EPLABEL: PREPARING FOR AN EPBD REQUIREMENT TO DISPLAY OPERATIONAL RATINGS ON ENERGY CERTIFICATES IN PUBLIC BUILDINGS

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ABSTRACT

EPLabel is a two year project involving nineteen countries, ten with full Partners supported by the EC's EIE SAVE programme. It addresses the EPBD's Article 7.3 requirement for 'Public Buildings' over 1,000 m² to display an Energy Certificate prominently. Its main technical objective is to develop a methodology for energy benchmarking and certification of a diverse range of non-domestic buildings based on their actual annual energy consumption, thereby supporting Member States planning to implement Operational Ratings under the EPBD.

This paper describes the key steps in the procedure for building energy certification based on an Operational Rating and proposes a clear, robust and pragmatic way for Member States to implement these steps, offering sufficient flexibility to accommodate national diversity whilst seeking the harmonisation the EC desires. For example, the method offers an easy entry level for cases where few if any benchmarks are currently in use, plus more detailed assessments where current knowledge is more advanced, including customised benchmarks based on schedules of accommodation and usage.

It is argued that customised benchmarks will allow more meaningful and fairer assessments of the energy use and CO_2 emissions of individual buildings than can be done by comparison with bulk energy statistics for a diverse sector.

KEYWORDS

Energy, certificate, operational, measured, rating, benchmark.

PROJECT BACKGROUND

EPLabel is a two year project involving nineteen countries, ten with full Partners[1], supported by the EC's Intelligent Energy for Europe (EIE) SAVE programme. It addresses the EU Energy Performance of Buildings Directive (EPBD) Article 7.3: the requirement for 'Public Buildings' over 1,000 m² to display an Energy Certificate prominently, OJEC (2003). The project aims to support each Partner's Member State in planning for and implementing Operational Ratings under the EPBD - see www.eplabel.org for further details.

[1] The project Co-ordinator is the UK Partner, Energy for Sustainable Development Ltd, who are supported by sub-contractors Target Energy Services, William Bordass Associates and the Association for the Conservation of Energy. The project is part funded in the UK by a Government Ministry (ODPM) and Constructing Excellence. The other partners are BBRI (Belgium), Energiereferat Frankfurt (Germany), Esbensen (Denmark), CSTB (France), NKUA (Greece), NUID (Ireland), DHV (Netherlands), Enerma (Sweden) and Motiva (Finland).

The project's main technical objective is to develop a methodology for energy benchmarking and certification of the diverse range of buildings in the following six sectors:

- Public administration offices,
- Higher education (Universities, Colleges),
- Schools,
- Sports facilities,
- Hospitals and other health facilities,
- Hotels and restaurants (to take account of residential and catering facilities in the public sector).

In 2002-04, EPLabel's predecessor Europrosper (see www.europrosper.org) reviewed the potential for Operational Ratings, developed a prototype procedure for offices, and contributed to draft CEN standards. EPLabel intends to demonstrate a clear, robust and pragmatic procedure which can assist Member States which plan to use Operational Ratings - offering sufficient flexibility to accommodate national diversity whilst seeking the harmonisation the EC desires.

ENERGY CERTIFICATION BASED ON OPERATIONAL RATINGS

The procedure for building energy certification based on an Operational Rating can be seen as having five key steps:

1. Collect quality data and calculate the building's Energy Performance Indicator[2] (EPI).
2. Identify appropriate benchmarks with which the EPI can be compared.
3. Grade the energy efficiency of the building by comparing the EPI with the benchmarks.
4. Identify cost-effective energy saving measures.
5. Collate all the relevant information onto an energy certificate, possibly of several pages with the first page being on display to the public.

SUMMARY OF WORK PROGRAMME

Following a review of existing approaches in the six target sectors, we plan to identify the common ground and to produce a pragmatic scheme which can help to support benchmarking and certification of operational energy in each country. The proposed strategy, summarised in the next section, offers an easy entry level for cases where few if any benchmarks are currently in use, plus more detailed methods of assessment where current knowledge is more advanced, including customised benchmarks based on schedules of accommodation and usage. The project's main deliverables will be:

- Software which demonstrates the five-step procedure.
- A website where independent or accredited experts[3] or self-assessors will be able to determine benchmarks for total measured energy consumption for any building within the targeted six sectors, with integral quality assurance procedures.
- Documentation and an on-line training package for energy certifiers.

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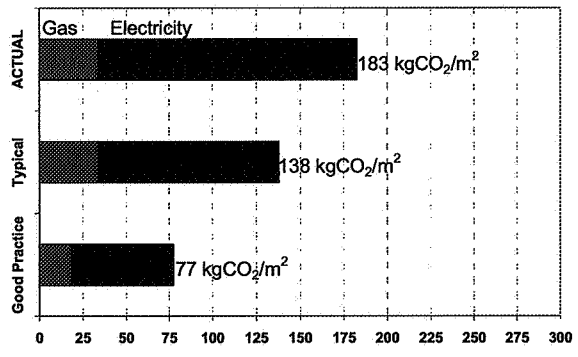
[2] Defined by CEN as the weighted sum of actual annual energy consumption divided by the building's floor area. Typical weightings would be for primary energy, or for carbon dioxide emissions.

[3] As required in Article 10 of the EPBD.

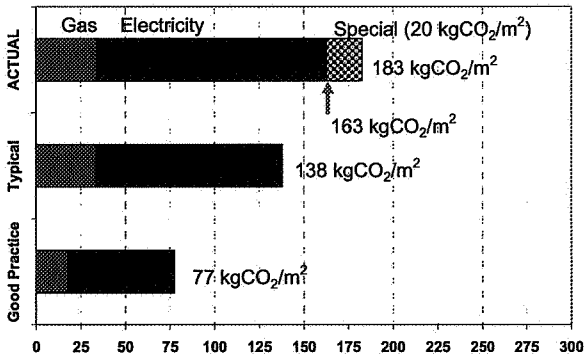
BENCHMARKING STRATEGY AND ALIGNMENT WITH EPBD

The Directive comes into force on 4 January 2006, but countries are allowed up to three years to phase it in. In many countries, the Operational Rating approach may start by requiring eligible buildings to provide a summary of their energy use, weight the different fuels used (e.g. by primary energy or by kg CO_2), report energy performance per m^2 of floor area (probably of Gross Internal Area, though there are other choices), and compare it with simple benchmarks (where these are available).

Following a review for the UK's Sustainability Forum, Bordass (2005), the UK team plans to apply benchmarks for Operational Ratings at three levels of sophistication, as illustrated in Figure 1.



Level 1: simple, usually derived from stock statistics for the type of building concerned.



Level 2: corrected, taking account of special energy uses not included in the Level 1 benchmarks.

The above charts show a building's actual carbon dioxide emissions in comparison with Typical and Good Practice benchmarks. With the level 2 approach, the emissions from a special energy use (not included in the benchmark reference) are identified by measurement and deducted from the total emissions before making the benchmark comparison.

Level 3: customised, taking more detailed account of the building's schedule of accommodation, activities and use.
The chart on the right includes benchmarks built up from each of the energy end uses occurring in the different activity areas in the building concerned, calculated separately assuming Typical and Good Practice energy efficiency for the fabric, plant, management and controls involved.

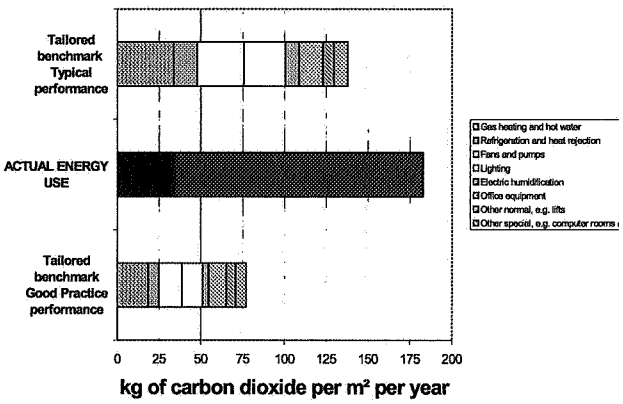


Figure 1: The three level benchmarking approach

EPLabel's focus is on developing the Level 3 benchmarking approach, which will allow more meaningful and fairer assessments of the energy use and CO_2 emissions of a building than is possible by comparing them with bulk energy statistics. The procedure will also need to be as compatible as practicable with the Level 1 and 2 assessments that may well be employed in initial statutory implementations of Article 7.3. In due course, it might become verified and accredited as an alternative to the Level 2 correction.

Industry Advisory Groups (IAGs) will help to ensure that the procedures make sense to each sector. Representatives will include major building owners, occupiers and managers as well as sectoral organisations. Advisory Group members will be asked to review key strategic documents and attend two meetings: the first to discuss EPLabel's review of the sector and ideas for the approach to benchmarking; and the second to comment on a working draft of the proposed benchmarking system.

EPLABEL SOFTWARE

Software is being produced in four development versions (see Table 1), linked to the energy certification 5-step process defined above. The preliminary version (V1.1) is an Excel file which demonstrates Step 1, namely getting the facts straight about the building: the sector and sub-type it fits within, its floor area (or other measure of extent) and the annual consumption of all energy supplies. The software allows each energy source to be summed by different weighting factors (with a choice of local, national or European values) and creates an energy and carbon dioxide emissions summary. The Energy Performance Indicator (EPI) is presented both on the basis of the delivery of fuels, thermal energy and electricity to the building's site, thereby taking fully into account the benefit of any on-site CHP and renewables (OSC&Rs) and on the basis of the intrinsic energy efficiency of the building (ie after excluding the benefit of OSC&Rs) in order to reveal the scope for energy saving measures in the building.

The next version of the software (V1.2) will illustrate the Level 1 benchmarking system, comparing the EPI with notional level 1 benchmarks graphically. It will also aim to calculate the CEN 'C' factor which relates the EPI to the building stock mean and to a nominal 2006 Building Regulation level. V1.2 will also illustrate Level 2 corrections - explicit allowances for 'special' activities or energy uses not included within the Level 1 benchmarks (e.g. a swimming pool in a school, a data processing centre in an office building, [illegible] external lighting). V1.2 could well resemble procedures which may be adopted by several countries for their initial implementation of Article 7.3. The intention will be to demonstrate the potential for a relatively simple initial Operational Rating procedure that does not require significant expertise.

V2 of the software, again in Excel, will demonstrate all five steps of the certification process. It will:

- Illustrate how fully customised benchmarks can be created for a building.
- Calculate the important A to G grade in addition to the 'C' factor.
- Incorporate a standard list of measures for each building type, presented in a tick-box format to allow applicability to be indicated and notes to be added.
- Generate a notional Energy Certificate, probably of three pages, the first for display, a second with more detailed data and a third with the list of applicable measures.

In 2006, a free-to-use website will carry an online version of V2. This V3 software will cover the first three steps of the energy certification process and offer a country-specific benchmark generation and grading service, with key parts available in eight languages.

TABLE 1
Proposed development schedule for EPLabel software

	Energy certification **five step** process					Purpose	Target date for release to Partners
	1	2	3	4	5		
Software version	Measure the EPI	Identify Benchmark	Determine Grade	Identify measures	Produce certificate		
V1.1	Emissions summary	-	-	-	-	Taster of EPLabel approach	May '05
V1.2	Emissions summary	Levels 1 to 2	CEN 'C' factor	-	-	Support early implementations of EPBD Article 7.3	Sept '05
V2	Emissions summary	Levels 1 to 3	CEN 'C' factor + A to G Grade	Standard list of measures (tick box form)	3 page certificate	Demonstrate customised benchmarking method	Nov '05
V3	Emissions summary	Levels 1 to 3	CEN 'C' factor + A to G Grade	-	-	Web site: to generate benchmarks and building grade	Spring '06

CONCLUSIONS

This paper has described the key steps in the procedure for building energy certification based on an Operational Rating and proposes a clear, robust and pragmatic way for Member States to implement these steps, offering sufficient flexibility to accommodate national diversity whilst seeking the harmonisation the EC desires. Implementation of Article 7.3 in many countries may start with an Operational Rating approach requiring eligible buildings to provide a summary of their energy use, weight the different fuels used (eg by primary energy or by kg CO_2), report energy performance per m^2 of floor area (probably of gross internal area, though there are other choices) and compare it with simple benchmarks (where these are available). This paper describes a proposal to categorise building energy benchmarks at three levels of sophistication: simple (derived from stock statistics), corrected (for special energy uses not included in the simple benchmarks) and customised.

Customised benchmarks will allow more meaningful and fairer assessments of the energy use and CO_2 emissions of individual buildings than are possible by comparison with bulk energy statistics for a diverse sector. In due course, such an approach could become verified and accredited as an alternative to the simpler benchmarks that may well be employed in initial statutory implementations of Article 7.3.

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