CIT Energy Management AB
A Chalmers Industriteknik Company

EPLabel

Work Package 2

Overview of Country Surveys

Final Report

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1. Introduction

The main purpose of *Work package 2 – Review* is to collect information on existing energy performance data, benchmarks and other relevant information for buildings in the six target sectors

- Administration offices
- Higher education;
- Schools;
- Sports facilities;
- Hospitals and other health sector facilities;
- Hotels and restaurants

for each participating country. The original idea was that all participants in all countries and regions should contribute information they have on any of the six sectors. However, none of the associated countries had any national funding for participating in the project, which meant that they could not contribute. The majority of the contracts for the subcontractors representing six countries were not ready in this stage of the project. Consequently, with the exception of Norway, only partner countries within the EPLabel project contributed with information for WP 2.

The purpose of the collected information was to get a grasp of how the Energy Performance of Buildings Directive – EPBD was implemented and the structure of the six possible public building sectors in each country. The main purpose was to get basic knowledge for future development of tailored benchmarks, which means collecting such data as typical activity spaces and possible benchmarks in each building sector.

This report reflects the status in the spring of 2005, both concerning the national implementation of the EPBD and other national data.

2. Collection of information

A questionnaire was developed by the coordinator ESD and sent out to all project partners for review in early February 2005. The final questionnaire was sent out in the middle of February 2005 and a first amount of answers had come from all partner countries just in time for the first project meeting on 25th-26th April 2005. After the meeting a few countries sent in revised answers.

During the first project meeting it became clear that the absolute majority of the countries were late in their national implementation of the Energy Performance of Buildings Directive - EPBD, which means that some of the answers in the questionnaire either could not be answered or were not to be based on any solid ground. It was also clear that only a few countries had any benchmarks for the building sectors of interest. Even the knowledge of the energy use and the size and structure of the six building sectors were weak in some countries.

The original idea was that the countries represented by subcontractors also should answer the questionnaire. By the time for the meeting in April 2005 most of the subcontracts were not finished and given the time foreseen to fill in the questionnaire it was decided at the meeting that it was wiser for the partners responsible for the subcontractors to use the limited funding available for more important tasks in the project.

The associated countries should also answer the questionnaire. However, the amount of time available for each associated country was limited, in most countries more or less nil, since they did not have any national funding available. At the meeting it was decided that the country group leaders should not put a large press on answers from the associated countries. They should only ask them to fill in the data they had available if they had any time to do so based on national funding.

Consequently, only the partner countries answered the questionnaire, together with Norway represented by a subcontractor. This report gives results for the following countries:

- Belgium: the Flemish Region, the Walloon Region and the Brussels-Capital Region.
- Denmark
- France
- Finland
- Germany
- Greece
- Ireland
- Norway (subcontractor)
- Netherlands
- Sweden
- United Kingdom: mainly the Regions of England and Wales

This means that the proposed Regional Groups are incomplete and the original idea of Regional reviews became more or less meaningless. The proposed Regional Groups were:

1.	***British Isles:***	**United Kingdom** and **Ireland**
2.	***Central Europe:***	**Germany**, Austria (subcontractor), Poland (subcontractor), Czech Republic (subcontractor), and Switzerland (associated)
3.	"***Nordic" Countries:***	**Denmark** and **Norway** (subcontractor)
4.	***South West Europe:***	**France** and Spain (subcontractor)
5.	***South East Europe:***	**Greece** and Italy (associated)
6.	***Benelux:***	**Netherlands** and **Belgium**
7	***Baltic Countries:***	**Sweden**, **Finland**, Estonia (associated), and Lithuania (associated)

However, where there is more than one country in each Regional Group (group 1, 3, 6, and 7) some basic comparisons are made in chapter 5.

3. Questions of interest

One of the main purposes of the questionnaire was to gather data for future development of "tailored" or "customized benchmarks" for the six building sectors inside EPLabel. For this purpose, knowledge of the types of activity floor areas inside each building category is of primary interest. It is also vital to know the occupancy times and which types of ventilation systems that serve these areas. To develop benchmarks inside the EPLabel project it is also important to know if there are any national benchmarks available and how they are defined. Also the national definitions of each building sector are of vital important for not comparing benchmarks for "apples and pears" inside the project.

3.1 Questions for each country

The questions for each country were mainly on the national implementation of the EPBD. In addition there was also general information for non-residential buildings regarding ventilation systems, occupancy times and energy metering arrangements.

3.1.1 General: Mainly implementation of the EPBD

Beforehand it was known that the EPBD implementation process, and how far it had come in the spring of 2005, varied widely between the countries. The questions summarises the status in each country by March 2005. It was also clear at the first project meeting that the development of the implementation was fast and that the information collected would probably soon be obsolete.

This question about the implementation of the EPBD was divided into the following sub-questions:

1. Organisations responsible for producing energy efficiency information
2. Plans for implementing Article 7.3 – energy certificate for display in large public buildings
3. Plans for implementing Article 10 – independent experts
4. Arrangements for review and comment of ongoing CEN standards
5. Prevailing ventilation systems in large non-domestic buildings
6. Common occupancy times in non-domestic buildings
7. Information of energy metering arrangements in non-domestic buildings

As a consequence of that the information on the implementation is changing fast no review of it has been done in this report. The information is constantly updated on the homepage of EPBD Buildings Platform (http://www.buildingsplatform.org/cms/).

3.1.2 Typical HVAC systems (ventilation systems) in the country and for each building sector

The ventilation systems for each building sector were divided into eight types:

A. Fully air conditioned with humidification
B. Fully air conditioned without humidification
C. Mechanical ventilation (no cooling)
D. Natural ventilation
E. Mixed mode (mixture of mechanical and natural ventilation, i.e. C and D)

F. Local cooling, e.g. split systems for small areas used with systems C, D or E
G. Top cooling (normally limited to system C with cooling used to limit peak indoor temperatures to say 25°C during hot weather only)
H. Other, please specify

3.1.3 Common occupancy times

The occupancy times were divided into nine types, from 10 hours per day on weekdays only to 24 hours a day all days in the week. In addition it was possible to specify to optional occupancy schemes. The defined occupancy times would fit almost all types of public buildings, from offices, via libraries etc, to sports centres.

3.1.4 Building energy metering arrangements

The intention with this question was to find out how common sub-metering were in both individual buildings and in multi-building sites e.g. hospitals or university campuses.

3.2 Data for each building sector in each country

The following questions are the same for the six building sectors:

- Administration offices;
- Higher education;
- Schools;
- Sports facilities;
- Hospitals and other health sector facilities;
- Hotels and restaurants.

3.2.1 If the building sector is defined as public according to the national rules

Here is described if the building sector in question is defined as public in each country. As most countries were late with their national implementation of the EPBD most countries could not answer this question.

2.2.2 National definition of each building sector

Here is given the national definition of each building sector if there is one.

3.2.3 National definitions of building sub-sectors

If each building sector nationally is divided into sub-sectors the definitions are given here. For each sector a number of generally common sub-sectors are pre-defined in questionnaire.

3.2.4 Number of buildings in each sub-sector larger than 1,000 m²

The intention was that through this question get a sense of the number of public buildings of each category in Europe. However, the number of buildings are not known in many countries, despite that the total floor area of the building sector may be known.

3.2.5 Types of spaces (Activity floor areas)

In this question the typical areas of activities are described and how common they are in each building sector. Typical activities are suggested in the questionnaire but they may vary between countries.

3.2.6 Contacts and possible persons for the Industrial Steering Group

Here the names and contact data are given of possible persons for the Industrial Steering Group.

3.2.7 Annual delivered energy use divided by fuels

Here is given the total floor area as well as the annual delivered energy use divided per fuel. The floor area is not known is some countries. The question turned out to be none precise, which means that some countries report the energy use for the country [TWh/year] whereas other report the annual energy use per the used metrics, normally kWh/ year & m^2.

3.2.8 National metrics used such as floor area or building volume

Experience from the earlier IEE-SAVE project Europrosper showed that the metrics used could differ quite a lot, both between countries and between building sectors inside the same country. Consequently it is important to have the definitions for each country and each building sector.

3.2.9 Weather normalisation procedures

Earlier experience also shows that weather normalisation methods differ between countries or even between building sectors in the same country. If a method is defined as a heating degree-day method the detailed definitions of e.g. the base room temperature may differ between countries. In countries with a domination cooling energy use there are no common simple methods.

3.2.10 Availability of energy benchmarks

One of the most important data is the availability of national benchmarks for each building sector or sub-sector. If benchmarks are available the basic approach of EPLabel with just comparing the total delivered annual energy per m^2 with statistical benchmarks works easily.

3.2.11 Reports and data from case studies, etc.

Available data from well-documented case studies and other reports, particularly state-of-the-art reviews, are always important to use inside a project of the type of EPLabel.

4. Summary of results

4.1 Questions for each country

4.1.1 Implementation of the EPBD

Most countries were late in their implementation of the EPBD. However the implementation processes were moving fast which means that the collected information very fast gets off-date. Consequently, no analyses of the national implementation of the EPBD are done here.

However it can be said that at the beginning of the project it looked like a large majority of the EU-countries were moving towards an asset rating of existing public buildings > 1000 m^2. During the project more and more countries either shifted towards Operational Rating or were thinking of allowing both methods.

4.1.2 Typical ventilation (HVAC) systems

In the questionnaire eight types of ventilations systems were defined. However, the question was not easy to answer and typical answer were that a system was common or unusual. To be more productive at the process of producing tailored benchmarks the ventilation systems should probably be connected to the type of space and the building sector.

4.1.3 Common occupancy times

In the same way as for the ventilation system above this question normally gave answers like common or uncommon. It had probably been more productive to be connected with each space type and building sector.

4.1.4 Building energy metering arrangements

The table below defined the building energy metering arrangements

	Information on current energy metering arrangements in your country		
Building or part of building to be assessed	Likely presence of dedicated main utility meters for all energy supplies	Likely presence of sub-meters for fossil-fuel or heat supplies	Likely presence of sub-meters for electricity supplies
Individual whole building not part of a site			
Part of a building occupied by different owners or tenants			
Building on a multi-building site			
Other			

However, the table has a British bias and turned out to be hard to interpret in other countries. It was clear that the landlord in all of the involved countries had no legal possibilities to get access to tenants' annual energy use, typically electricity.

4.2 Data for each building sector in each country

In the tables in this subchapter there is a difference in semantics: **No data** means that the question not is answered whereas **No info** means that there are no available information in the country.

4.2.1 If the building sector is defined as public according to the national rules

	Public Sector Offices	Higher Education	Schools	Sport Facilities	Hospitals	Hotels & Restaurants
Belgium	No data	No data	No data	No data	No data	No data
Denmark	Yes	Yes	Yes	Yes	Yes	No
Finland	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
France	Unclear	No Info	Unclear	No Info	Unclear	No Info
Germany	Yes?	Unclear	No data	No data	No data	No data
Greece	Yes?	Yes?	Yes?	Yes?	Yes?	Yes?
Ireland	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
Netherlands	Yes?	Yes?	Yes?	Yes?	Yes?	Yes?
Norway	Yes	Unclear	No data	No data	No data	No data
Sweden	Yes	Yes	Yes	Yes	Yes	No
United Kingdom	Yes?	Yes	Yes	Yes	Yes	No

From the table can be concluded that in the spring of 2005 it was still unclear how public buildings were to be defined in most of the involved countries.

4.2.2 National definition of each building sector

Most countries had some kind of definition the building sector. In some countries it was precise whereas in others it was more vague. The definitions are shown in each country review in the Appendix.

4.2.3 National definition of building sub-sectors

Most countries had some kind of definition sub-sectors inside each building sector. The definitions are shown in each country review in the Appendix.

4.2.4 Number of buildings in each sector larger than 1000 m^2

In the table below T means total number of buildings including those smaller than 1000 m^2. For some sectors the number of buildings are not known whereas the number of sites are. Here the number of sites is given if known.

Number	Public Sector Offices	Higher Education	Schools	Sport Facilities	Hospitals	Hotels & Restaurants
Belgium	No data	No data	No data	No data	219 sites	1915 hotels
Denmark	600	200	2900	950	210	1000
Finland	No data	246/305	T 250	880	500/715	816 hotels
France	T 13000	No Info	T 57800	No Info	4200 sites	No Info
Germany	No data	No data	No data	No data	No data	No data
Greece	No data	400	2700 T 6500	600	530 sites	600
Ireland	No data	34 sites	T 4040	505	No data	860+490
Netherlands	600	255	7930	T 13090	107 sites	2700 hotels
Norway	400	624	T 5340	T 1120	100	29116?
Sweden	5-8000?	⇨	20-25000 incl H.E	8-10000	15-20000	1600 hotels
United Kingdom	T 14600	171 sites	T 37000	> 5220	6500	9500 hotels

From the table above it is clear that the number of buildings is hard to estimate the total umber of public buildings in the countries inside EPLabel. The main reason is a lack of consistent statistics. In some countries the total number of buildings inside a sector may be known but not the number of buildings above 1000 m^2. The definitions of the building sectors are also somewhat different between countries.

One way to estimate how reasonable the numbers are is to compare the number of buildings with the number of inhabitants in each country. Denmark, Finland, Ireland, Norway and has about 4-5 million inhabitants each whereas Belgium, Greece and Sweden roughly has twice that population (9-11 million). Netherlands has about three times the population of the smallest countries. Consequently you could expect about the same number of buildings in Denmark, Ireland, Finland and Norway and about twice as many in Belgium, Greece and Sweden. UK and France has about 60 million inhabitants whereas Germany is 1,5 times larger. This gives the following relations

- Denmark, Finland, Irland, and Norway about 1
- Belgium, Greece, and Sweden about 2
- Netherlands about 3
- France and United Kingdom about 12
- Germany about 18

A quick look at the numbers in the table above shows that the number of buildings sometimes seems to be related to the population and sometimes very much not. One number that must be wrong is the number of hotels in Norway which is three times the hotels in the UK, which has 12 times the population of Norway. Here the definitions clearly are different. The Swedish number of buildings is also high compared to its population.

2.2.5 Types of spaces

The following tables gives the types of spaces that are common in the six building sectors in each country. The space types are classified from A to L. The results shows that the definition of a space type also differ somewhat between the countries.

Public Sector Offices (A-D)

	A Cellular office	B Open plan office	C Computer / server room	D Debating chamber
Belgium	No data	No data	No data	No data
Denmark	Common in older buildings. Current trends are to open plan offices.	Common in new buildings and older buildings being rebuild or refurbished.	Common in most larger buildings	Common in larger buildings
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	Common	Rare	Common	See meeting room
Greece	Common	Common	Depends on the function	Depends on the function
Ireland	No data	No data	No data	No data
Netherlands	Usually	Occasionally	Common	Occasionally
Norway	No data	No data	No data	No data
Sweden	Very common	Common in buildings from 1970s and from late 1990s⇨	Common in “office buildings”	In town and county halls
United Kingdom	Very common in older buildings. However, current trends are to open plan.	Increasingly, since the 1960s and widespread now, both for new buildings and for older buildings being rebuilt or refurbished with much more open space. *(Open planning tends to increase occupation densities, but energy densities increase still faster as they need more sophisticated engineering systems which have a tendency to default to ON*	In most of the larger buildings, e.g. town and county halls, government departments and regional centres, though there are also separate data processing facilities.	In the larger government department buildings.

Public Sector Offices (E-H)

	E Meeting room	F Kitchen	G Restaurant/Canteen	H Reception
Belgium	No data	No data	No data	No data
Denmark	Common	In smaller buildings only for reheating, snacks etc. In larger building for preparation of hot and cold meals	Common in larger buildings	Common in all public buildings. In buildings with more than one occupant the reception might be shared among all users
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	Common	So called “tea kitchens” are common	Sometimes	Seldom
Greece	Depends on the function	A separate small room, often named kitchen, with a refrigerator and a coffee machine, may be available in many buildings.	Rare.	Not common, maybe concierge
Ireland	No data	No data	No data	No data
Netherlands	Common	Common	Common	Common
Sweden	Very common	Common, particularly “tea kitchens”	In larger buildings	Common
United Kingdom	Frequently	Yes, in the larger buildings, often with hot meal preparation	In most of the larger buildings.	In most of the buildings over 1000 m2. However, some of the premises over 1000 m2 will be in rented buildings which may have a main reception in the landlord’s space.

Public Sector Offices (I-L)

	I Dry sports	J Swimming pool	K Laboratory, workshop	L Residential (bedrooms, etc spec.)
Belgium	No data	No data	No data	No data
Denmark	No data	No data	No data	No data
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany				
Greece	Rarely library, laboratory, parking space, health centres, car services, press room, editorial room			
Ireland				
Netherlands				
Norway				
Sweden				
United Kingdom	Rare	Rare	Occasionally in the larger buildings, though will often be in special purpose buildings outside the main office.	Occasional caretaker's accommodation. <u>Council chamber</u> In most town, district and county halls <u>Auditorium</u> Common in town centre town halls circa 1860 - 1960 <u>Flat floor meeting hall/ exhibition space</u> Common in town centre town halls circa 1860 - 1960

Higher education (A-D)

	A Cellular office	B Open plan office	C Computer/ server room	D Debating chamber
Belgium	No data	No data	No data	No data
Denmark	Common in older buildings. Current trends are to open plan offices. Normally used by teaching staff in universities.	Common in new buildings and older buildings being rebuild or refurbished. Normally used for administration staff in universities.	Common in larger buildings.	Common in universities
Finland	No data	No data	No data	No data
France	No data	No data	Common	Common
Germany	Common	No	Common	Common
Greece	Common	Common	Common	Common
Ireland	No data	No data	No data	No data
Netherlands	Usually	No data	Yes	Yes
Norway	No data	No data	No data	No data
Sweden	Very common	Uncommon, but maybe in newer buildings	Very common	Very common
United Kingdom	No data	No data	No data	No data

Higher education (E-H)

	E Meeting room	F Kitchen	G Restaurant/Canteen	H Reception
Belgium	No data	No data	No data	No data
Denmark	Also used for classrooms, tutorial areas, seminar and common room.	Kitchen for heating of meals, snacks etc. in smaller buildings and in larger buildings for preparation of hot and cold meals.	Common in universities, some have more than one. Sometimes in laboratories	Common for all types. In buildings with more than one occupant the reception might be shared among all users.
Finland	No data	No data	No data	No data
France	Common	Common	No data	No data
Germany	Common	Common	Common	?
Greece	Common	Common for preparation of small snacks and preheating	Common. Not in KEK's and IEK's	Not common
Ireland	No data	No data	No data	No data
Netherlands	Yes	Common	Common	Common
Norway	No data	No data	No data	No data
Sweden	Very common	Very common, particularly tea kitchens	Common on larger campuses but typically run buy the Student Unions, who typically own their houses. Usually the facility management is carried out in cooperation with the owner of the university buildings	Common
United Kingdom	Includes classrooms, tutorial areas, seminar and common rooms	No data	Includes canteens and refectories	No data

Higher education (I-L)

	I Dry sports	J Swimming pool	K Laboratory, workshop	L Residential (bedrooms, etc spec.)
Belgium	No data	No data	No data	No data
Denmark	Common in universities	Sometimes in universities	Common in universities	Often on campus at universities. Includes washing facilities. Library Includes learning resource centres, reading room and computer labs.
Finland				
France				
Germany	Common	Sometimes	Common	Residential (bedrooms, etc) Sometimes
Greece	Sometimes, in major establishments	Sometimes, in major establishments	Common	Not common in Greece at all. Shops, post offices, bank offices Common in major public establishments Pressroom, printing office Sometimes Library Common Photographic studio Sometimes
Ireland				
Netherlands				
Norway				
Sweden	Uncommon, but common in Student Unions' houses	Uncommon, but sometimes in Student Unions' houses	Common at larger universities	Non, Student dormitories are typically run by companies owned by the Student Unions
United Kingdom				Residential (bedrooms, etc) Includes washing facilities Library Includes learning resource centres and reading rooms

Schools (A-D)

	A Cellular office	B Open plan office	C Computer/ server room	D Debating chamber
Belgium	No data	No data	No data	No data
Denmark	Principal Office	Teachers office and classrooms for teaching	On most schools	Rare
Finland	No data	No data	No data	No data
France	4.1% of the surface (Secondary schools)	67% of the surface (Secondary schools)	Increasingly.	No data
Germany	No	Classroom, common	Common (computer room)	Rare
Greece	Cellular office, in cases where a building accommodates two schools there are two principals offices.	Open plan offices, in cases where a building accommodates two schools there are two different teachers' offices.	Probably available in about 50% of secondary schools at the moment and increasing.	Commonly used as gym room and event room
Ireland	No data	No data	Increasingly.	No data
Netherlands	Usually	No data	Common	Yes
Norway	Limited numbers	No data	No data	Rarely
Sweden	Common	Uncommon	Common in secondary schools	Sometimes in secondary schools
United Kingdom	No data	No data	Increasingly	Secondary schools only

Schools (E-H)

	E Meeting room	F Kitchen	G Restaurant/Canteen	H Reception
Belgium	No data	No data	No data	No data
Denmark	Commonly used as event room, larger meetings, canteen	For educational purpose on primary schools. Preparation of hot and cold meals on boarding schools and on some high schools and vocational schools.	At larger schools	Often an open plan office for administration staff.
Finland	No data	No data	No data	No data
France	No data	No data	7.3% of the surface (Secondary schools)	
Germany	Rare	Common	Rare	Rare
Greece	Number varies between min. 6 and max. 20	In larger schools; offering re-warming of snacks	Only in private schools <u>Canteen</u> Almost always available	No data
Ireland	No data	Snacks, reheat or hot meal preparation	Secondary Schools only	
Netherlands	Yes	Common	Often combined with large gathering area	Common in secondary
Norway	No data	No data	No	No data
Sweden	Common	All schools make lunches	All schools make lunches	Common
United Kingdom	No data	Snacks, reheat or hot meal preparation	Often uses assembly space	No data

Schools (I-L)

	I Dry sports	J Swimming pool	K Laboratory, workshop	L Residential (bedrooms, etc spec.)
Belgium	No data	No data	No data	No data
Denmark	Common at larger schools	Only at some schools	Common on most schools	Only on boarding schools. Often with washing facilities. The energy consumption from living quarters are not included in this sector, but in sector 6.
Finland	No data	No data	No data	No data
France	2.3% of the surface (Secondary schools)			5% staffs resident and 12.7% dormitories of the surface (Secondary schools)
Germany	Common	Sometimes	Common	Seldom
Greece	Most common in private schools	Rare, only in some private schools	Secondary schools only	
Ireland		Secondary schools only, very rare	Secondary schools only	Secondary boarding schools
Netherlands	Often centrally consolidated in primary education Usually independent for secondary education	Usually not	Common in secondary	None
Norway	No data	Rarely		No
Sweden	Almost all primary & secondary schools	Very uncommon	Chemistry teaching laboratories in secondary schools	Only in folk high schools, etc.
United Kingdom			Secondary schools only	

Sport facilities (A-D)

	A Cellular office	B Open plan office	C Computer/ server room	D Debating chamber
Belgium	No data	No data	No data	No data
Denmark	Common in larger sport clubs and centres and are used for the management of the club/building.	Rare, only when administration of large sports clubs are placed in buildings with sports facilities.	Not common.	Not common.
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	No	No	No	No
Greece	Common	Not common, only found in Olympic venues	Not common, only found in Olympic venues	Not common
Ireland	No data	No data	No data	No data
Netherlands	Limited office space	No data	No data	No data
Norway	No data	No data	No data	No data
Poland	No info	No info	No info	No info
Sweden	Common in personnel areas	Uncommon	Uncommon	None
United Kingdom	Managers office	None	None	None

Sport facilities (E-H)

	E Meeting room	F Kitchen	G Restaurant/Canteen	H Reception
Belgium	No data	No data	No data	No data
Denmark	Rare, only when administration of large sports clubs are placed in buildings with sports facilities.	Often in privately owned buildings, rarely in public buildings. Only used for snack preparation.	Café/Kiosk Snack area in larger buildings. In smaller buildings combined with reception/desk.	Only in large public centres. Often the reception is combined with a kiosk in smaller buildings.
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	No	No	Sometimes	Rare
Greece	Common	Not common	Not common, only found in some Olympic venues Canteen Sometimes	Sometimes
Ireland	No data	No data	No data	No data
Netherlands	Sometimes	Sometimes	Sometimes	Sometimes
Norway	No data	No data	No data	No data
Sweden	One or two at each centre in the personnel areas	Common with cafes, etc, also tea kitchens for the personnel	Only in the largest centres	Always
United Kingdom	Function room in some cases	Snack preparation only - sometimes chip frying	Vending - snack area - café	Small reception and desk

Sport Facilities (I-L)

	I Dry sports	J Swimming pool	K Changing facilities	L Outdoor sports
Belgium	No data	No data	No data	No data
Denmark	Most buildings for sports contain at least two rooms for dry sports. The lager buildings contain several.	In centres with swimming pool. Mostly indoor.	Common in all types of buildings for sport. In larger buildings there can be several.	Common in clubs, dry sport centres and other buildings with sport facilities.
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	No data	No data	No data	No data
Greece	In indoor venues	In swimming centres	Common	In playing fields Press and TV-radio facilities Sometimes Shops Not common Medical room Sometimes, certainly in Olympic venues Parking facilities Often, certainly in Olympic venues Residential Very rare, only found in few Olympic venues
Ireland				
Netherlands	Yes	Sometimes	Yes	Sometimes
Norway		Not so common		
Sweden	Dry sport centres	Bath centres	Always	Not uncommon with a football field or a jogging track with outdoor lighting, also outdoor ice rinks are not uncommon (ice hockey and bandy very popular)
United Kingdom	See above (includes Bowls/tennis/squash halls)	See above	See above (Dry, Wet)	See above Fitness gym See above

Hospitals (A-D)

	A Cellular office	B Open plan office	C Computer/ server room	D Debating chamber
Belgium	No data	No data	No data	No data
Denmark	In health centres each doctor normally has an office. In hospitals administrative personnel and doctors might have either cellular offices or open plan offices. Not common in dental clinics.	In hospitals administrative personnel and doctors might have either cellular offices or open plan offices. Not common in dental clinics.	Common	Only in larger hospitals.
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	Rare	Some	Common	No
Greece	Common	Common	Common	Common
Ireland	No data	No data	No data	No data
Netherlands	Management, staff	Staff, administration	No data	Education
Norway	No data	No	No data	No data
Sweden	Common	Uncommon	Common	Only in regional/university hospitals
United Kingdom	No data	No	No data	No data

Hospitals (E-H)

	E Meeting room	F Kitchen	G Restaurant/Canteen	H Reception
Belgium	No data	No data	No data	No data
Denmark	Only in hospitals.	Large kitchen for preparation of food for patients in hospitals with kitchen. In other hospitals, health centres and dental clinics smaller kitchens for heating of food, snacks etc. for staff.	Kiosk/Café In hospitals.	Common in all health sector buildings
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	Some	Common	Common	Common
Greece	Common	Common	Common in hospitals, less common in health centres and private clinics	Common
Ireland	No data	No data	No data	No data
Netherlands	Staff	Central kitchen (patients/ restaurant)	Personnel & visitor restaurant	Several (by care & examination/ treatment department)
Norway	No data	No data	No data	No data
Sweden	Very common	Common, particularly tea kitchens for the personnel	Common in most major hospitals	Always
United Kingdom	No data	No data	No data	No

Hospitals (I-L)

	I Research laboratory	J Swimming pool	K Operating theatre	L Wards (overnight accom.)
Belgium	No data	No data	No data	No data
Denmark	Only in larger hospitals	Not common	Only in hospitals and in some specialized health centres.	Only in hospitals. In some larger hospitals both for patients and relatives.
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	Common	Sometimes	Common	Sometimes
Greece	Common	Not found	Common in hospitals	Common is hospitals, less common in health centres <u>Intensive care</u> Common in hospitals <u>Parking</u> Sometimes
Ireland				

	I **Research laboratory**	J **Swimming pool**	K **Operating theatre**	L **Wards (overnight accom.)**
Netherlands	A. Patient not present Patient present (clinical chemistry, medical microbiology, clinical pathology)			Care (general, special, child, nursery, day care) <u>Examination and treatment spaces</u> Consultations, organ examinations, imaging, nuclear medicine, outpatient, urgent treatment, surgery (operating theatre), delivery rooms, physiotherapy <u>Special functions spaces</u> Dialysis, revalidation day treatment, radiotherapy, central sterilization, pharmacy <u>Facilitating function spaces</u> Communal spaces (patients), misc. services (retail, hairdresser), overnight accommodation staff (availability shift), bed management, linen department, personnel locker rooms, central warehouse, concierge, technical services workshops, archives, central medical administration <u>Recreation space</u> Patients & staff
Norway		Rarely		
Sweden	Typically only in regional/university hospitals	Typically only in regional/university hospitals (treatment of rheumatism, etc.)	Common in hospitals	Always in hospitals
United Kingdom				

Hotels & restaurants (A-D)

	A Cellular office	B Open plan office	C Computer/ server room	D Debating chamber
Belgium	No data	No data	No data	No data
Denmark	Managers office in larger establishments	For administration staff at larger hotels, conference centres and holiday centres	Common in larger establishments	See above
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	No data	No data	No data	No data
Greece	Only in luxury accommodation facilities	No data	Only in luxury accommodation facilities	No data
Ireland	No data	No data	No data	No data
Netherlands	No data	No data	No data	No data
Norway	Limited numbers	No data	No data	No data
Sweden	Common in administrative areas	Uncommon	Server rooms in larger hotels	In all hotels
United Kingdom	Managers office in medium and larger hotels	None	None	No data

Hotels & restaurants (E-H)

	E Meeting room	F Kitchen	G Restaurant	H Reception
Belgium	No data	No data	No data	No data
Denmark	Common at larger hotels, conference centres and community homes	Common	Common at larger hotels, conference centres and holiday centres. Most hotels and motels have a breakfast room.	Common except in scout cabins and living quarters
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	No data	No data	No data	No data
Greece	Sometimes, in business or luxury hotels	In all types of hotels	In all types of hotels	In all types of hotels
Ireland	No data	No data	No data	No data
Netherlands	No data	No data	No data	No data
Norway	No data	No data	No data	No data
Sweden	In all business/luxury hotels	No data	In all business/luxury hotels	Always
United Kingdom	Meeting or function rooms in some cases	Most hotels have a catering kitchen	Most hotels have a restaurant or breakfast room	Reception foyer and desk

Hotels & restaurants (G-I)

	I Indoor dry sports	J Swimming pool	K Retail outlets	L Bar
Belgium	No data	No data	No data	No data
Denmark	At larger hotels, conference centres and holiday centres. Mostly fitness gym with exercise machines.	A small swimming poll at some larger hotels, conference centres and holiday centres.	At hotels, conference centres, holiday centres, youth hostels and camping cabins	Bar At some larger hotels, conference centres and holiday centres
Finland	No data	No data	No data	No data
France	No data	No data	No data	No data
Germany	No data	No data	No data	No data
Greece	Only in luxury or major hotels	Only in luxury or major hotels	Only in luxury or major hotels	Only in luxury or major hotels Laundrette Only in luxury or major hotels Hairdressers Only in luxury or major hotels Shops Only in luxury or major hotels Music facilities Sometimes Conference rooms About 460 officially registered in luxury or major hotels Garage Often found at business of luxury hotels
Ireland				
Netherlands				
Norway		Less than 50 %)		
Sweden	Common in luxury hotels	Common in luxury hotels	Common in luxury hotels	In almost all business/luxury hotels
United Kingdom	Fitness gym increasingly popular	Small swimming pools are increasingly common		Wet changing For swimming pool if present

4.2.6 Contacts and possible persons for the Industrial Steering Group

Some countries reported many contacts for the Industrial Steering Group whereas others where in the process of forminhg the group. The results for each country is shown in the Appendix.

4.2.7 Annual delivered energy use divided by fuels

The two tables below shows first the total heated floor area of each sector in each country and the the annual energy use per m^2. As for the number of buildings, the floor area may be compared with the number of inhabitants. This gives the following approximative relations:

- Denmark, Finland, Irland, and Norway about 1
- Belgium, Greece, and Sweden about 2
- Netherlands about 3
- France and United Kingdom about 12
- Germany about 18

Most of the data for Greece are the averge size per building, not the total floor area for the whole sector.

Heated floor area of each sector in each country

Floor area [1,000 m²]	Public Sector Offices	Higher Education	Schools	Sport Facilities	Hospitals	Hotels & Restaurants
Belgium	No Info	No Info	VL: 13 500	No Info	No Info	No Info
Denmark	3 800	3 000	18 500	3 440	8 220	7 100
Finland	No data	2 200	14 700	3 170	3 900	1 800
France	17 290	No Info	81 437	No Info	96 000	No Info
Germany	No data	No data	No data	No data	No data	No data
Greece	*Av 1950*	No data	7 200	*Av 1 500*	No data	*Av 3 270*
Ireland	No data	No data	7 785?	No data	No data	4 200
Netherlands	23 300	12 160	16 900	No data	7 111?	No data
Norway	2 983	3 000	11 936	3 100	2 300?	6 092
Sweden	> 4 900	> 3 257 (4 800)	37 300	5 700	13 500	H: 6 600 R: 1 200
United Kingdom	29 250	45 000	114 600	5 610	30 400	21 750

A closer look to the table above reveals that some of the data follows the relation in population wheras others differs a lot. The floor area for higher education is about the same in Denmark, Finland and Norway and about three times for the Netherlands. The number for Sweden in paranthises is the floor area for the university buildings of the main building owner the sector. To this area should be added the unknown aera of colleges etc. The hospital floor area is not following the population ratio. The same thing is that the number of sports facilities seems very low for the UK.

The table below shows the measured annual energy use per m2 for each sector in each country. For public sector offices the Dutch data are Primary energy and the Finnish data are expressed per m^3. For Norway the data are the total energy use. For the other countries the definitions of the floor area may differ.

Measured energy performance for each sector in each country [kWh/year & m^2]

Heating / Operat. Elec.	Public Sector Offices	Higher Education	Schools	Sport Facilities	Hospitals	Hotels & Restaurants
Belgium (VL)	214/75	189/56	197/31	244/108	256/100	300/172
Denmark	99/43	118/38	105/30	105/40	168/72	131/78
Finland kWh/m^3	44.7/15.8	No data	*Possible*	No data	No data	No data
France	141/57	No Info	~150/-	No Info	155/67	No Info
Germany	120/25	133/38	148/14	178/?	Per bed	No data
Greece	85/119	No data	65/43	322/37	299/108	198/75
Ireland	No data	No data	144/33?	No data	No data	No data
Netherlands	PE 356	127/70	131/34	No data	240/119	Total
Norway	T 233	T 235	T 194	T 279	T 389	T 295
Sweden (m^2 BRA)	130/?	110/111 (m^2 BTA)	144/? (133/70)	147/?	(148/?) 134/122	H: 154/? R: 146/?
United Kingdom	250/113	No data	144/33	343/105	358/133	400/140

The table above shows that annual energy use per m^2 is not easily compared for a building sector between the countires. A resonable result is that Greece is using the least heating for offices and schools. The exception for sport facilities is understandable because much heat is need for swimming pools. A more amasing result is that hotels & restaurants and hospitals in Greece use as much heat energy as in some of the northern countries.

Also the annual electrical energy use differs. Sometimes maybe the users´electricity may not be included. For Sweden there are no easely avaialbale official statistics for electricity use in premises buildings.

4.2.8 National metrics used such as floor area or building volume

Metric normally use for normalisation

Public Administration offices

<table>
<tr><td>Belgium</td><td colspan="3">No data</td></tr>
<tr><td>Denmark</td><td colspan="3"><table>
<tr><td>Name</td><td>Definition</td><td>Application</td></tr>
<tr><td>Floor area</td><td>Gross floor area, measured to the exterior of walls including area in use in attic, but excluding cellar. Adjoining rooms (e.g. shed, outhouse, ventilation room, balcony, terrace, etc.) are not included in the gross floor area.</td><td>To determine if a building is covered by ELO.</td></tr>
<tr><td>Living area</td><td>Gross floor area, measured to the exterior of walls including area in use in attic and cellar. Attic area is determined as area in residential use measured in a horizontal plane 1.5 m above floor to the exterior of the roof covering. Cellar area includes areas in residential use in cellar.
Including, access areas e.g. stairs and lifts. Adjoining rooms (e.g. shed, outhouse, ventilation room, balcony, terrace, etc.) are not included.</td><td>For calculation of consultants fee for domestic buildings.</td></tr>
<tr><td>Commercial area</td><td>Gross floor area, measured to the exterior of walls including area in use in attic and cellar. Attic area is determined as area in residential use measured in a horizontal plane 1.5 m above floor to the exterior of the roof covering. Cellar area includes areas in residential use in cellar.
Including, access areas e.g. stairs and lifts. Adjoining rooms (e.g. shed, outhouse, ventilation room, balcony, terrace, etc.) are not included.</td><td>For calculation of consultants fee for other building types among these, public buildings and business properties.</td></tr>
<tr><td>Heated area</td><td>Heated gross floor area measured to the exterior of walls, including heated attic, ½ of (unheated) cellar, and access areas e.g. stairs and lifts. The total area of the cellar that is heated is also included.</td><td>For calculation of energy labelling of a building with respect to heating consumption.</td></tr>
<tr><td>Unheated area</td><td>Unheated gross floor area measured to the exterior of walls, including unheated attic and ½ of (unheated) cellar. Shed, outhouse, garage etc.) are not included.</td><td></td></tr>
<tr><td>Total area</td><td>Total area = heated area + unheated area.</td><td>For calculation of energy labelling of a building with respect to electricity and water.</td></tr>
</table></td></tr>
<tr><td>Finland</td><td colspan="3">No data (building volume)</td></tr>
<tr><td>France</td><td colspan="3">kWh/m^2</td></tr>
<tr><td>Germany</td><td colspan="3">Gross Floor Area, Net Floor Area, Rented Floor area, heated gross floor area (VDI)
In non residential buildings no national wide binding regulation for the calculation of rented or sold floor area exists</td></tr>
<tr><td>Greece</td><td colspan="3">Floor area</td></tr>
<tr><td>Ireland</td><td colspan="3">No data</td></tr>
<tr><td>Netherlands</td><td colspan="3">Floor area</td></tr>
<tr><td>Norway</td><td colspan="3">No data</td></tr>
<tr><td>Sweden</td><td colspan="3">Floor area</td></tr>
<tr><td>United Kingdom</td><td colspan="3">Floor area.</td></tr>
</table>

Higher education

Belgium	No data
Denmark	See sector 1
Finland	No data
France	No info
Germany	Gross Floor Area, Net Floor Area, Rented Floor area, heated gross floor area (VDI) In non residential buildings no national wide binding regulation for the calculation of rented or sold floor area exists
Greece	Floor area
Ireland	No benchmark data available.
Netherlands	No data
Norway	No data
Sweden	Floor area
United Kingdom	Gross floor area (in ECON 54)

Schools

Belgium	No data
Denmark	See sector 1
Finland	No data
France	No info
Germany	Gross Floor Area, Net Floor Area, Rented Floor area, heated gross floor area (VDI) In non residential buildings no national wide binding regulation for the calculation of rented or sold floor area exists
Greece	Floor area
Ireland	No data
Netherlands	No data
Norway	No data
Sweden	Floor area
United Kingdom	Floor area

Sport centres

Belgium	Surface area of the swimming pool.
Denmark	See sector 1
Finland	No data
France	No info
Germany	Gross Floor Area, Net Floor Area, Rented Floor area, heated gross floor area (VDI) In non residential buildings no national wide binding regulation for the calculation of rented or sold floor area exists
Greece	Floor area
Ireland	No data
Netherlands	Primary electricity based on 40% efficiency
Norway	No data
Sweden	Floor area
United Kingdom	Gross internal floor area provides a default metric. Swimming pools are usually categorised by metres length and lanes (25m five lane). Sports halls are usually categorised by the number of badminton courts (four or six court).

Hospitals

Belgium	Surface or number of beds.
Denmark	See sector 1
Finland	No data
France	kWh/m^2
Germany	Gross Floor Area, Net Floor Area, Rented Floor area, heated gross floor area (VDI) In non residential buildings no national wide binding regulation for the calculation of rented or sold floor area exists
Greece	Floor area
Ireland	No data
Netherlands	Floor Area
Norway	No data
Sweden	Floor area
United Kingdom	GJ/100m^3

Hotels and restaurants

Belgium	No data
Denmark	See sector 1
Finland	No data
France	No info
Germany	Gross Floor Area, Net Floor Area, Rented Floor area, heated gross floor area (VDI) In non residential buildings no national wide binding regulation for the calculation of rented or sold floor area exists
Greece	Floor area
Ireland	No data
Netherlands	No data
Norway	m2
Sweden	Floor area
United Kingdom	Hotel size is invariably indicated by the number of bedrooms or beds. Gross internal floor area provides a default metric, which is related to the number of rooms in the benchmarking guides (see section 1.2 above). Restaurant size is often indicated by the number of covers but no relationship to building floor area has been identified in the benchmark literature.

Definition of metric of normalisation

Public administration offices

Belgium	m2
Denmark	See 2.2
Finland	m3
France	Heated floor area in m²
Germany	m2
Greece	Heated floor area in m².
Ireland	No data
Netherlands	Gross floor area (area for each floor measured from the perimeter of the outer wall)
Norway	m2
Sweden	BRA (= Useful area ≈ Gross internal area): Measured inside the external walls, less partitions between tenants, area for shafts and thick internal walls. In the future BTA = Gross external area is proposed for simplicity reasons.
United Kingdom	Stock statistics are mostly in NIA net internal area (also known as net lettable) in the figures above. This is the normal Valuation Office metric for commercial office space. Energy statistics in GPG 286 (reference 5.1A) are in treated floor area (TFA)

Higher education

Belgium	m2
Denmark	See sector 1
Finland	No data
France	No info
Germany	m2
Greece	Heated floor area in m²
Ireland	No data
Netherlands	No data
Norway	M2
Sweden	Akademiska Hus uses BTA = Gross external floor area in their environmental reports. Internally Akademiska Hus always uses LOA = premises area, on which the rents are based. Most other landlords probably use LOA or BRA.
United Kingdom	None found (in ECON 54)

Schools

Belgium	m2
Denmark	See sector 1
Finland	No data
France	Heated floor area in m²
Germany	m2
Greece	Heated floor area in m²
Ireland	m2
Netherlands	No data
Norway	m2
Sweden	BRA (= Useful area ≈ Gross internal area): Measured inside the external walls less partitions between tenants, area for shafts and thick internal walls. In the future BTA = Gross external area is proposed for simplicity reasons.
United Kingdom	Gross Internal Area (GIA) in ref 5.1A, Treated Floor Area (TFA) in ref 5.1B

Sport centres

Belgium	m2
Denmark	See sector 1
Finland	No data
France	No info
Germany	m2
Greece	Heated floor area in m²
Ireland	No data
Netherlands	No data
Norway	m2
Sweden	BRA (= Useful area ≈ Gross internal area): Measured inside the external walls less partitions between tenants, area for shafts and thick internal walls. In the future BTA = Gross external area is proposed for simplicity reasons.
United Kingdom	Gross internal floor area from the design process

Hospitals

Belgium	m2
Denmark	See sector 1
Finland	No data
France	Heated floor area in m²
Germany	kWh/bed
Greece	Heated floor area in m²
Ireland	No data
Netherlands	Gross floor area
Norway	m2
Sweden	BRA (= Useful area ≈ Gross internal area): Measured inside the external walls less partitions between tenants, area for shafts and thick internal walls. In the future BTA = Gross external area is proposed for simplicity reasons.
United Kingdom	GJ of delivered energy per 100 cubic metres of heated volume

Hotels and restaurants

Belgium	m2
Denmark	See sector 1
Finland	No data
France	No info
Germany	No data
Greece	Heated floor area in m²
Ireland	No data
Netherlands	No data
Norway	m2
Sweden	BRA (= Useful area ≈ Gross internal area): Measured inside the external walls less partitions between tenants, area for shafts and thick internal walls. In the future BTA = Gross external area is proposed for simplicity reasons.
United Kingdom	Gross internal floor area from the design process.

4.2.9 Weather normalisation procedures

Public administration offices

<table>
<tr><td>Belgium</td><td>No data</td></tr>
<tr><td>Denmark</td><td>In ELO a degree day system is used, named ELO-degree days. It is based on degree-days, GD, from the Danish Technological Institute calculated from measured data taken by the Royal Veterinary and Agricultural University in Copenhagen.
The starting point for the ELO method regarding the climatic correction, is that degree days among others are used in a overall comparison and levelling of yearly differences for buildings across the country.
Degree-days for the previous month are published for ELO consultants on the homepage of ELO around the first week in the subsequent month.
ELO-degree days for DFF-normal year and each year from 2000 to august 2004 can be seen in the table below.

<table>
<tr><td>Year</td><td>Jan</td><td>Feb</td><td>Mar</td><td>April</td><td>May</td><td>June</td><td>July</td><td>Aug</td><td>Sept</td><td>Oct</td><td>Nov</td><td>Dec</td><td>Total</td></tr>
<tr><td>DFF</td><td>519</td><td>486</td><td>444</td><td>311</td><td>154</td><td>58</td><td>22</td><td>18</td><td>91</td><td>207</td><td>341</td><td>461</td><td>3112</td></tr>
<tr><td>2000</td><td>443</td><td>383</td><td>400</td><td>229</td><td>112</td><td>85</td><td>36</td><td>32</td><td>103</td><td>165</td><td>275</td><td>396</td><td>2659</td></tr>
<tr><td>2001</td><td>461</td><td>450</td><td>469</td><td>317</td><td>129</td><td>93</td><td>9</td><td>15</td><td>124</td><td>151</td><td>357</td><td>506</td><td>3081</td></tr>
<tr><td>2002</td><td>457</td><td>360</td><td>378</td><td>278</td><td>113</td><td>35</td><td>19</td><td>0</td><td>80</td><td>301</td><td>372</td><td>524</td><td>2917</td></tr>
<tr><td>2003</td><td>509</td><td>518</td><td>412</td><td>298</td><td>142</td><td>29</td><td>8</td><td>19</td><td>81</td><td>319</td><td>292</td><td>394</td><td>3021</td></tr>
<tr><td>2004</td><td>532</td><td>431</td><td>403</td><td>258</td><td>142</td><td>83</td><td>46</td><td>13</td><td>79</td><td>211</td><td>347</td><td>400</td><td>2945</td></tr>
</table>
ELO-degree days for DFF-normal year and each year from 2000 to august 2004.

Degree-days Dependant Consumption (GAF) and Degree-days Independent Consumption (GUF) are two central notations in the ELO degree-days system. By means of degree-days, energy consumption for space heating (Degree-days Dependant Consumption, GAF) is corrected with respect to the outside temperature. The remaining part of the energy consumption (Degree-day Independent Consumption, GUF) contains the basic consumption including domestic hot water, e.g.:
• Domestic hot water
• Heat loss from re-circulation pipes for domestic hot water
• Etc.
Some of these heat losses are useful for the building during the heating season.
One degree day [K*24 hours] expresses a difference of 1 K between the average indoor temperature during a 24 hour day, which is set to be 17 °C, and the measured average outdoor temperature for a 24 hour day, $t_{out,ave.}$

GD = (17 - $t_{out,ave}$)*(one 24 hour day) [K*24 hour day]

The degree day corrected energy consumption is determined by:
$$E_{corr}[kWh] = GAF_{normalyear} + GUF = GAF[kWh] \cdot \frac{GD_{normalyear}(3112)}{GD_{actualyear}} + GUF[kWh]$$</td></tr>
<tr><td>Finland</td><td>No data</td></tr>
<tr><td>France</td><td>Degree day correction</td></tr>
<tr><td>Germany</td><td>Degree days (based on 15/20° degree</td></tr>
<tr><td>Greece</td><td>The common procedure for weather normalisation of heating energy is the DD method, while the procedure for normalisation of cooling is the CSI as described below.
1. The heating – cooling degree-day method (DDM): the concept primarily builds on the temperature difference between a base indoor temperature and the outdoor temperature, multiplied by the duration of the temperature difference. The length of heating and cooling season is pre-determined as is the base indoor temperature.
The climate severity index (CSI): an index of the relative influence of the climate on the heating consumption of a building. The absolute climatic influence on the heating or cooling requirements of a building depends on the building characteristics, but the relative climatic influence is quite independent of factors such as quality of the envelope, window to wall ratio or orientation of the building. The only significant factor remaining is the use of the building mainly due to internal gains. Assuming that buildings corresponding to the same sector have a similar value for internal gains it is possible to calculate the CSI corresponding to each sector for a certain geographic area.</td></tr>
<tr><td>Ireland</td><td>No data</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Netherlands</td><td>Heating degree days most likely if any, though unknown if applied here and, if so, if applied correctly.</td></tr>
<tr><td>Norway</td><td>Degree-day (GD) Norwegian Meteorological Institute</td></tr>
</table>

	Factor 0,4 ; 40 % of the consumption subject to be adjusted to outdoor temperature
Sweden	Degree days: four major climatic zones exist, but DD is available for about 300 locations in 10 zones. Room temperature is 17°C. Heating limits for each month: A day during the following months gives 0 DD if the average outdoor temperature is higher than April 12°C; May, June, July 10°C: August 11°C; September 12°C; October 13°C Energy signature is also used, but not common.
United Kingdom	For offices, Reference 5.1A and B makes weather corrections to a 2462 heating degree-days at a 15.5°C base. 2462 was chosen for the initial energy guides in the 1970s as the 20-year average of the eighteen degree-day regions for the UK over the previous two decades. The figure needs review, owing to climate change, which has reduced the average by nearly 10%, and population density (most people are in the south). The adjustment is made for fossil fuel only (those in buildings with electric heating are asked to refer upwards for advice) and, oddly, to 100% of its consumption. There is no normalisation for exposure There is no normalisation for cooling. *(NOTE FOR DEFENCE BUILDINGS. These do normalise the heating percentage of fossil fuel use only. For electric heating, the allowance for delivered electricity is 0.76 times the fossil fuel benchmark, which seems high).*

Higher education

Belgium	No data
Denmark	See sector 1
Finland	No data
France	No info
Germany	Degree days (based on 15/20° degree)
Greece	See sector 1
Ireland	No data
Netherlands	Heating degree days most likely if any, though unknown if applied here and, if so, if applied correctly.
Norway	Degree-day (GD) Norwegian Meteorological Institute Factor 0,6 ; 60 % of the consumption subject to be adjusted to outdoor temperature
Sweden	Degree days: four major climatic zones exist, but DD is available for about 300 locations in 10 zones. Room temperature is 17°C. Heating limits for each month: A day during the following months gives 0 DD if the average outdoor temperature is higher than April 12°C; May, June, July 10°C: August 11°C; September 12°C; October 13°C Energy signature is also used, but not common
United Kingdom	None found (in ECON 54)

Schools

Belgium	No data
Denmark	See sector 1
Finland	No data
France	Degree day correction, 73% for heating and 27% for DHW
Germany	Degree days (based on 15/20° degree)
Greece	See sector 1
Ireland	No data
Netherlands	Heating degree days most likely if any, though unknown if applied here and, if so, if applied correctly.
Norway	Degree-day (GD) Norwegian Meteorological Institute Factor 0,6 ; 60 % of the consumption subject to be adjusted to outdoor temperature
Sweden	Degree days: four major climatic zones exist, but DD is available for about 300 locations in 10 zones. Room temperature is 17°C. Heating limits for each month: A day during the following months gives 0 DD if the average outdoor temperature is higher than April 12°C; May, June, July 10°C: August 11°C; September 12°C; October 13°C Energy signature is also used, but not common
United Kingdom	Reference 5.1C makes weather corrections. When the benchmark graph is displayed, the benchmark levels are always the same within each category. The individual school, however, may have its consumption level reduced slightly to reflect geographical location. The warmest area of the UK receives no allowance, while all the others have some level of reduction. This is calculated by assuming that 75% of the fuel consumed is used for heating, and reducing this component by multiplying it by the ratio of the annual degree days in the warmest area to the annual degree days in the area under consideration. If your school is in the warmest area, its reduction factor is one, whereas all other areas have a reduction factor of less than one. Work is currently underway to allow year on year weather corrections.

Sport centres

Belgium	No data
Denmark	See sector 1
Finland	No data
France	No info
Germany	Degree days (based on 15/20° degree)
Greece	See sector 1
Ireland	No data
Netherlands	Heating degree days most likely if any, though unknown if applied here and, if so, if applied correctly.
Norway	Degree-day (GD) Norwegian Meteorological Institute Factor 0,6 ; 60 % of the consumption subject to be adjusted to outdoor temperature
Sweden	**Degree days**: four major climatic zones exist, but DD is available for about 300 locations in 10 zones. Room temperature is 17°C. Heating limits for each month: A day during the following months gives 0 DD if the average outdoor temperature is higher than April 12°C; May, June, July 10°C: August 11°C; September 12°C; October 13°C **Energy signature** is also used, but not common.
United Kingdom	Benchmark Guide 51 (1996) provides no weather normalisation. Benchmark guide 78 (2000-current) provides three different zones: Scotland, South of England, and the rest.

Hospitals

Belgium	Degree-days 15/15.
Denmark	See sector 1
Finland	No data
France	Degree day correction
Germany	Degree days (based on 15/20° degree)
Greece	See sector 1
Ireland	No data
Netherlands	Heating degree days most likely if any, though unknown if applied here and, if so, if applied correctly.
Norway	Degree-day (GD) Norwegian Meteorological Institute Factor 0,4 ; 40 % of the consumption subject to be adjusted to outdoor temperature
Sweden	Degree days: four major climatic zones exist, but DD is available for about 300 locations in 10 zones. Room temperature is 17°C. Heating limits for each month: A day during the following months gives 0 DD if the average outdoor temperature is higher than April 12°C; May, June, July 10°C: August 11°C; September 12°C; October 13°C Energy signature is also used, but not common.
United Kingdom	Degree day correction

Hotels and restaurants

Belgium	No data
Denmark	See sector 1
Finland	No data
France	No info
Germany	Degree days (based on 15/20° degree)
Greece	See sector 1
Ireland	No data
Netherlands	Heating degree days most likely if any, though unknown if applied here and, if so, if applied correctly.
Norway	Degree-day (GD) Norwegian Meteorological Institute Factor 0,2 ; 20 % of the consumption subject to be adjusted to outdoor temperature
Sweden	**Degree days**: four major climatic zones exist, but DD is available for about 300 locations in 10 zones. Room temperature is 17°C. Heating limits for each month: A day during the following months gives 0 DD if the average outdoor temperature is higher than April 12°C; May, June, July 10°C: August 11°C; September 12°C; October 13°C **Energy signature** is also used, but not common.
United Kingdom	Benchmark Guide 36 (1993) provides no weather normalisation. The HCIMA Hospitable Climates “Heat” on line benchmarking procedure does not appear to provide any weather normalisation, but this has not been confirmed. Introduction to Energy Efficiency in Catering Establishments provides no weather normalisation in the main procedure but an appendix describes the NPI procedure, which includes normalisation of heating by degree days.

Other comments

Public administration offices

Belgium	No data
Denmark	No data
Finland	No data
France	No data
Germany	No data
Greece	No data
Ireland	No data
Netherlands	Some governmental organizations and municipalities have an older building stock. There are exceptions to the EPBD requirements for monuments or protected buildings, which may apply to some of these buildings.
Norway	No data
Sweden	No data
United Kingdom	No data

Higher education

Belgium	No data
Denmark	No data
Finland	No data
France	No info
Germany	No data
Greece	No data
Ireland	No data
Netherlands	Universities often have an older building stock, which causes higher energy consumption. Moreover, there are exceptions to the EPBD requirements for monuments or protected buildings, which may apply to some of these buildings.
Norway	The m2 are probably higher: qualified guess 2.500.000 m2
Sweden	No data
United Kingdom	No data

Schools

Belgium	No data
Denmark	No data
Finland	No data
France	No data
Germany	No data
Greece	No data
Ireland	No data
Netherlands	No data
Norway	No data
Sweden	No data
United Kingdom	In its background information, ref 5.1C includes benchmarks for secondary schools with a swimming pool, but this category is not in the drop-down menu of school types available when data is input.

Sport centres

Belgium	No data
Denmark	No data
Finland	No data
France	No info
Germany	No data
Greece	No data
Ireland	No data
Netherlands	No data
Norway	No data
Sweden	No data
United Kingdom	No data

Hospitals

Belgium	No data
Denmark	No data
Finland	No data
France	Difficulty using benchmarks generally in the health sector due to: • wide range of activities in health sector buildings, with wide range in energy intensity • frequent change of activity type from year to year within the same building • increasing activity levels and number of energy consuming clinical equipment • problems breaking down energy use to assign to specific activities/buildings due to lack of submetering and no recent analysis of historical data Statistical sources propose surfaces by bed (the surface varies in the cases studied between 80 and 130 m ²). The surface by bed is - 123 m² in the public - 87.5 m² in the private sector. The surface by bed in new construction (except laboratories, poles mother-child, and urgency) is of 85m ² / bed in the public and of 77 m ² by bed in the private. It could be interesting to use the indicator of kWh/bed as a specific indicator of performance for health sector.
Germany	No data
Greece	No data
Ireland	No data
Netherlands	No data
Norway	No data
Sweden	No data

United Kingdom	GJ/100m^3 metric is out of line with all other UK benchmarks, which are based on kWh/m^2 treated floor area. Some trusts have improved performance simply by taking out false ceilings and increasing building heated volume. Also benchmark data from GPG72 is well out of date. NHS has targets set in 2001 of 35-55 GJ/100m^3 for new build, 55-65 GJ/100m^3 for existing buildings, and 15% energy/carbon absolute reduction target to be achieved by 2010. Although policy and target setting is devolved to the regions, Wales, Scotland and NI have adopted the same targets as for England. Difficulty using benchmarks generally in the health sector due to: • wide range of activities in health sector buildings, with wide range in energy intensity • frequent change of activity type from year to year within the same building • increasing activity levels and number of energy consuming clinical equipment • problems breaking down energy use to assign to specific activities/buildings due to lack of submetering and no recent analysis of historical data Against a background of 3-5% growth in actual estate size per annum. Current thinking is that the hospital types in GPG72 are too crude and no longer reflect the diversity of types and usage mix in the NHS and that a new typology of up to 10 categories may be needed. Furthermore, the original classification of buildings into categories was not necessarily based on systematic criteria: for example, a hospital might be categorized “acute” even though only 10% of its facilities are for acute services. Thus comparison within usage categories becomes difficult. A more formal set of criteria for categorization needs to be developed, coupled with revised list of categories, and then linked to consistent and reliable data, for a more definitive and useful benchmark approach to be developed. At the moment a piecemeal approach is being taken: the NHS in Scotland developing a tailored benchmark approach based on activity type (i.e., eight separate components: theatres, laundries, etc) as a way of improving accuracy of benchmark. Builds up tailored benchmark based on activity type GP benchmark and floor area (Energy Monitoring and Targeting System, available from SEEP Forum website), so that each hospital has a unique signature benchmark. Extension of this approach to the entire UK is under discussion. GPG72 was largely based on Scottish data in the first place, since this data was in a more readily usable format. WHE in Wales have commissioned ESD to develop an Estates Energy Model, which breaks down main metered energy usage to buildings and departments based on activities, but uses GPG72 benchmarks and categories. NHS Estates in England have commissioned work to assess the viability of existing estates data to develop more useful benchmarks.

Hotels and restaurants

Belgium	No data
Denmark	No data
Finland	No data
France	No info
Germany	No data
Greece	No data
Ireland	No data
Netherlands	No data
Norway	No data
Sweden	No data
United Kingdom	No data

4.2.10 Availability of energy benchmarks (energy targets)

	Public Sector Offices	Higher Education	Schools	Sport Facilities	Hospitals	Hotels & Restaurants
Belgium	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Denmark	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Finland	No Info	No Info	No Info	No Info	No Info	No Info
France	**Yes**	No Info	**Yes**	No Info	**Yes**	No Info
Germany	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No data**
Greece	**Yes**	**No data**	**Yes**	**Yes**	**Yes**	**Yes**
Ireland	**(UK)**	**(UK)?**	**(UK)?**	**(UK)?**	**(UK)**	**(UK)**
Netherlands	**(New)**	**(New)**	**(New)**	**(New)**	**(New)**	**(New)**
Norway	**No data**	**No data**	**No data**	**No data**	**No data**	**No data**
Sweden	**(New)**	**(New)**	**(New)**	**(New)**	**(New)**	**(New)**
United Kingdom	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

As the table above shows there are available energy benchmarks for almost all sectors of existing public buildings in some countries: Belgium, Denmark, Germany, and the UK. In Finland, Netherlands, Norway, and Sweden benchmarks are available only for new buildings. France has benchmarks for some building sectors and Ireland has a tradition to adopt UK benchmarks.

4.2.11 Reports and data from case studies

Only a few countries answered this question. The result is shown in that national review in the Appendix.

5. Regional reviews

5.1 British Isles: United Kingdom and Ireland

The UK data in this report is only about the region of England and Wales. Scotland has its own implementation of the EPBD and Northern Ireland is currently in a political stand-still. Ireland has a tradition of adopting UK methods inside trhe building sector.

In the spring of 2005 the implementation of the EPBD in both UK and Ireland was delayed and not much was sure.

UK has a tradition of benchmarks for different premisis building types. These benchmarks are based both on stastistics and on energy audits of smaller building populations. This means that much of the data needed for the EPLabel project is already available in the UK, at least in principle. However, the devil is always in the details which means that some data probably will have to be adjusted.

Ireland did not have much of benchmarks when this survey was done in the spring of 2005 but there was on ongoing audit of schools.

5.2 Central Europe: Poland, Czech Republic, Austria, Switzerland, and Germany

Only Germany is a partner country inside EPLabel. As written earlier no data was reported from the subcontractors as the funding was strictly limited and other areas were seen as more important. Consequently, there is no idea to make any regional review of central Europe.

5.3 “Nordic” Countries: Norway and Denmark

Denmark has a nearly ten year old tradition of annual energy certification of existing buildings, whereas Norway has nothing like this. However, the new Danish system for larger buildings is planned to be based on Asset Rating and only made every fifth year, compared with the old system (ELO) which was based on operational rating (excluding the tenants´ energy) and made annually or every second year.

Even if Norway is not a member of the EU it has to implement the EPBD. The details of this implementation was unsure in the spring of 2005.

Norway has a tradition of electrically heated buildings because of an electricity system whole based on hydropower. This means that submetering of heating and operational electricity is not that common. Norway has presently a system for energy auditing to identiy energy conservation measures (ENØK) based on regional offices, which means that the implementation varies a lot. There are some available benchmarks but the quality is unclear.

5.4 South-West Europe: France and Spain

The limited funding for the subcontractor in Spain was seen to be used for more important tasks inside the project. Consequently, there is no idea to make any regional review of South-West Europe.

5.5 South-East Europe: Italy and Greece

The limited funding for the subcontractor in Italy was seen to be used for more important tasks inside the project. Consequently, there is no idea to make any regional review of South-East Europe.

5.6 Benelux Countries: Belgium and Netherlands

Belgium has three different regional implementaton of the EPBD whereas the Netherlands has a national implemenation but it has meet some political problems.

The Belgian implenmentation scheme that seemed to be more or less on the track in the spring of 2005 was the one for the Flemish Region. The Brussels region will probably adopt a close copy of this system, wheras the Vallon implementation was unclear. The avaliblity of benchmarks in Belgium are mainly from earlier projects run by the BBRI.

The Dutch implementation was unsure in the spring of 2005 because of political problems. The Netherlnds has a energy certifcation system for smaller buildings and was developing a system for premises buildings. Benchmarks are not easily available.

5.7 Countries around the Baltic Sea: Sweden, Finland, Estonia, and Lithuania

The plans in the project were that Estonia and Lithuania were to participate in EPLabel on national funding. However, no such funding was available why no data could be collected from these countries. Estonia has made some work in line with the Finnish energy audits mainly of schools.

The implementation of the EPBD in both Estonia and Lithuania was unclear in the spring of 2005.

Finland has a long tradtion of what is called energy audits of certain types of premises buildings. The benchmarks produce by this auditing has not been public available but are used by Motiva in the audit work. The audit tradition is especicially strong when it come to industries and their process and buildings.

The Finnish implementation of the EPBD was also unclear in the spring of 2005.

The Swedish implementation of the EPBD in the spring of 2005 was dealt with by an offcial investigation that was to publish a midterm report in November 2005. Not much details were known ecept that the building and property industry favoured operstional rating and this was the weay rthat the invetsgationintended to propose.

Sweden has a tradition of good heating energy statistics of premsises buildings since the oil crises in the 1970s. However, no easly avialable statistics exist when it comes to the electrciity use in the buildings. Consequently, benchmarks of the types needed in EPLabel do not exist in Sweden.

Appendix

Country Reviews

Belgium
Denmark
Finland
France
Germany
Greece
Ireland
Netherlands
Norway
Sweden
United Kingdom