estate market	• Competitors in home market • Legislative/ regulation effects • New technologies, services, ideas. • Developing energy benchmarking schemes could be more attractive to large property portfolio owners as they are cheaper to get and provide more practically useful information (e.g. NABERS scheme, US Energy star) • Demand for a broader certification scheme which covers more topics than energy

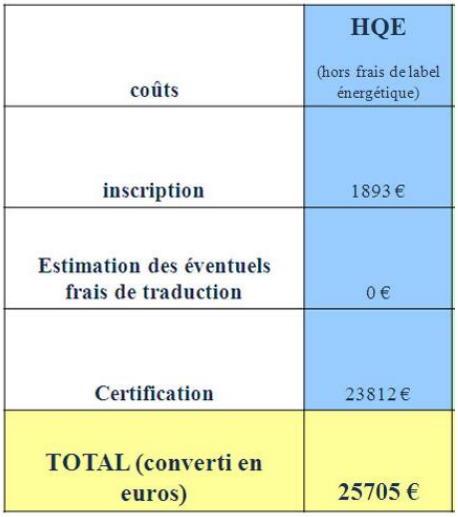
Synthesis

- The certification system of the Passivhaus Institut is currently recognized by building owner, planners especially on EU level
- The certification system focuses only on the energy topic, but is accepted by academics, professionals, planners, etc.
- Different certification criteria/systems for new buildings ("certified passive house"), renovated buildings ("EnerPhit") , building component and certified materials ("Certified components")
- The certifications system can be used for existing and new buildings covering non-residential and residential buildings
- Energy advisory is included by using the calculation tool (PHPP); that means a certified passive house planner can support the planning process, but is not needed.
- The administrative process of the certification is high

5. HQE

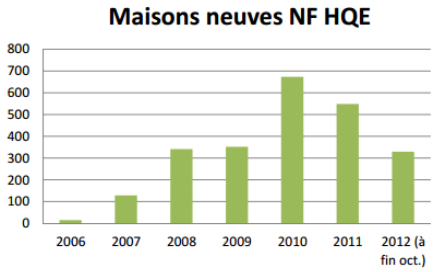
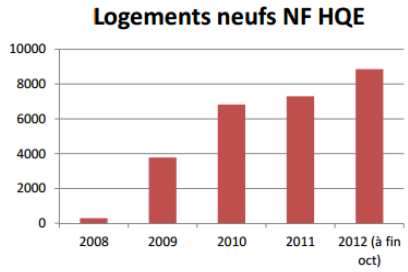
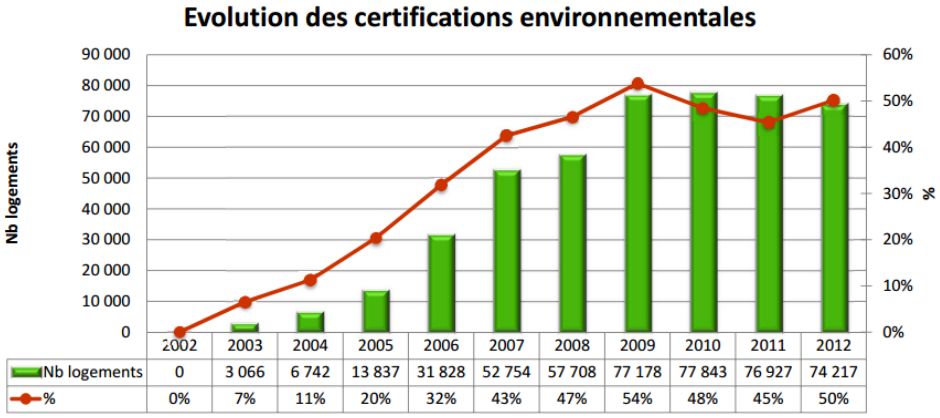
Introduction

Scheme Name	HQE (Haute Qualité Environnementale)	
Scheme Owner	Association pour la Haute Qualité Environnementale (ASSOHQE).	
Brief overview	**Country of origin**	France
	Year of creation	1996
	Type of Labelling	Comparative (It started as a pass/fail, but clients demanded a rating)
	Scope in terms of building type	Residential and non-residential New and existing buildings Public and private buildings Building types: Offices, schools, health, commercial, hospitality, logistics.
	Scope in terms of assessment	Sustainability
	Performance rating	Design phase: pre-certificate for programmation and conception; Commissioning: certificate (following completion)
	Customer profile	Architects and engineers Property developers and investors Property users Institutions and local authorities
	Performance assessment method	Measured and estimated.
	Rating scale and weighting system	No weighting system. 14 pillars/requirements spread over 4 themes. Weighting done by theme, energy counts as a theme itself (energy, environment, comfort, health). All 4 themes are equally important, hence you cannot counterbalance bad performance in one theme by a high performance in another. For the energy theme, the performance of the building is compared to existing energy regulation and energy-labelling programmes. The approach awards one star for each of the following levels

		being attained: • HPE (Haute Performance Energétique (High Energy Performance)) with an energy consumption at least 10% lower than the conventional reference consumption as required in the French building regulation (Regulation Thermique, 2005) • THPE (Tres Haute Performance Energétique (Very High Energy Performance)) with an energy consumption at least 20% lower than the conventional reference consumption as required in the French building regulation (Regulation Thermique, 2005) • BBC (Batiment Basse Consumption (Low Energy Building)) with an energy consumption not exceeding in the baseline scenario 50 kWh primary energy per m2 and year. • BEPOS (also called an Energy Plus building, producing more energy than it consumes).
	Certification costs	Certification fee: approximately 12 000 - 25 000 EUR depending on the type of non-residential building. Certification fee includes the registration fee and the assessment cost by their auditor. The cost for the assessor/ project coordination is not mandatory under HQE non-residential since the auditor price is included in the certification fee. Estimation of costs of certification aspects for an office building of 20 000m2:  Source: Bureau Veritas in http://www.lemoniteur.fr/201-management/article/actualite/871078-breeam-leed-et-hqe-a-la-conquete-du-monde (2012)

coûts	HQE (hors frais de label énergétique)
inscription	1893 €
Estimation des éventuels frais de traduction	0 €
Certification	23812 €
TOTAL (converti en euros)	25705 €

Operation and management in market

Market size	HQE groups over 245 000 residential and non-residential buildings and over 36 million m² in 8 countries worldwide[151] to date. While in France, it has around 1100 non-residential buildings (amounting to 16 million m²) and 226 000 dwellings + 3 000 detached houses (amounting to 20 million m²). The mandatory EPC system has over 5 million certified buildings in France. The following diagrams provide an indication of the level of activity in the residential use of the HQE certification.   The following graph provides an indication of the extent of all brands of environmental certification in France (HQE, Patrimoine Habitat & Environment, Habitat & Environment).  |	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
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Nb logements	0	3 066	6 742	13 837	31 828	52 754	57 708	77 178	77 843	76 927	74 217
%	0%	7%	11%	20%	32%	43%	47%	54%	48%	45%	50%	 Below its international coverage:

[151] France, Belgique, Luxembourg, Italie, Allemagne, Algérie, Maroc et Brésil via la marque AQUA.

	
Monitoring and compliance mechanism	A project's performance is checked through "full third-party" audits conducted by an independent auditor who is appointed and paid by the scheme operator (e.g. cerway – international certifications).  The auditor remains neutral and objective and may not, under any circumstances, advise or train the certification applicant. Such complete transparency guarantees independence and impartiality for the applicant. The project audit takes place in the presence of the project's stakeholders and is usually held on site. The auditor checks: • Compliance with the certification scheme's requirements and evidence of the fulfilment of environmental performance targets by the project owner; • Compliance with project management requirements. This approach comprises an interpersonal and educational dimension: it allows each of the project's stakeholders to actively participate in the certification process and brings together all of the stakeholders around the project.
Marketing strategies and budget	The majority of certified buildings is residential and has a public nature, i.e. the scheme started off as mandatory for social housing, it became voluntary only since 2005. Today, 90% of social housing is certified (public authorities operate these houses and are thus interested in quality and low operating costs and in addition they get financial support) and 40% of residential private developers stock is certified (due to financial or environmental interest). Individual owners are only a few that certify their buildings. Energy regulation is a good push for this certification as industry wants to know where it is going.
Communication and distribution strategies	Website – oriented towards the French market + a good international website New visual identity with two logo types representing the brand 'HQE'. Brochures promoting HQE. Communication strategy on HQE performance and its benefits. Link to public bodies, national certification bodies and French energy regulation.

	Membership – including French GBC, part of WGBC Promoting its comprehensive approach (multi-criteria), technical expertise, high environmental performance (including comfort and health impacts), adaptability to other countries, cultures and climate zones, transparency (full third-party audit). Use of 'Sustainable Building Passport' to communicate clearly the performance of a building. Promotion through references and partners.
Link to financial instruments	There are several links to financial instruments at national and regional level (e.g. www.ademe.fr/aquitaine) including e.g. tax exemptions and subsidies linked to HQE certificates. For details see: • http://www.constructionsdurablesaquitaine.com/general/aides.asp • http://enetech.fr/ademe-subventions/ademe-subventions.html
Administrative resources/ costs	n.a.
Means of market operation	The French certification High Environmental Quality Standard (HQE) is represented in France by the Association pour la Haute Qualité Environnementale (ASSOHQE) which is a recognized public service organization. Responsibility for assessment and certification under this standard is distributed between different organisations. The following three certification bodies are responsible for environmental building certification in France under HQE: • Certivea - NF Tertiary Buildings – HQE (www.certivea.com) • Cequami - NF Detached House – HQE (www.cequami.fr) • Cerqual - NF Housing - HQE (www.cerqual.fr) The latter two (Cequami and cerqual, together with Cequabat – a housing certification body) are all part of/affiliated with/members of Qualitel, an independent association promoting quality of habitat since 1974.
Management of the scheme	The standard is controlled by the Paris based Association pour la Haute Qualité Environnementale (ASSOHQE). Its active members include organizations from different categories: users, industry, contracting authorities, project management, expertise, advice & support.

Positioning in the market

Expected uptake/ developments	The trend shows increasing share of certified residential buildings (but numbers go down as the total construction of dwellings has gone down). As for non-residential, 90% of Paris is certified, while only around 15-20% in the rest of the country. The trend will be increasing if certification becomes mainstream, as in Paris, and the way to stand out will be via high level of performance (excellent). The demand will increase if the extra over costs of making a building green will go down even further.
View on the EU wide scheme	There is a market if it makes possible to compare the energy label across countries, i.e. A, B, C, D rating means the same. It needs to add value, to create a distinction with other schemes, to be able to compare assets in terms of assessments. They would not expect a high uptake if it is only energy unless it allows for comparability across countries. The EU wide energy scheme can/ should be incorporated into one of the existing international voluntary schemes; this would lead to a higher uptake. They would see a standalone common EU voluntary certification scheme as a competitor for HQE.

View on integration of the EU wide scheme	They do not feel the scheme would be of benefit to them if it's only focusing on energy. They mentioned only a financial incentive looking at energy would create added value. It would have to be integrated within the scheme or comparable to have an added value.

SWOT Analysis

Strengths (internal, positive factors)	Weaknesses (internal, negative factors)
• High acceptance and credibility (in France) • Link to financial and other government incentives • Linked to public authorities and bodies • Multi-criteria: more sustainable approach (more credibility), helps their assets to have their proof of level of performance allowing to fight loss of value of not being green • Certification goes beyond regulation: , if they apply now - anticipation of future regulation, then easier to conform in future • Easy to understand & compare assets (system of stars, global rating) • Recognition of engagement	• It is criticized for its lack of readability and its commercial and industrial aims.[152] • Weak international image. • Low uptake in the non-residential sector (compared to residential) • Very heavy verification system. • Perceived as costly
Opportunities (external, positive factors)	**Threats (external, negative factors)**
• A developing market, growing demand for certification • Updating of coverage + requirements to keep its recognition value as otherwise all would certify and it loses its 'value added' • Distinguish itself from other schemes • Supporting government policies[153] (To be certified, a project must meet the basic requirements, such as compliance with local regulations, if any exist (accessibility, seismic standards, etc.)) • Global 'sustainability' trend in the sector: Certification is an environmental regular practice, clients looking for recognition of engagement	• Competitors in the international market

Synthesis

The "Commercial Buildings - HQE (High Environmental Quality) method was launched in 2005 in France (while the HQE concept was developed since mid 90s). It is a standard for green buildings in **France**. The HQE aims to improve the environmental quality of new and existing, residential and commercial

[152] http://rmitallchange.weebly.com/the-hqereg-high-environmental-quality-certification-the-french-green-certification.html

[153] All lease agreements must include an energy performance diagnosis (DPE). Environmental laws known as "Grenelle Laws I and II" have laid down general principles of energy efficiency and sustainability standards, etc, however such laws only provide for principal guidelines that will only be binding after the related decree is enacted. For instance, under the Grenelle II law, all buildings must have their energy consumption reduced by more than 38% before 2020. A decree is to be enacted containing specific obligations in order to meet these objectives (DLA PIPER, 2014)

buildings, that is to say, to offer safe and comfortable structures whose impact on the environment, evaluated over the entire life cycle, are the most mastered possible. This is a multicriteria optimization approach that is based on a fundamental, a building must meet before any use and ensure adequate living environment for its users. The HQE three inseparable components:

- An environmental management system operation (EMS) where the client sets its objectives for the operation and clarifies the role of different actors.
- 14 targets to structure the answer technical, architectural and economic objectives of the client.
- Performance indicators

Success factors:

- Link to financial incentives, national regulation requirements and national acceptance are strong success drivers
- It needs to be a niche market and you need to update requirements and scope of the scheme constantly to avoid everyone getting a certification → key will be to get high performance to distinguish itself
- Uptake is expected to rise as certification becomes more standardised

Scope and positioning of an EU common scheme:

- Go beyond regulation
- Wider sustainable criteria or energy component comparable across countries
- Credibility important
- Link to financial incentives
- Uptake only if not competing with current schemes – integrated better
- Simple – start with a few indicators that are easy to understand
- Create a roadmap with ambitions to see where it is going → interesting for the industry
- Should measure both, as designed and as achieved energy consumption
- Rating with energy classes to differentiate between performance levels
- If energy only, it doesn't have a value added to the existing mandatory scheme under the EPBD
- it should be operated by entities that are already operating similar schemes, e.g. in FR only accredited bodies can deliver energy labels, they have the strucutre and functioning procedures in place to deliver quality and credible service, if integrated into other schemes, then it would decrease the costs, also if online features to register, etc. would decrease the costs, verification process could be with 1-2 controls to verify performance
- should cover both, existing and new buildings scheme should be integrated into the existing scheme. If a country does not have a national scheme, then a national body or a tool could use this and they do not have to use other international scheme. Calculation procedure could come alone through national bodies.

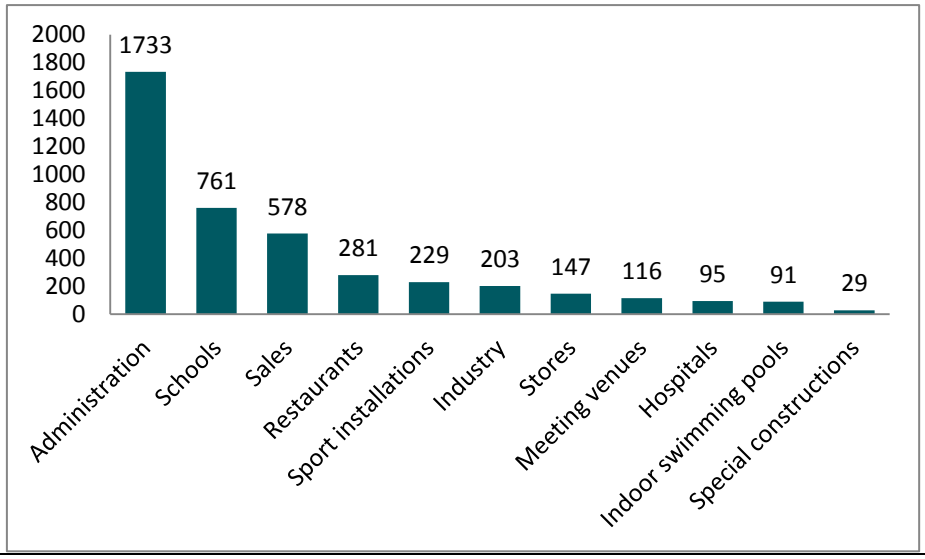
6. Minergie

Introduction

Scheme Name	Minergie	
Scheme Owner	AMI (the MINERGIE Association)	
Brief overview	**Country of origin**	Switzerland
	Year of creation	In 1994 used for 2 buildings, the label is registered later in 1998.
	Type of Labelling	Endorsement Label
	Scope in terms of building type	New and refurbished buildings including residential and non-residential and private and public buildings. Apart from buildings, products and services can conform also to MINERGIE standards. The same applies to building modules such as systems, components and materials. Minergie for buildings is a performance standard which sets a target energy performance for the building. It does not appear to have proscriptive requirements for individual equipment performance.
	Scope in terms of assessment	Historically energy only with an emphasis on health and well-being of occupants. Recent supplements to the label now also cover energy efficiency in materials which broadens its scope.
	Performance rating	Based on verified energy data
	Customer profile	It is used by developers, building owners and building users, architecture and engineering companies and municipalities.
	Performance assessment method	Calculated according to Swiss standard. Random checks at the building site is done.
	Rating scale and weighting system	NA Within the framework of the MINERGIE several products are offered: • the regular MINERGIE-Standard for buildings is MINERGIE's main activity. The standard requires that general energy consumption must not to be higher than 75% of that of average buildings and that fossil-fuel consumption must not to be higher than 50% of the consumption of such buildings. • The MINERGIE-P-Standard defines buildings with a very low energy consumption, it is especially demanding in regard to heating energy demand. This standard corresponds to the internationally-known passive house standard.

		• The MINERGIE-ECO-Standard adds ecological requirements such as recyclability, indoor air quality, noise protection etc. to the regular MINERGIE requirements.
	Certification costs	A fee is charged for certification. These are: 900 Swiss Francs for houses that are less than 500m^2; 1100 Francs for equivalently-sized commercial projects; 1600, 3500 and 10,000 Francs for projects between 500 m^2 and 2000 m^2, 2000 m^2 and 5000 m^2, and over 5000 m^2, respectively[154]. To maintain feasibility and general use the additional costs for MINERGIE must not exceed 10% of the construction costs.

Operation and management in market

Market size	Core markets are France, Italy and Germany and the USA. Minergie covers 13% of new buildings and 2% of refurbishments in Switzerland which are mostly residential buildings (around 34.44 million m^2)[155]. **Number of Minergie certificates per non-residential building type (source: Minergie[156])** 
Monitoring and compliance mechanism	The required measures needs to be satisfied for each building for Minergie application. Apart from general requirements such as a ventilation system and moderate extra costs, a detailed quantitative proof of energy performance (for heating, hot water, ventilation and air conditioning) has to be delivered. This proof is the core of the MINERGIE-Certification process.

[154] http://en.wikipedia.org/wiki/Minergie, Last updated ON 4 February 2014.

[155] http://www.swissworld.org/en/switzerland/swiss_specials/green_technology/minergie/

[156] https://www.minergie.ch/list-of-buildings.html

	The appropriate forms for all projects applying for a certificate are verified and random tests on the building sites are performed.
Marketing strategies and budget	Not available
Communication and distribution strategies	Advertised by members, banks and builders. Has awareness among market stakeholders and is promoted by a number of local municipalities and goverments
Link to financial instruments	9 Swiss Cantons provide subsides between 1,000 and 9,000 USD depending on the ambition level of the project. Minergie states that single family homes cannot meet Minergie in a cost effective way.
Administrative resources/ costs	MINERGIE is organised as a non-profit association and is registered in the Swiss Trade Register. A governing board of eight people is in charge of strategic decisions. There is a head office who is supported in operational decisions by the MINERGIE Building Agency. The certification and all related contacts and support activities are executed by MINERGIE Certification Units located at the administrations of the 26 Swiss cantons and the Principality of Liechtenstein. Hence there is a decentralised system of implementation.
Means of market operation	The organisation is responsible for the certification process.
Management of the scheme	Minergie is financed by its members, its services (certification, education and information programs, consulting and coaching) and its sponsors (companies of the Swiss construction industry, investors and different levels of government. It is a public-private partnership which is more unique among the rating schemes. There are close to 400 members including architecture firms, contractors, manufacturers, banks.

Positioning in the market

Expected uptake/ developments	The goals of the Swiss national Swiss Energy Infrastructure and environment programme call for 20% of new construction and 5-10% of refurbishment projects to be Minergie certified.
View on the EU wide scheme	NA
View on integration of the EU wide scheme	NA

SWOT Analysis

Strengths (internal, positive factors)	Weaknesses (internal, negative factors)
• Easy procedure: In order to offer easy procedures to obtain MINERGIE Certification there is a possibility offered by the use of standardised solutions for buildings and building-technology equipment • Flexibility: The standard does not stipulate the use of any specific material or technology. All that it demands is reinforced insulation to prevent any heat loss during the winter, coupled with a high-performance ventilation system that maintains a	• The standardized solutions are available only for residential buildings. • Minergie clearly states they are not cost-optimal in single-family home markets. The additional investment required is not recovered through savings during a reasonable payback period. • As designed it is more suited for cold climates and might run into broader difficulty when utilized in warmer climates without changes to methodology (which then reduces it's

refreshing ambient temperature during the warm summer months.	comparability).
Opportunities (external, positive factors)	**Threats (external, negative factors)**
• A developing market, growing demand for certification • Supporting government policies • Strong link to incentive schemes (in Switzerland)	• Very limited international market • Requires verification which adds cost and requires trained staff/reviewers • Because the standard requires performance better than 75% of the building stock it will likely require more benchmarking data (that is sufficiently verified) than is readily available at an EU-scale

Synthesis

- Directed towards residential units but has some commercial application
- As a public private partnership there is strong support and linkage with local government and includes subsidies for implementation.
- Current uptake is strong in country of origin. Also some adoption in neighbouring countries but appears most suited for heating-dominated climates.
- Cost of this scheme is not cost-competitive and is largely focused on building types that are not within the current scope of this assignment
- The public-private partnership of this scheme is a strong point as it promotes private-sector buy-in and may allow for easier increase in regulatory standards. However, this strength is also a limiting factor for up scaling this approach at the EU level as the number of stakeholders and government entities rapidly increase.

Annex D: CEN EPB Calculation Methodology

This annex describes the development of the CEN energy performance methodology. To understand the choices made within CEN and how these might fit with a common certification scheme, the context of the CEN EPB methodology is presented. In the first section the history as well as the current situation is described, sketching why CEN was asked to develop the energy performance calculation methodology. To explain why a certain methodology was chosen, the next section gives the development procedure and the boundaries that frame the choices made by the CEN experts and continues elaborating in more detail about differences among Member States that influence the calculation method. Despite all these differences, CEN tries to make a methodology that is as harmonised as possible. Criteria that are used for this are also described. It also discusses whether the CEN EPB calculation methodology can provide comparability across MS and the added value of the certification scheme in this context. This annex concludes with the role of CEN as an actor in the process in the EU and with the MSs.

The context and history of the energy performance related CEN standards

The development of energy performance related CEN standards before the EPBD (< 2004)

CEN already had many standards in place that now are part of the energy use calculation methodology long before the introduction of the EPBD. CEN was, and is, organised in separate TCs (technical committees), dedicated to a specific topic. The most relevant TCs for the energy calculation methodology are:

- TC 89: Thermal performance of buildings and building components
- TC 228: Heating systems in buildings
- TC 156: Ventilation for buildings
- TC 247: Controls for mechanical building services
- TC 169: Light and lighting

Standards were developed within working groups in these TCs, initiated by individual experts or groups of experts, after approval by the respective TC. There was no overall scheme or responsible team that linked these standards together, provided harmonisation or took care of possible overlaps or gaps among related topics (except for a joint working group among TC89, TC156 and TC 228). In parallel to this loose set of CEN standards, several countries developed an overall energy performance calculation methodology as an instrument for implementing pre-EPBD national energy performance legislation, for setting minimum energy performance requirements for new buildings (e.g. The Netherlands) and/or for energy labels of existing buildings (e.g. Denmark). These were partly based on some of the related CEN standards, but were developed further at the national level, with limited international interaction.

The CEN mandate after the introduction of the EPBD (2004-2008)

In 2004 the European Commission gave Mandate 343 to CEN. It ordered CEN to develop a methodology for calculating the integrated energy performance of buildings in accordance with the terms set forth in the EPBD. Access to this methodology in the form of European Standards would increase the accessibility, transparency and objectivity of energy performance assessment in the Member States. The time frame to develop the set of EPBD CEN standards was limited, because they had to be ready for the national implementation of the EPBD. The existing CEN structure of TCs and experts was used, making a relatively quick result possible. The result was a set of circa 50 standards successively

published in the years 2007-2008, each covering part of the energy performance calculation, all with their own level of complexity, and a so called "Umbrella Document" that linked the standards together. Although roughly all parts of the energy calculations were covered, the set of standards didn't form a complete and consistent energy calculation methodology. Since building regulation is an area where the EU Member States claim their national privilege to formulate the national legislation and the EPBD also adopted the subsidiarity principle in this respect, this first set of CEN Energy Performance of Buildings (EPB) standards functioned well as a first set of reference standards on which the Member States based their national calculation procedures.

To provide maximum flexibility, the CEN EPB standards on some topics contained more than one calculation method (e.g. a simple and a more complex one), to cover the (anticipated) needs and wishes of different Member States.

Parallel to the completion of this first set of CEN EPB standards, the involved experts initiated the Intelligent Energy Europe (IEE) CENSE project (2007-2010), aiming at evaluation of the result and to prepare recommendations for a more consistent second generation of CEN EPB standards to accommodate the implementation of the EPBD and its recast.

The current situation of the Energy Performance CEN standards (2010-2015)

Following the publication of the recast EPBD and, based on the recommendations from the IEE CENSE project, a second mandate (M/480) was given by the European Commission to CEN for the development of the second generation of CEN Standards related to the EPBD. The work on the upgrade of the CEN EPB standards is ongoing at this moment and a new set, supported by the EU Member States, is expected in 2015.

The aim of this second mandate is to make the existing EPBD CEN standards more consistent and more transparent, in line with requirements that are specified by the Member States. The set of standards should be unambiguous and more modular, enabling a more direct use and implementation by the MS.

The set of standards should serve the following possible application areas:

	New building		Major renovation		Building in use phase
	As designed	As constructed	As designed	As constructed	
Energy performance [1)]	X	X	X	X	
Energy certificate [2)]	X	X	X	X	X

[1)]: *Main purpose*: legal minimum energy performance requirements
[2)]: *Main purpose*: Mandatory provision of information, with possibly indirect economic consequences

Differences between these application areas occur in the purpose (e.g. ensuring compliance with minimum energy performance requirements versus mandatory provision of information), in practical limitations (e.g. access to input data, level of proof) and in the type of assessors (e.g. professional designers versus independent experts or specially trained assessors). This implies that per application area a clear balance is sought between accuracy and level of detail and between simplicity and availability of input data.

This balance is influenced by the national or regional context: climate, culture and building tradition, building typologies, policy and legal frameworks (in particular the type and level of quality control and enforcement).

Procedure and boundaries for the development of the EPB CEN standards

This section describes the procedure and boundaries that frame the choices made by the CEN experts In order to explain why a certain methodology is chosen.

General

In general, European Standards (ENs) are based on a consensus, which reflects the economic and social interests of 33 CEN Member countries channelled through their National Standardisation Organisations. The development of a European Standard is governed by the principles of consensus, openness, transparency, national commitment and technical coherence and follows several steps, including a public commenting stage ("CEN enquiry") on the draft standard. During this public commenting stage, everyone who has an interest (e.g. manufacturers, public authorities, consumers, etc.) may comment on the draft. These views are collated by the CEN national members (the National Standardisation Committees) and analysed by the CEN TCs.

The final draft is submitted to the CEN national members for a weighted formal vote. Most standards are initiated by industry. Other standardisation projects can come from consumers, Small and Medium-sized Enterprises (SMEs) or associations, or European legislators.

EPBD (set of CEN EPB standards)

The calculation method that is being described in the CEN EPB standards is developed within the regular CEN procedure as described above, that secures broad support among the various interest groups in Europe.

A key role is played by the Collective Team Leaders (CTL) from CEN/TC 371, the EPBD Program Committee, in which key experts from the individual CEN TCs (as mentioned earlier) participate and collectively initiate and coordinate the EPB standardisation activities under the mandate M 480.

In addition to the regular CEN structure, an additional structure of consultation with the EU Member States has been set up for the CEN EPB standards. In this structure a small Liaison Committee from the MS is the counter part for the CEN CTL, ensuring a dynamic interaction during the whole development process.

The choices that are made by the technical experts are guided by several boundary conditions. The scope of the calculation method is laid down in the mandate from the EU to CEN and based on the framework given in the recast EPBD. Therefore the CEN EPB energy calculation method[157] focusses on:

- almost all building types (some exclusions for e.g. listed historic buildings are made)

[157] The CEN EPB set of standards also include standards on system inspection. The focus here is on the assessment of the whole building including the technical building systems, although there are clear links

- energy use only, opposed to aspects such as indoor environment, building material use, building process, construction waste, transport, water use, biodiversity, pollution from the building, health aspects, social aspects
- the energy use of buildings during the use phase only, opposed to other parts of the life cycle of the building
- with important boundary condition: taking into account general indoor climate conditions, in order to avoid possible negative effects such as inadequate ventilation or overheating the building related energy use, opposed to e.g. the energy consumed by using consumer products
- conventional calculations and calculations based on measured energy

Another important boundary condition for the energy calculation method is that the methodology is usable across the whole of Europe, meaning that it is suitable for the European range of climate conditions, building types, construction typologies, building tradition and practice, building usage, energy level of the existing building stock, available technical solutions and innovation level. It also fits the various forms of national legislation, quality assurance, policy related needs and cost expectations of all aspects of the certification procedure.

Since each of these issues span a quite broad range, the CEN experts chose to develop a relatively detailed methodology, but with parallel simplified routes, where desired and possible. For the same reason, the method contains a certain amount of default values, with the possibility for alternative values on national level. This way a balance is found between a high level of comparability, and the possibility to adapt the method to national needs.

One CEN EPB method with choices and boundary conditions

The mandate M 480 to CEN asks to make a clear separation of the harmonised procedures and the national or regional options, boundary conditions and input data. In the CEN EPB standards this is being achieved by the following set up:

Each EPB standard has the following two Annexes:

- Annex A (normative): mandatory (empty) framework template for choices and input data
- Annex B (informative): framework template of Annex A completed with one set of voluntary **default choices** and input data on European level, the so called "CEN defaults"

In general each individual user of the EPB standard is free to create his/her own data sheet according to the template of Annex A (i.e.: to replace the default choices and values of Annex B). But:

- For instance private parties can mutually agree (private contract) to use any specific set of choices and values (a completed data sheet according to the template of Annex A) for the assessment of the energy performance for their private use

- In addition e.g. (national or regional) governments can mandatory prescribe a specific set of choices and values (a specific completed data sheet according to the template of Annex A, replacing the default choices and input values of Annex B) for the assessment of the energy performance in the context of their building regulations (or different sets, depending on the application).
    - published via the National Standardisation Body[158]

[158] In CEN jargon, such document is called a "National Annex" to the CEN standard.

- embed a completed data sheet according to the template of Annex A in the building regulations[159]

CEN default choices

With respect to Annex A and Annex B, the Commission requests CEN to provide one complete set of voluntary (in CEN terms: "Informative") choices for all options, boundary conditions and input data – Annex B. This is called the set of CEN default choices. By using Annex B, the procedure to calculate the overall energy performance becomes fully operational. This set can be adopted by any individual MS as their national set of choices. As a starting point, Annex B can be directly used for the purpose of the common voluntary certification scheme. Through updates based on periodic review and evaluation, it will be a powerful stimulus for further European harmonisation/ comparability across Member States.

CEN and ISO: the global arena

Where desired, CEN standards are coordinated with International Organisation for Standardisation (ISO) standards via the ISO/CEN Vienna Agreement. It provides the means for ISO standards to become CEN standards and vice versa.

Collaboration on the EPB standards with ISO may greatly enhance the usability, credibility and accessibility of the EPB standards involved. Such collaboration is currently in place for a number of EPB standards and intended for others. This collaboration does not add restrictions or limitations to the methodologies needed for the European arena, because there are ways to differentiate within a standard where needed or (as ultimate option) to divorce at any stage.

Differences among Member States

There are differences among countries or even regions that influence the calculation method:

- **Climate**: climate does not only influence the absolute energy use of a building, more importantly it changes what effective energy saving measures are. So, clearly, climate data and other climate related default values that are used within the energy calculation, differ among (and possibly also within) Member States.
  Differences in climate will also influence accents in the formula structure, especially for simplified methods, because while some effects are an essential part of the energy use in some parts of Europe, they are small in other areas and can be neglected there.
  In addition, climate affects the use of buildings and systems, which can influence the energy performance. In cold climates, for instance, systems for heat recovery from ventilation air need to be defrosted in winter, which has a negative effect on the products' overall energy efficiency, compared to milder climates, where defrosting isn't necessary.
- **Market penetration of new products and technologies**: These differ among countries, due to all kinds of forces (climate, subsidies, building tradition, cultural aspects, professional education level, awareness, ...) and influences among other things the choice of conservative default values or other simplifications among countries. Default values become less conservative when the use of innovative products becomes more main stream.

[159] If in the context of the CEN EPB standards the term "National Annex" is used, it is the intention to include this option, although the term "National Annex" is normally used only for an Annex to a CEN standard.

- **Building traditions, cultural differences, occupancy behaviour and architectural traditions**: All these aspects have an influence on the methodology and often on default values or other simplifications used in the method. For example:
    - *The average building size*: in The Netherlands houses are on average 110 m^2 large, while in Belgium the average house is probably at least twice as big. This influences all assumptions in the calculation that are given as a function of floor area, such as the internal heat gain per m^2, which, as a consequence, in the Netherlands is higher than in Belgium. And it influences the energy performance indicator of the overall energy use when this is expressed per m^2.
    - *Large differences across Europe to determine the floor area of a building*: Internal measurement, external measurement and all kinds of mixes between these are used, leading to differences of over 15% in assessed floor area. This results in differences in all variables that are given as a function of floor area.
- **National policy aspects**: Some examples of how national policy aspects influence the energy calculation method are given below:
    - *Primary energy and CO_2 conversion factors:* The primary energy conversion factors differ per country for several reasons. The generation of electricity, for instance, is done with different mixes of fuel e.g. coal, biomass, wind and nuclear power. There are not only differences in the generation mix, but also national policy choices play a role, e.g. on how the CO_2-emmissions of for instance nuclear energy and biomass are assessed.
    - *The energy uses that are included:* Although the recast EPBD is much more clear about the energy uses that need to be taken into account in the energy performance calculation than the previous version of the EPBD, there are still differences among countries in this aspect. Some examples:
        - *Some countries only take into account cooling needs when a cooling system is present, while others do this also without an actual cooler, in the assumption that coolers will be installed eventually or to ensure a level playing field (compensating for less comfort).*
        - *Some countries take into account the energy use of appliances, others only the internal heat gain of these devices, but not the energy use itself.*
        - *Energy use for lighting and ventilation of indoor car parks are treated differently, because some see this as part of the buildings energy use, while others see a car park as outdoor space (due to the demand of high ventilation needs and therefore having an outdoor climate).*
    - *Differences in ways how of expressing the energy performance and in rating scales*: there are many ways to express the energy performance, depending on the exact aim and policy wishes of the assessment. The current level of the energy quality of the building stock will also determine how rating scales (A-G, 0-100, …) are distributed over the building stock.
- **Legal context**: Some examples of how the legal context in a country can influence the method are the following:
    - Links with other regulations:
        - *Indoor air quality*: If a country has regulations for the indoor quality of buildings, this can influence the amount of ventilation that needs to be present and with that the default values that minimally need to be applied in the calculation. If less ventilation is actually present in a building, it will depend

on policy choices how this is dealt with in the calculation method: if the actual, low level of ventilation is used, a building is granted a better energy performance at the cost of a poor and even unhealthy indoor climate.

- *The definition of the useful floor area of a building*: The way in which the useful floor area is determined goes far beyond the energy performance assessment. The useful floor area is used in all kinds of legal as well as commercial contexts, (think e.g. of the real estate sector). Therefore proposing one fixed European way of calculating the useful floor area in the energy assessment is not straight forward.
- *The definition of building and the use of building spaces:* Superficially it seems clear where the border of a building lies and what the use category of a building is. But for instance whether cellars, attics, storage spaces and indoor parking spaces, are part of the energy assessment differs per country; and then: which standard conditions of use (occupancy pattern, required indoor conditions, use of equipment, …) are to be assumed also differ, partly due to traditional differences of use, but also due to the intended level of simplification (accuracy versus costs and robustness)[160].

- *Type of government control:* Does the control take place on the (refurbishment) design or on the realised building. This influences the possibility of measurements (e.g. of airtightness) and the need for default values. Also whether there are legal consequences or not and how severe these are, influences among other things the level of verifiability, lack of ambiguity and reproducibility of the assessment.
- Status of the regulation: if the assessment is purely informative to encourage owners to take steps, or whether the assessment is linked to mandatory measures or financial benefits (subsidies, cheaper mortgages, investment schemes of ESCO's,…). These aspects clearly influence the required level of verifiability, lack of ambiguity and reproducibility of the method and inputs to the method.
- Type and level of quality control and enforcement of the energy performance assessment: qualification requirements for the assessors (auditors) and quality assurance of the certificates (with incentives and/or sanctions?), the acceptable assessment time (costs), the expected precision and accuracy (comparison with actual energy use, robustness, reproducibility), assurance of compliance with minimum energy performance requirements (with sanctions?), etc.

All these differences form the boundaries by which countries determine the level of complexity of (parts of) the energy performance assessment method. Note that this implies that for the optimum selection of the CEN default choices and input values a specific (spelled out) context as listed under the bullet points above has to be assumed.

[160] Example of two extremes: an office building can be regarded as a building with one set of conditions of use (~ office) for the whole building or as a building that consists of office spaces, corridors, lobby, meeting rooms, education rooms, restaurant, toilets, etc., each with different conditions of use.

Is comparability across Member States on European level possible?

An important question that remains is to what extent the CEN EPB calculation methodology can provide comparability across Member States. The method itself is intended to be as harmonised as possible. But it will contain choices between options, boundary conditions and input data that may differ per country (the earlier mentioned "Annex A and Annex B" of each EPB standard). The rationale behind such possible differentiation is that it is clear that countries over Europe differ in context as well as in policy choices. Part of this broad range of needs can be overcome by making a detailed method that covers all physical effects (if that is even possible), but that makes the calculation method unnecessarily complex and in conflict with some of the requirements, such as affordability, verifiability and unambiguity. Every simplification on the other hand reduces the general applicability on other aspects.

CEN will provide a CEN default for all choices within the methodology, resulting in a, theoretically, fully harmonised European method. For some defaults it is clear that one CEN default is nonsense, such as climate data. Others, as explained above, also require specific attention in this respect.
Note that changing the assumption and input data, be it the climatic data, occupancy patterns, or specification of the dimensions of the floor area, to name a few, has also consequences for the benchmarks, because the energy performance of the benchmark cases have to be consistent with the calculation. This implies that on a relative scale, the energy performance compared against certain benchmarks may be less sensitive for differences in e.g. assumed standard climatic data and occupancy patterns as the absolute value expressed in kWh/m^2.

A step by step approach of gradual convergence could be envisaged, with as starting point a common method with specific differentiation in the form of national annexes, and a gradual diminishing of the differentiation where possible, based on increased confidence from practical experience. This means on the one hand that the national choices will gradually shift more and more towards the CEN choices and on the other hand that the CEN choices will be updated based on the collection of (national) experiences.

The voluntary common EU scheme provides a change to speed up this process: By using the updated CEN standards and the first set of default CEN choices the scheme can be put to practice. Experiences gained with the scheme will accelerate the validation of the CEN choices, provided that periodic reviews and updates are based on understanding of technical coherence as well as the needs of the Member States.

The Role of CEN as an Actor

In the following we describe briefly:

- what role CEN plays as an actor in the EU28 and how is the current collaboration process between CEN and the MS;
- are there any issues/ limitations in the current collaboration process between CEN and the MS?
- whether and what role CEN could play in the setting up/ running of the new EU scheme;
- What could we learn from CEN's process/ interaction with MS for this new scheme?

CEN's role as an actor in the EU28

European Standards are developed by the European Standardisation Organisations. The three European Standardisation Organisations, CEN, CENELEC and ETSI, are officially recognised by the EU as competent in the area of voluntary technical standardisation[161].

Current collaboration process between CEN and the MS in the EPB standards process

Introduction

As mentioned before, because of the delicate balance in the requirements set by the mandate M 480 on developing a harmonised methodology with flexibility at national/regional level, the regular CEN procedures to build consensus are complimented by specific instruments of consultation of the EU and EFTA[162] Member States. This consultation includes the identification and prioritisation of items for revision and gaps in the current set of standards.

Liaison Committee

Under the Energy Performance of Buildings Committee (EPBC), the regulatory committee of the MS on the EPBD, a Liaison Committee to the CEN M480 project team was set up to make the needs of the Member States regarding usability of the EPBD standards explicit towards CEN and contribute to the effectiveness of the standards from the perspective of the Member States. To quote from the mission statement of the LC:

> *"The needs of the Member States will often show convergence but will also diverge on several aspects. It is the ambition of the Liaison Committee to align the Member States needs where possible and make the diversity in needs explicit. Only then it can be dealt with in a rational way."*

Note that the technical content of the standards is in principle not the focus of the Liaison Committee. The technical quality is subject of the regular CEN EPB procedures in which Member States can participate through their national standardisation organisations.
The Liaison Committee acts as a liaison between CEN and the EPBC (formerly known as EDMC) (representing the Member States) during the development of the revised set of EPBD CEN-standards and will also interact with the European Commission and the Concerted Action EPBD (CA III) to mutually benefit from the knowledge and experience available and increase the effectiveness of the Liaison Committee. Because of the complexity of the matter, a dynamic interaction has been agreed upon with the Collective Team Leaders from the CEN M 480 project.

Concerted Action EPBD (CA III):

The Concerted Action (CA) EPBD was launched by the European Commission to promote dialogue and exchange of best practice between the MS, to support them in the task to transpose and implement the Directive. It currently (CA III) consists of an active forum of national authorities supported by technical experts from 29 countries. One of the CA III objectives is to establish a dialogue with CEN. The CA III facilitates regular workshops of representatives from the CEN project team, the Liaison Committee and the Member States and other special sessions for information exchange and feed back to CEN.

[161] The European Union (EU) Regulation (1025/2012), settling the legal framework for standardization.

[162] European Free Trade Association

EPBC (formerly known as EDMC):
The Energy Performance of Buildings Committee (EPBC, formerly known as EDMC), is the formal platform of dialogue between the Member States and the Commission with regard to the EPBD. The EPBC is strongly interested in the development of the CEN EPB standards and on providing input and feedback, via the Liaison Committee, via agenda items at their meetings where experts from CEN are invited and via subcommittee on the CEN activities. The EPBC has no formal decision powers on the CEN work, but the Committee's chair (representing the Commission) always seeks a consensus regarding the position of the Committee.

Are there any issues/ limitations in the current collaboration process between CEN and the MS?

With respect to the objectives and expectations:
The requirements of the EPBD are in accordance with the principle of subsidiarity and the principles of proportionality. Consequently the Directive leaves room for flexibility at national or regional level as mentioned before. This is also reflected in the mandate M 480 to CEN, which asks to make a clear separation of the harmonised procedures and national or regional options, boundary conditions and input data.

In the CEN EPB standards this is being achieved by the set up as described previously (common EPB method with national or regional choices…) with a common template for choices and input data (Annex A of each EPB standard) and voluntary default choices (Annex B of each EPB standard).

In this context, the Commission requests CEN to provide one complete set of voluntary (in CEN terms: "Informative") choices for all options, boundary conditions and input data as voluntary common completed data sheet according to the template of Annex A: the Annex B. This set can be adopted by any individual MS as their national set of choices. This set is also intended for possible use as voluntary common European calculation procedure.

Standards versus regulations:
MSs can refer to CEN or national standards for the EPB calculation methodology or choose to embed the EPB calculation methodology, or parts of it, in their building code. As explained, it is possible to refer to the CEN EPB standards as such, and embed only the specification of the data sheet according to the templates of the Annexes A of each EPB standard as the national or regional choices in the building regulations itself. For the CEN EPB method this is fully equivalent with the option to publish the national or regional choices as National Annexes to the CEN standards.

With respect to the process
Theoretically, MSs have no direct formal influence on the development of CEN EPB standards, because this is regulated within CEN via the National Standardisation Organisations. However, in practise MSs have a strong indirect influence because under the current terms of the EPBD the national or regional authorities may decide whether or not to adopt the calculation methodologies as described in the CEN EPB standards.

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