



ENPER - TEBUC

## **Energy Performance of Buildings**

Legal Context and  
Practical Implementation of an  
Energy Performance  
Legislation



## SAVE ENPER TEBUC

### Task B3 : Legal Context and Practical Implementation of an Energy Performance Legislation

(Final Report – 10/09/03 )

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## **Important remark**

The aim of this report is to give the reader a qualitative indication of the overall situation of the implementation of energy performance regulations in Europe.

The authors are aware that all details in this report are probably not correct and, therefore, the reader should not take each individual statement for the absolute truth. The reasons are multiple : differences in terminology, differences in interpretation of the questionnaires, need for synthesis and simplification of sometimes complex situations and also in some cases lack of knowledge of all aspects of the national legislation

## 1.Aims of the Report

The calculation procedures used for assessing the energy performance level of a building and of the impact of building technologies are a crucial part of the whole EP implementation. Meeting the challenges 1-6 of figure 1.1 is ambitious. However, at least as important is the achievement of another range of challenges related to the legislative aspects, (Figure 1.1, challenges 7 to 14).

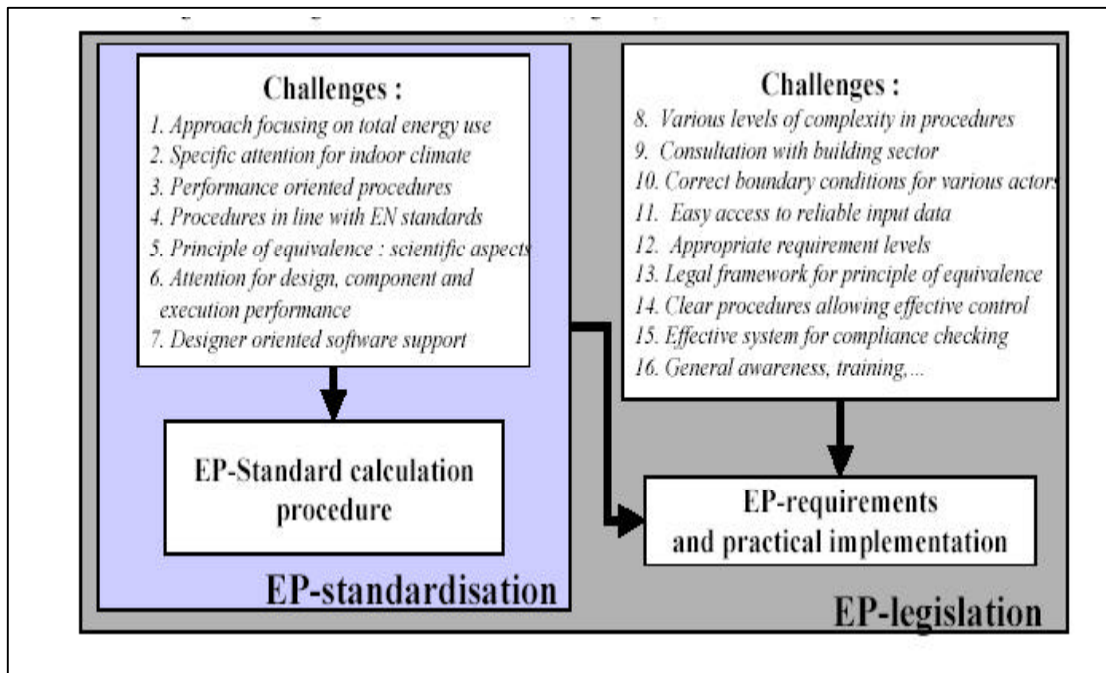


Figure 1.1 Overview of challenges for achieving an effective Energy Performance legislation

Specific issues of the present report are :

- Is there a possibility need for proof of compliance after the works / upon delivery/ upon completion ?
- Which control procedures are applied ? What are the possible actions in case of non compliance ?
- Is there information available about the compliance with the regulations? Evolution over time since first thermal building regulations ?
- Which is the present degree of compliance with the new European Directive for the Energy Performance of Buildings ?

## 2. Legal Context and Practical Implementation of an EP legislation

### 2.1 Introduction

The overall investigation on the legal context of the EP regulation in each country is examined in five different steps. The first one concerns general information on the EP regulation, the second deals with the requirements and the characteristics of the EP during the design phase, the third deals with the construction phase while the third, fourth and fifth parts deal with the 'upon delivery' and the 'after construction' phases respectively, Figure 2.1.

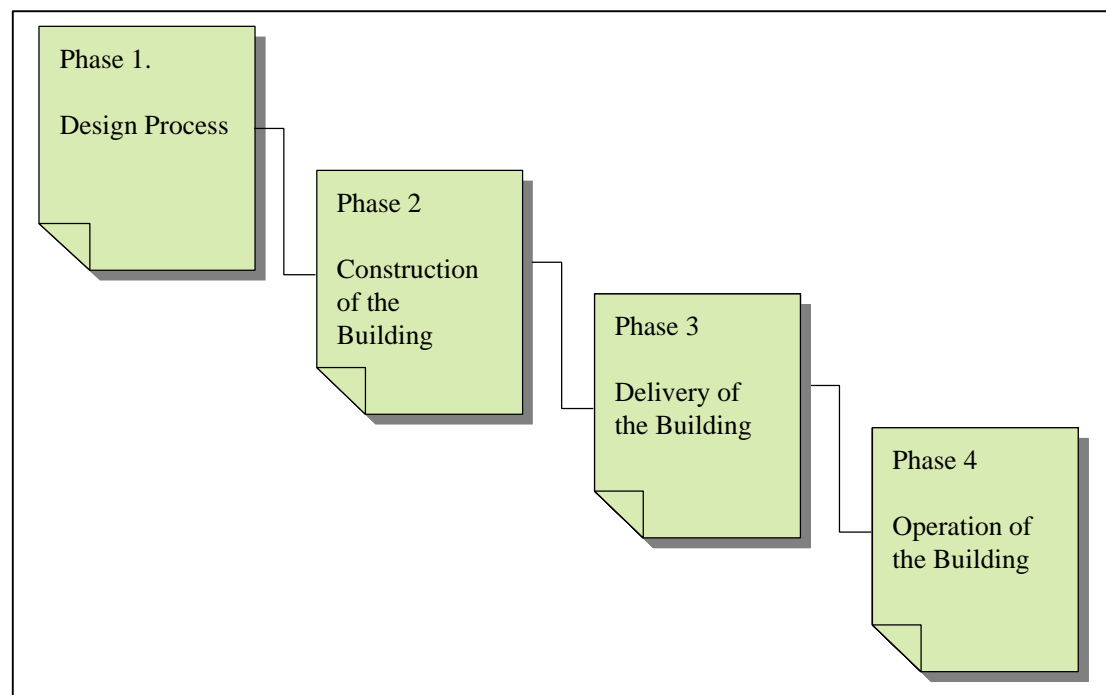


Figure 2.1 : Main Phases of the Building process examined in the present report.

Using a specific questionnaire that has been distributed to the participating countries has collected the reported information. Countries that have replied are : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Israel, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and UK. It is important to note that for **Belgium** (proposal for Flemish Region) there are different procedures for the 3 Regions and certain descriptions concern envisaged new regulations.

### 2.2 General Information on the National EP procedures

In this part of the report the procedure followed by each national EP is analysed. Also, information on the type of buildings covered by the EP is given.

There are two types of legal procedures followed by the national EP regulations.

- According to the first procedure followed by all countries except of France and Belgium (proposal for Flemish region), the designer or the responsible engineer has to prepare a document that should satisfy the specific requirements of the regulation. This may involve energy calculations or specific estimations, (like U values, shading values, etc). The document has to be submitted to an official authority in order to obtain the permission to build. Calculations may be checked or not. During the construction or later the authority may check or not the compliance with the regulation.
- In the second procedure, followed by France and Belgium (proposal for Flemish region), the responsible designer or the building owner has to certify that the building regulations will be respected. A control by the authorities is possible when the building is finalised or even all along the construction process and the first years of use in France.
- Application of the EP procedure is a mandatory requirement for all participating countries, except Ireland where the method is optional and applies only to new dwellings.

As it concerns the type of buildings where the EP applies, the overall situation is shown in Table 2.2.1 of the Annex. Energy performance regulations apply to all new residential and non-residential buildings except of UK where EP applies only to new residential buildings. In the UK EP procedures can be used as a method of compliance for new non-residential buildings if desired. Early indications following the recent (April 2002) change to the Regulations suggest that such methods are now more popular for these building types than they were before when simple prescriptive (i.e. maximum U-values etc.) approaches were the dominant methods of compliance. Buildings not designated for human occupation as well as non-conditioned buildings are excepted in almost all countries.

As it concerns, existing buildings, all countries, except Italy, do not apply any specific EP regulation, (Table 2.2.1). Some minor exceptions are in Denmark in case that the building changes its use and in Germany where boilers have, under conditions, to be replaced.

As it concerns the applications of the EP regulations to buildings subject to renovation, Austria, France, Israel, Spain and UK<sup>1</sup> do not apply any specific requirements, (Table 2.2.1). In Belgium (proposal for Flemish region) only thermal insulation requirements are in force, while Finland,

Germany, Greece, Italy, Netherlands, Norway and Portugal ask to comply, both residential and non-residential buildings, only in cases of major renovation. Finally, in Sweden, EP regulations have to be applied in the affected part of the building.

Finally, during major extensions of existing buildings all countries except Italy, Spain and UK, ask for a full application of their national EP regulation in both residential and non-residential buildings. In Finland, EP has to apply in case the surface of the exterior envelope increases, (Table 2.2.1).

The EP procedure suggested in the participated countries is unique for all building types except for Belgium (proposal for Flemish region) where there is a different approach according to the building type or the type of works and in UK where EP applies only to new residential buildings. See note above about the use of EP procedures in the UK for new residential and new non-residential buildings

In all countries, except Belgium (proposal for Flemish region), Austria and Switzerland, performance regulations apply to the whole country. In the three mentioned states a regional approach is followed.

### **2.3 Legal Aspects during the Design Phase**

The main legal aspects during the design phase of a building deal with the responsibilities of the building owner, of the engineers, of the responsible person to perform the EP calculations as well as of the authorities in charge to control the proper application of the legislation. Other parameters of interest deal with the application of possible energy certification schemes, as well as with the application of the equivalence principle.

The specific situation in all involved countries regarding the legal aspects during the design phase is summarised in Annex 2.

As it concerns the responsibility of the building owner, in almost all countries he is just responsible to select and give the contract to the other actors of the design.

- In Belgium (proposal for Flemish region), the owner is responsible if he explicitly refuses to implement the measures proposed by the EP adviser and due to which the building not longer meets the legal requirements.

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<sup>1</sup> "The UK consists of England, Wales, Scotland and Northern Ireland. Strictly speaking the results reported here apply only to England and Wales, but much is also applicable to Scotland and Northern Ireland."

- In France, and probably in other countries, the owner may hire a control office to supervise the design of the building, while he is also the responsible person to decide to apply for a voluntary certification method. But even if the owner hires such a control officer he is responsible to follow or not to follow the advices of this control officer.

The architects and engineers are responsible for the overall design of the building and in specific countries, (Austria, Germany, Greece Italy, and Spain), should carry out the EP calculations assisted or not by experts. A slightly different situation is in France, Finland, Ireland, Netherlands, Norway, Portugal, Sweden and Switzerland, where the engineers should design the building but may not perform the EP calculations, which may be carried out by other persons. However, as mentioned, it is very common that the building engineers take care of the EP calculations. In France and in Israel, architects and engineers of a building may not perform or deal with any EP calculations during the design phase. Finally, in Belgium (proposal for Flemish region), the engineers of the future building and EP expert: at the time of the request for the building permit, they both commit themselves to observe the requirements, and they provide an indicative, non-binding list of practical measures they anticipate to implement in order to achieve the required overall energy efficiency.

Energy performance calculations may be performed by any one in most of the countries, (Denmark, Finland, France, Ireland, Netherlands, Norway, Portugal, Sweden, Switzerland, and UK), where specific requirements to carry out energy calculations have not be set up. On the contrary in Austria, Belgium (proposal for Flemish region), Germany, Greece, Italy and Spain, energy performance calculations, should be performed only by accredited experts.

As it concerns the possible control of the energy performance calculations, three different conditions have been identified.

- In some countries like Switzerland there is no control. In particular, in Norway a self control approach is applied.
  - In UK, Finland, and Portugal it is at the discretion of the building control authorities to check the calculations.
  - Finally, in Spain, Netherlands, Greece, Germany, Denmark, Italy and Austria, energy calculations should be checked by the authorities.
  - France, Belgium (proposal for Flemish region) and Israel are not mentioned because is not mandatory to perform any energy performance calculations.

The requested final requirements of the EP calculations vary from country to country.

In Switzerland, Sweden, Portugal, Italy, Ireland, Denmark and Portugal the final annual energy consumption of the building has to be reported. Denmark has 3 different methods to carry out the thermal insulation either U-values, sum of  $U \times A$  or energy frame

- In The Netherlands, Germany and France, the annual primary energy consumption is the main requirement of the EP legislation.
- In Spain, Israel and Finland, the U values and the performance of some other building components have to be reported.
- In Greece, the final annual energy consumption as well as the performance of some building components have to be calculated.
- In Norway, EP deals either with the U values of the building or its annual energy consumption.
- Finally, in UK the energy label based on the EP procedure has to be displayed in all new dwellings which shows

a) An index in the range 1 to 120, based on the costs per unit floor area per year, for space and water heating, and

b) An index in the range 0.0 to 10.0, based on the CO<sub>2</sub> emissions per unit floor area per year, attributable to space and water heating (for a standard occupancy and heating level).

Most of the countries do not apply any energy certification scheme based on the calculated energy performance of the building, (Belgium (proposal for Flemish region), Finland, Germany, Ireland, Israel, Netherlands, Norway, Portugal, Spain, Sweden and UK).

- In Austria and Greece an energy certification scheme based on the calculated energy consumption of the building is in force. :
- In Denmark there is a mandatory energy labelling of commercial and residential buildings. For small buildings (less than 1500 m<sup>2</sup>) the labelling is done when a building is sold. The rating is calculated. The energy rating include efficiency of boilers, hot water production and electricity consumption. It is expected that the coming energy frame in Danish Building Regulation in 2005 will include these factor. The seller of a small building is responsible to ensure that the energy rating and energy plan is not older than 3 years. For larger buildings (1500 m<sup>2</sup> or more) it is obliged to have an energy rating and an energy plan drawn up for the building once a year. The energy

rating include efficiency of boilers, hot water production and electricity consumption. The rating is measured data and not calculated as for the small buildings.

- In France, different certification schemes exist. A first energy label with two levels HPE (high energy performance) and THPE (very high energy performance) is directly linked to the energy regulation. A second label "qualitel" covers broadly "construction quality" and is mainly applied to apartment buildings. This qualitel label covers a broader field than energy. HPE and THPE labels can be obtained as an option to the qualitel label. A third label "vivrelec" is developed by Electricite de France. It covers energy performance as well as comfort in the building using electricity for heating. A fourth label "NF maison individuelle" covers single family houses. It is a global quality label. It includes a systematic verification of technical regulations. So even if it is not mandatory to perform energy performance calculation at the design stage in France, it becomes mandatory when you request a label.
- Finally in Switzerland, classification is not mandatory. The existing regulation asks to fulfill just the requirement. However, if the heat use is lower than a much lower limit, the building may get the MINERGIE label that allows to obtain subventions in some states.

Finally, as it concerns the application of the equivalence principle :

- Italy, Denmark, Israel, Spain, UK, and Switzerland do not apply for the moment the principle. Although the principle of equivalence is not explicitly mentioned in the UK Regulations it is perfectly possible to use any approach to comply with the Regulations provided they give the same level of energy performance and you can satisfy the local authority. Each instance has to be evaluated on a case by case basis – see Task B2.. Energy performance regulations in all other countries allow such an application.
- In Austria, The innovative system has to ensure that the energy consumption is equal or less than a conventional system. No special form is required. The architect or planner has to demonstrate the equivalence. .
- In Belgium (proposal for Flemish region), the principle is stated, but there is no practical development as yet. In Finland, there is a national energy calculation method whose principles are very similar than those of EN 832.. In the same country, there is no standard procedure for report and every designer has freedom to use his/her own presentation.

- In Germany, innovative systems may be treated as conventional components. Construction details or manufacturer certificates may be asked for by the building office. In Ireland, the principle applies for the energy requirements in the Building Regulations generally, but not for the Heat Energy Rating method.
- In the Netherlands, the applicant may try to convince the Municipality that his/her solution is equivalent to the intention of the performance as required/ to the level of performance as required.
- In Norway, , the building code is to a large extent based on functional requirements, with very few detailed descriptions on how the building elements should look like. This gives freedom to the designers, as long as they can document that the general requirements in the code are fulfilled.
- Finally, in Portugal, the professional have to explain and prove that the alternative is equal or better than the initial solution.
- In France a commission is in charge of assessing proposal to apply the principle of equivalence which can be prepared by any actor. This commission advises the Minister of Housing who finally gives or not its approval.

#### **2.4 Legal Aspects during the Construction Phase**

The main legal aspects considered for the construction phase of a building, deal with possible inspections and the characteristics of these inspections, possible penalties or sanctions applied in the case of non compliance with the EP legislation, as well as with aspects related to the legal responsibility during the construction. The specific situation in all participating countries is summarised in Annex 3.

As it concerns possible inspections during the construction phase, three specific legislative conditions have been identified. Countries that apply a self control procedure, countries that apply a mandatory or voluntary control procedure and finally countries applying a non control procedure.

- In some countries, Israel, Norway and Sweden, a self- control procedure is followed. In Norway, . the control procedure is based on a documented self-control, carried through by the contractor or by an independent assessor hired by the contractor or the owner of the building. In Sweden, a quality liable person is assigned by the owner, then the control plan is decided by the local building committee after suggestion by the Byggherre, (owner) and his staff. The control

plan is decided by local building committee after suggestion by the Byggherre, (owner) and his staff.

- Mandatory or voluntary control during the construction phase is applied by Austria, Netherlands, Italy Portugal, Denmark, Finland, Germany, Greece and Ireland. In Austria, the community controller can, (but does not have to), make inspections during the construction phase. Most of the time there is no inspection during the construction. There is no predetermined procedure - it depends on the controller. In Belgium (proposal for Flemish region), there are random checks. Officials can inspect the construction site or the finished building at any time up to 5 years after submittance of the dossier-as-built. In principle anything that enters the EP calculation may be checked. In Denmark, sometimes - the municipality can come on a visit. In practice the building owner hires an engineering firm to control the construction (insulation level of constructions and pipes). It is voluntary to have a quality assurance. A self control approach is also applied for large projects. In Finland, the communal authorities have right to do intermediate inspections.. The control procedures concern mainly water and sewage systems, ventilation systems and thermal insulation, but not e.g. heating systems. The control is made mainly in those points, in which security and healthy considerations must be taken into account The control is made for the design, the final systems and structures and also for some intermediate constructions..A self control approach is also applied. In France the same principle is applied and the inspection can be done up to 2 years after the completion of the building.

- In Germany and in Greece, the building office is authorised to check the compliance of the building with the regulations at any time. It checks the thickness of insulation, the type of boilers, etc. Finally, in Portugal, a building control officer may visit and monitor the building during construction. Most buildings are not monitored, but a proportion are. Any aspect covered by the Building Regulation may be inspected. In all countries where control is voluntary or mandatory, officials of the local municipality or the responsible of the building office performs controls. |

- Finally, countries not applying any control during the construction phase are Spain, Switzerland and UK.

As it concerns penalties or sanctions because of the non compliance with the EP regulation :

- most of the countries, and in particular UK, Switzerland, Sweden, Spain, Portugal, Netherlands, Israel, and Austria do not apply such actions., However, in Switzerland, the

energy declaration of the building has the same importance as any other information of the file given to get the building permit: if one of these element is not respected, the architect can be sued. In Norway, a "completed"-certificate is not given in case of non compliance with the EP regulations. The authorities normally do not themselves control that the building process are in line with the official requirements concerning energy performance. They shall control that the documentation and control plans exist. In Ireland, the builder/developer may be asked to make good the non-compliant aspect. An Enforcement Order may be served, the building project would be halted (this can be served during and up to five years after the completion of the building).

- In Greece, Italy and Germany, the builder-owner or his representative are ordered to change the parts which are sub-standard., or the construction may stop. In Finland, municipal authorities can demand corrections, stop the building process or determine fines.
- In Denmark, the controller may ask to change the constructions to the promised insulation level. In practice to be solved between the building owner and the building contractor. Also, The building owner can stop the building process or stop the payment to the contractor.
- In France the authorities can require compensating actions, for example improvement of the heating system if the insulation level is not the one planned and if it is too late to replace it. In case of problems financial penalties can be determined by the judge.
- Finally, in Belgium (proposal for Flemish region), financial penalties can be imposed.

As it concerns possible responsibility of individuals in case of non compliance with the EP regulations :

- in UK, Switzerland, Spain, Portugal, Netherlands, no one has any responsibility.
- In Norway, and in Denmark the full responsibility is with the contractor, while
- in Greece, Germany , France, Italy and Sweden, the responsibility is with the owner.
- In Ireland and Switzerland responsibility belongs to the individual/organization responsible for the project as specified in the application to the local authority.
- In Finland, : If the fault is in the desing, then the designer has the responsibility. If the fault is in real constructions or systems, so that they are not according to the design, then the head of the construction or the installation works has the responsibility.

- Finally, in Belgium (proposal for Flemish region), as it concerns responsibility, if the information in the dossier-as-built is not correct: the expert/architect is responsible, if requirements are not met: due to the fact that the owner refuses certain necessary measures the owner is responsible. For the moment there is no practical experience.

## 2.5 Legal Aspects during the Upon Delivery Phase

The main legal aspects considered for the upon delivery phase of a building, deal with possible inspections and the characteristics of these inspections, possible penalties or sanctions applied in the case of non compliance with the EP legislation, as well as with aspects related to the legal responsibility upon the delivery of the building, and the application of certification schemes during this phase. The specific situation in all participating countries is summarised in Annex 4.

As it concerns inspections and controls during the upon delivery phase, many countries do not apply any, (Switzerland, Spain, Portugal, Netherlands, Ireland and, Austria). .

- In France also some random checks can be performed.
- In UK, Buildings are usually inspected by building control on completion; however this does not cover the details of the EP procedure. Checking is to establish that the building was constructed according to the plans that were approved.
  - In Sweden, the control report is turned in to the local building committee this is required to get an "end of construction" certificate.
  - In Norway and Denmark, a "completed" certificate is given based on running reports to the authorities about documented self-controls during the building process and a "completed" report worked out by the contractor.
  - In Greece and Italy the building control office is authorised to check the compliance of the building with the regulations at any time.. However, the procedure has not yet applied.
  - In Germany, the building office is authorised to check the compliance of the building with the regulations at any time. It checks the thickness of insulation, the type of boilers, etc.
  - In Finland, the water flow rates in heating systems and the air flow rates in ventilation systems and vents are measured and balanced. The working of control systems is tested. These are done by the designers and the installers.

- Finally, in Belgium (proposal for Flemish region), there are random checks whether the dossier as built is correct.
- It has to be mentioned that in Norway and Sweden a self-control procedure is applied.

In the above countries, where official control has to be carried out, (Finland, Germany, UK, and Greece), inspections are performed by representatives of the state or of the local municipality.

As it concerns possible sanctions,

- in UK, : the completion certificate, necessary before building can be occupied, is withheld until the building control authority is satisfied.
- in Norway, a "completed"-certificate is not given .
- In Greece and in Italy he owner has to change the parts that do not comply with the regulation or in case of a serious bias.
- In Germany, it is necessary to change Off the sub standard construction parts.
- In Belgium (proposal for Flemish region), there are financial penalties proportional to the extent of non compliance.
- Finally, in Finland, the sanctions can be fines or prohibition to take the building into use..

As it concerns responsibility,

- in Belgium (proposal for Flemish region) if the dossier-as-built is not correct: the expert/architect is responsible, if requirements are not met: due to the fact that the owner refuses certain necessary measures the owner is responsible. For the moment there is no practical experience.
- In Finland, the responsibility remains to them who have made faults.
- In Sweden, Italy and Greece, the responsibility is with the owner,
- in UK is with the builder, in Norway is the contractor that has the responsibility while
- in Germany both the builder and the owner assume the responsibility.

Finally, as it concerns certification schemes applied during the upon delivery phase,

- in UK, The SAP rating must be displayed (or conveyed to occupier) for each new dwelling (see note at top of page 8 above) while

- in Germany, there is a certification that must contain the calculation procedures, the heat loss coefficient of the walls, the efficiency of the heating and air conditioning devices and the calculated primary energy consumption of the building.

## **2.6 Legal Aspects during the After Construction Phase**

The main legal aspects considered for the 'after construction' phase of a building, deal with possible inspections and the characteristics of these inspections, the systems to be inspected, possible penalties or sanctions applied in the case of non compliance with the EP legislation, as well as with aspects related to the legal responsibility after the construction and the application of certification schemes during this phase. The specific situation in all participating countries is summarised in Annex 5.

As it concerns inspections and controls during the 'after construction' phase, many countries do not apply any, (UK, Switzerland, Spain, Portugal, Netherlands, Ireland and Israel).

- In Sweden, for some parts such as ventilation, chimneys also the buildings position and size is controlled but not for EP more for safety compliance these certificates are needed to get an "end of construction" certificate.

- In Greece and Italy, the building control office is authorised to check the compliance of the building with the regulations at any time.. However, the procedure has not yet applied.
- In Germany, there is a yearly inspection by the chimney sweep independent of the type of building for all heating systems between 4 and 400 kW with gaseous or liquid fuels.
- In France, the control is not systematic, a part of the building is controlled. The strategy to control buildings is defined at a regional level. The approach is to use the control as a mean to enhance quality. . So controls are focus on points where non compliance to regulations seems most common
- In Finland, : after the construction there is a final, official inspection by the communal authorities, before the building can be taken into use.
- In Denmark, the municipality can come on a visit but in practice they do not. If it is a bigger building project with a firm to control sometimes they make a control of the energy consumption of the ventilation system.
- In Belgium (proposal for Flemish region), a random checking may be done in any building.

- Finally, in Austria, the controller compares the real building with the data from the architect's plan.

As it concerns the systems and components to be controlled,

- in Sweden the Ventilation, chimneys, building size and position are controlled.
- In Greece and Belgium (proposal for Flemish region) all parameters related to the EP may be controlled.
- In Germany, CO<sub>2</sub>, CO and soot content of the exhaust fumes are measured, which provides information on the efficiency of the boiler, the rest of the system is inspected.
- In France, controls are focus on type of buildings and part of the regulations where quality problems are referenced.
- In Finland, the communal authorities have freedom to decide the content and width of the final inspection. Usually they concentrate on issues, which are coupled with safety and healthy issues. In general may control : Exterior walls and windows, stoves, ventilation systems and tap water and electric network systems.
- In Denmark, : Boilers, Ventilation system. and energy consumption are controlled mainly in large buildings.
- Finally, in Austria, the outside dimensions and the structure of the walls, roof, ceiling, windows and doors as well as the g-value of the windows are controlled. In all countries control is performed by representative of the state or of the local community.

As it concerns possible sanctions or penalties,

- in Austria, in case of non compliance, there will be a new inspection after the necessary modifications. The building gets no authorisation of use.
- In Belgium (proposal for Flemish region), financial sanctions can be imposed. The dossier as built need to be corrected. Sanction is proportional to the infringement.
- In France, if a certification was requested the certificate can be withdrawn. Sanctioning system is seldom used.
- In Germany, the attention of the owner is called to bad or non compliant values. There is the theoretical possibility to shut down a bad system but this is never done in practice.
- In Italy there are economic sanctions

- In Norway, a requested certificate is not given, while
- in Greece, the owner has to change the parts that do not comply with the regulations. All other countries do not apply any sanctions.

As it concerns the responsibility for non compliance with the EP regulations,

- in Belgium (proposal for Flemish region), if the dossier-as-built is not correct: the architect is responsible, if requirements are not met: due to the fact that the owner refuses certain necessary measures, the owner is responsible. For the moment there is no practical experience.
- In Finland, the responsibility belongs to whom has made faults, while
- in Greece, Italy, Sweden, Germany and Austria the responsibility is with the owner.

Finally, as it concerns application of certification schemes during the after construction phase,

- in Greece, a certification scheme applies as function of the energy,
- in Austria, a certification is made upon the real building.
- In Germany, every year a certification according to the controls on the boiler efficiency is provided.
- Finally, the certification applied in France is already mentioned in the previous chapters.

## **2.6 Some Conclusions**

Based on the above, an attempt has been made to codify the legal situation regarding EP legislation in the participated countries. The results of the codification are given in Figure 2.6.1.

As it concerns the Calculation Procedure during the Design Phase two specific conditions are applicable in Europe.

- Condition A1 : Calculations are required to demonstrate compliance with the regulations.
- Conditions A2 : A declaration of the Owner that the design complies with the regulation has to be done. Calculations are not required.

Condition A1 is the dominant one in Europe as A2 is applied only by France and Belgium (proposal for Flemish region).

As it concerns the control of the submitted calculations, three specific conditions have been identified :

- Condition B1 : The Energy performance calculations are not controlled by the state. : Local authorities shall control that documentation of energy performance. The authorities may of course control the calculations, but are not obliged to do so. (Applied by Norway)
- Condition B2 : The Energy performance calculations may be controlled by the state, (Applied by UK, Portugal, Finland and Israel)
- Condition B3 : The Energy performance calculations should be controlled by the state, independently if this is done or not, (Applied by Denmark, Austria, Spain, Netherlands, Switzerland, Greece, Germany and Sweden )

As it concerns the control procedures during the construction phase, three specific conditions have been identified :

- Condition C1 : The Construction Procedure is not inspected by the state or a responsible body, (applied by UK, Spain, Portugal, Switzerland)
- Condition C2 : The Construction Procedure may be inspected by the state, (applied by Austria, Denmark, Netherlands, Greece, Finland, France, Ireland, Germany and Belgium (proposal for Flemish region))
- Condition C3 : A self inspection procedure is applied, (Norway, Sweden and Israel, may also be applied by Denmark and Finland)

Concerning the legal status for the 'Upon Delivery ' Phase, three specific conditions have been identified :

- Condition D1 : The building is not inspected by the state or a responsible body upon its delivery, (applied by Denmark, Spain, Portugal, Switzerland, France and Ireland)
- Condition D2 :The building may be inspected by the state upon its delivery, (applied by Finland, UK, Greece, Germany, Netherlands, Belgium (proposal for Flemish region) and Austria)
- Condition D3 : A self inspection procedure is applied, (Norway, Sweden and Israel, may also be applied by Denmark and Finland)

Finally, as it concerns the 'After Construction' phase, , three specific conditions have been identified as well :

- Condition E1 : The building is not inspected by the state or a responsible body after its construction, (applied by Ireland, UK, Switzerland, Norway, Finland and Israel, Portugal, Spain)
- Condition E2 :The building may be inspected after its construction, (applied by : France, Netherlands, Belgium (proposal for Flemish region), Greece, Denmark, and Sweden)
- Condition E3 : A mandatory inspection procedure is applied, (Germany, Austria)

As shown from the analysis of the main characteristics of the EP regulations of the participating countries, only Germany and Austria present exactly the same characteristics. It is evident that the general legal frame in the European countries, not just for energy or buildings, varies as the legal tradition and the way that the state acts is very different.

It is expected that the new European Directive for buildings will help to harmonize and homogenize the legal frame concerning the energy consumption of buildings. Thus, it is extremely important to examine the existing situation in the European countries regarding the requirements of the EP Directive. Such an analysis is performed in the following chapter.

NO	A1	B1	C3	D3	E1
UK	A1	B2	C1	D1	E1
DK	A1	B3	C2	D1	E2
A	A1	B3	C2	D2	E3
SP	A1	B3	C1	D1	E1
PT	A1	B2	C1	D1	E1
NL	A1	B3	C2	D2	E2
CH	A1	B3	C1	D1	E1
GR	A1	B3	C2	D2	E2
D	A1	B3	C2	D2	E3
FR	A2		C2	D2	E2
B	A2		C2	D1	E2
FI	A1	B2	C2	D2	E3
S	A1	B3	C3	D3	E2
IL	A1	B2	C3	D3 D1	E1
SI	A1	B3	C2 C1	D1	E3
IT	A1	B3	C2	D2	E2
	Design Calcul	Check Design	During Constr .	Upon Deliver	After Constr .

Figure 2.6.1. Codification of the characteristics of the EP regulations in Europe

### 3. Legal Context of the Implementation of the EPD

This part of the document aims to investigate the degree at which the EPR of the participating countries fulfil the main requirements included in the new EP Directive for Buildings. Also, to investigate the actions undertaken or not undertaken by the States in order to satisfy the specific requirements of the EPD.

The specific research focuses on six important articles of the Directive and in Particular articles 3-10. A specific questionnaire has been prepared and sent to the participants of the project. Seventeen countries, twelve EU member states, (B, DK, D, SU, FR, IE, IT, NL, GR, PT, SP, S and UK), and five non-member states, (IL, CH, RUS, and NO, SL) have been replied.

The obtained results are discussed in the following for all the six articles and the participating countries.

#### 3.1 Article 3 : Adoption of a methodology

*According to article 3 of the EPD : 'Member States shall apply a methodology, at national or regional level, of calculation of the energy performance of buildings on the basis of the general framework set out in the Annex. Parts 1 and 2 of this framework shall be adapted to technical progress in accordance with the procedure referred to in Article 14(2), taking into account standards or norms applied in Member State legislation. This methodology shall be set at national or regional level. The energy performance of a building shall be expressed in a transparent manner and may include a CO2 emission indicator'.*

The specific situation in the participating countries is summarized in Table 3.1.1. As shown, none of the 13 member countries completely satisfies the requirements of article 3. Most of the countries satisfy partly the requirements. There is one country, (GR), where the new methodology according to EPD, is almost ready, four countries , (B-FL, DK, FR, PT), where the new methodology is under preparation and four countries, (SU, IE, SP, UK), where the preparation of the new methodology has not yet started.

Topic : Energy Performance Methodology. Member States have to prepare a methodology of calculation of the energy performance of buildings.

Country	Situation
Belgium, Flemish Region	<p>Calculation methodologies for new buildings have been developed for residential buildings at the one hand and offices and school on the other hand. They take into account all aspects listed in the EPD annex points 1. and 2. The determination procedures are now subject to approval by the Flemish public authorities before they will take effect. The energy performance is expressed in terms of primary energy. For informative purposes only, the corresponding CO2 emission will probably be listed on the energy certificate. (But requirement expressed in terms of primary energy only). For other types of new buildings the procedures need to be extended.</p> <p>Brussels and Wallonia: in principle they have shown interest to adopt the methodology developed for Flanders. Existing buildings: in recent years an energy advice procedure has been developed (in the framework of Belgian and European -SAVE Belas- projects) for existing residential buildings. It partly covers the points 1. and 2. listed in the annex. It could be a first basis for certification. In future a greater degree convergence between the determination procedures of new and existing buildings may be desirable</p>
Denmark	<p>The existing calculation methodology fits partly with the EPD requirements A new calculation methodology is under preparation. The impact of the Directive on the labelling of large buildings is under examination. A proposal on the labelling of new large buildings is under preparation.</p>
Finland	<p>The existing methodology does not correspond to the requirements of the EPD. It is unclear when the preparation of a new calculation methodology will start.</p>
France	<p>The existing calculation methodology fits partly with the EPD requirements. Calculation methods that refer to the A/C load and the use of renewable energies are not included and have to be prepared during the next 2 years.</p>
Germany	<div style="border: 1px solid black; height: 20px; width: 100%;"></div> <p>In Germany there exist methods for energy performance calculations which</p>

	<p>fulfill all the requirements of the EPD. For small and medium residential buildings the EN 832 is used, for other buildings the DIN 4701-10 or the DIN 4801-6 (monthly calculations); cooling loads are calculated by VDI 2078.</p> <p>But the aspects of lighting and cooling are not used in the EP calculations, energy for cooling is not included in the EP or EPmax of buildings.</p>
Ireland	<p>The existing calculation methodology fits partly with the EPD requirements. It covers just the heating load and the hot water demand. It is expected that a new methodology according to the requirements of the EPD will be developed in 'due course'.</p>
Israel	<p>The existing methodology does not correspond to the requirements of the EPD. A new method that fits with EPD has been proposed but it is unclear if and when the new calculation methodology will be adopted..</p>
Italy	<div data-bbox="464 1039 1362 1106" style="border: 1px solid black; height: 30px; margin-bottom: 10px;"></div> <p>The Italian EPR already applies a methodology of calculation of the energy performances of buildings</p> <p>The energy performance of a building is expressed as an "energy requirement for heating divided by the building volume and by the degree days of the site" [MJ/(m<sup>3</sup> °C days)].</p> <p>In addition, some partial energy performance indicators are applied (annual energy efficiency of the heating system, annual energy efficiency of the heat generator, transmission heat loss volumic coefficient of the building).</p> <p>The following specific requirements are not fulfilled:</p> <ul style="list-style-type: none"> <li>a) Air-conditioning installation is not taken into account</li> <li>b) Lighting installation is not taken into account</li> <li>c) Residential building are not classified into single family houses and apartment blocks, but rather into continuously occupied buildings and discontinuously occupied</li> </ul>

Greece	The existing methodology does not correspond to the requirements of the EPD. A new methodology that fits perfectly with the requirements of EPD has been prepared and it is expected that will be applied by 2004.
Netherlands	Different methods (mandatory and non-mandatory) are applied which seem compatible to this artikel of the EPD. A CO2-indicator is foreseen in the revised version (2004) of the EP Standard for residential buildings
Norway	The existing methodology does not correspond to the requirements of the EPD. A new methodology that fits with the requirements of EPD is under preparation and is planned to be finished during 2003
Portugal	The existing methodology does not correspond to the requirements of the EPD. A new methodology that fits with the requirements of EPD is under preparation and is planned to be finished during 2003 and to be implemented in 2004
Russia	There is a calculation methodology that involves several aspects of EPD
Slovenia	Not clear
Spain	The existing calculation methodology fits partly with the EPD requirements. It is not clear when a new methodology will be developed.
Sweden	The methology of calculation is available in Sweden and a CO2 indicator is not mandatory but is often calculated for larger buildings when they are built.
Swiss	There is a calculation methodology that involves several aspects of EPD
UK	The existing calculation methodology fits partly with the EPD requirements. It is now being developed to meet the requirements of the EPD..

Table 3.1.1 Situation in the participating countries regarding article 3 of EPD.

As it concerns the non-member states, Norway has already started the preparation of the new methodology according to the requirements of EPD, while Russia, Switzerland and Israel do not plan any specific actions in order to comply with the EPD specifications.

The specific situation in each member state is as follows :

In Belgium – Flemish region, calculation methodologies for new buildings have been developed for residential buildings at the one hand and offices and school on the other hand. They take into account all aspects listed in the EPD annex points 1. and 2. The determination procedures are now subject to approval by the Flemish public authorities before they will take effect. The energy performance is expressed in terms of primary energy. For informative purposes only, the corresponding CO<sub>2</sub> emission will probably be listed on the energy certificate. (But requirement expressed in terms of primary energy only). For other types of new buildings the procedures need to be extended.

In Denmark, the existing methodology fits partly with the requirements of the new Directive. DBUR, works on three main projects concerning implementation of the new EU-directive (funded by Danish Energy Authority and National Agency for Enterprise and Housing):

- 1) To develop a method to calculate the energy performance in relation to the directive. At the moment just the net energy demand is calculated and the a method for lighting, air-conditioning, heating installations and hot water supply has to be prepared.
- 2) To give a survey of the influence of the directive on the existing labelling of large buildings. At the same time make proposals to do the existing labelling scheme more efficient still in relation to the directive.
- 3) To make a proposal for a labelling method for new large buildings as it is decided that new buildings could be treated differently than existing ones.

In Finland, the existing methodology does not correspond the methodology of EPD. The EP of the building is given in U-values and the EP must be given in more extended way in future.

In France the existing calculation procedure fits quite well with the EPD requirements. The main missing part are : the energy consumption for air conditioning, and the contribution of renewable energies and CHP technologies. The plan is to add it in the near future (2 years).

In Ireland, at present the energy rating methodology in the Irish Building Regulations (the 'Heat Energy Rating' method) applies to new dwellings only, and does not meet all of the requirements of the EP Directive. It covers demand for space and water heating, but not the supply and conversion of sources of heat. It takes account of insulation, ventilation, solar and internal gains, the hot water system, and control and responsiveness of the space heating

system. The result is expressed in a simple and transparent manner: kWh per m<sup>2</sup> of floor area per year.

However, a new energy rating method for dwellings, which will meet the requirements of the Directive, is planned by Sustainable Energy Ireland. It is expected that an energy performance methodology meeting the requirements of the Directive for other building categories will be developed or adopted in due course.

In Italy, EPR already applies a methodology of calculation of the energy performances of buildings. The energy performance of a building is expressed as an "energy requirement for heating divided by the building volume and by the degree days of the site" [MJ/(m<sup>3</sup> °C days)].

In Germany there exist methods for energy performance calculations which fulfill all the requirements of the EPD. For small and medium residential buildings the EN 832 is used, for other buildings the DIN 4701-10 or the DIN 4801-6 (monthly calculations); cooling loads are calculated by VDI 2078.

But the aspects of lighting and cooling are not used in the EP calculations, energy for cooling is not included in the EP or EP<sub>max</sub> of buildings. In Germany there are only a few hot days in the year with the need of cooling. Residential buildings therefore are very seldom equipped with cooling devices. Only buildings or parts of buildings where internal loads have to be removed - like concert halls, lecture halls, operating rooms in hospitals etc. are regularly equipped with cooling devices. But operating times for these devices in many cases are only a few hours per year. The EnEV (German Energy Performance Regulation) in these cases allows, that building and cooling device may be optimized in such a way that energy consumption for cooling is minimized.

In the German EnEV also the typology of buildings is different from the classification given in Annex A. The EnEV only knows two types: buildings with normal inside temperatures (more than 4 months above 19 °C) and those with low inside temperatures (more than 12°C and less than 19°C for more than 4 months). Buildings with normal inside temperatures are divided into residential and other buildings to allow the use of simplified calculation methods for residential buildings.

In Greece, the existing methodology does not correspond to the requirements of the EPD and as in Finland it is based just on the U value of the building. A new methodology that fits

perfectly with the requirements of EPD has been prepared and it is expected that will be applied by 2004.

In the Netherlands, different methods (mandatory and non-mandatory) are applied which seem compatible to this artikel of the EPD. A CO<sub>2</sub>-indicator is foreseen in the revised version (2004) of the EP Standard for residential buildings

In Portugal, a new Building Energy Regulation is now being prepared, as an objective of Energy Police of the Government. It focus on two main goal. The first one, deals with thermal insulation requirements. In the other end the overall methodology is planed to follow very closely the new European Directive and CEN standards. The working group which is now preparing the work, is quite aware of the purposes of the new Directive, and regarding Article 3, the overall methodology which will be implemented in the new regulation will apply the principles of the Annex A.

In Sweden, the methodology of calculation is available and a CO<sub>2</sub> indicator is not mandatory but is often calculated for larger buildings when they are built.

In Spain, the new regulation include aspects related to the envelope, lighting and systems, but the energy consumption is not calculated in a integrated way. In particular, the methodology that concerns the envelope calculates the building energy demand during the heating and cooling periods and compares with a reference building. The part of the legislation that refers to lighting it is devoted to non-residential buildings, and establishes a limit value for the "lighting energy efficiency" which represents the "W/m<sup>2</sup>" needed for every 100 lux. So lighting is evaluated independently of the rest of the energy consumption. Finally, the part of the methodology that refers to systems does not include any calcuation procedure. Thus, the new regualtion has to be reformulated in order to satisfy the requirements of the EPD.

In UK, the existing legislation satisfies partly the EPD requirements. In particular, for the residential buildings in April 2002 the UK introduced a new version of the SAP (The Government's Standard Assessment Procedure for energy rating of dwellings). This version provides two ratings (both of which are normalised for the dwelling's floor area):

- i) a cost-based rating (the SAP rating)
- ii) an index based on CO<sub>2</sub> emissions (the Carbon Index).

In a general way, a framework is in place, but significant technical, procedural and legislative adjustments will need to be undertaken during the next 3 years in order to be in a position to comply with the Directive.

As it concerns non domestic buildings, the existing legislation, does not yet refer to a standard way of calculating the energy performance. . For offices only the Carbon Performance Rating (CPR) has been introduced to estimate the likely carbon emissions due to the design of heating, lighting, mechanical ventilation and air conditioning systems, but the method is only one of a number of alternative ways of showing compliance. One alternative, also aimed at offices, is the Carbon Emissions Calculation Method (CECM). This allows further design freedom, provided the calculated carbon emissions of the proposed design are no worse than those of an equivalent design that would comply using the prescriptive compliance route (ie minimum requirements for U-values, heating, lighting etc). Any professionally acceptable calculation method or software may be used to make the comparison of carbon emissions. There is at present no requirement to estimate energy performance for non-domestic buildings

Israel, right now has only a Thermal Insulation Standard, which prescribes a maximum value for the Voluminal energy Loss, G. No calculation of yearly energy utilization or other factors is required. In a proposed Energy Code, it is suggested to base the minimal mandatory requirements and energy grading on an energy performance calculation that is in line with Article 3, but to enable also the option of a prescriptive approach that is usually preferred by many entrepreneurs and designers. It is not clear yet how much time will pass until this recommendation is implemented. In the meantime the tendency of the relevant Standardization Committee is to prefer the prescriptive approach.

Norway is not a EU member, but as an EOS country Norway will comply to EPD as other EU member countries The present building regulation and the Norwegian standards do not include the Energy Performance legislation suggested in the Energy Performance Directive (EPD).

Finally, in Russia and Switzerland they apply methodologies that fit partly with the requirements of the EPD. In any case, as both countries do not belong to EU have no intention to comply with the EPD requirements.

### **3.2 Article 4. Energy performance Requirements**

According to article 4 of the EPD :

*'1. Member States shall take the necessary measures to ensure that minimum energy performance requirements for buildings are set, based on the methodology referred to in Article 3. When setting requirements, Member States may differentiate between new and existing buildings and different categories of buildings. These requirements shall take account of general indoor climate conditions, in order to avoid possible negative effects such as inadequate ventilation, as well as local conditions and the designated function and the age of the building. These requirements shall be reviewed at regular intervals which should not be longer than five years and, if necessary, updated in order to reflect technical progress in the building sector. The energy performance requirements shall be applied in accordance with Articles 5 and 6. 3. Member States may decide not to set or apply the requirements referred to in paragraph 1 for the following categories of buildings:*

*— buildings and monuments officially protected as part of a designated environment or because of their special architectural or historic merit, where compliance with the requirements would unacceptably alter their character or appearance,*

*— buildings used as places of worship and for religious activities,*

*— temporary buildings with a planned time of use of two years or less, industrial sites, workshops and non-residential*

*- agricultural buildings with low energy demand and non-residential agricultural buildings which are in use by a sector covered by a national sectoral agreement on energy performance,*

*— residential buildings which are intended to be used less than four months of the year,*

*- stand-alone buildings with a total useful floor area of less than 50 m<sup>2</sup>. are part of a renovation to be carried out within a limited time period, with the abovementioned objective of improving the overall energy performance of the building.'*

The specific situation in the participating countries is summarized in Table 3.2.1. Eight EU countries, (D, NL, IT, S, DK, FR, IE, and UK), use minimum energy performance requirements. Minor changes have to be done in order to meet the format of EPD. In five other EU countries, (SU, SP, GR, and PT), no minimum requirements exist, but GR, B-FL and PT, have already prepared them. As it concerns non EU member countries, NO and RUS, have already minimum energy requirements in use, while Israel may develop such a standard in the future.

Question : Minimum Energy Performance Standards	
Country	Situation
Belgium – Flemish Region	Minimum requirements are in a final state of the decision making process, for those building categories for which an EP determination procedure is ready: i.e. new residential buildings, offices and schools. For offices and schools account is taken of the required ventilation flow rates and average lighting level when calculating the minimum requirements
Denmark	Requirements referred to article 4 are almost met.
Finland	No minimum requirements in use.
France	Minimum requirements already in use.
Ireland	Minimum requirements in use but not according to the methodology of EPD.
Israel	No minimum requirements in use.
Italy	<div style="border: 1px solid black; height: 20px; width: 100%; margin-bottom: 5px;"></div> <p>The Italian EPR already sets minimum energy performance requirements, which are mostly compatible with the framework set out under heading A in the Annex (with the exceptions pointed out for Article 3).The energy performance requirements are differentiated on the basis of the kind of intervention (contruction of a new building, installation of a new heating system, renovation of the heating system, replacement of the heat generator</p>
Germany	Minimum Requirements already in use
Greece	No minimum requirements in use. The new regulation has set the minimum requirements according to the EPD.
Netherlands	<div style="border: 1px solid black; height: 20px; width: 100%; margin-bottom: 5px;"></div> <p>The EP requirements for new buildings calculated with the EP standards seem to meet the EPD requirements of this article.</p>

Norway	Minimum requirements for heating already in use.
Portugal	No Minimum requirements in use. A new standard in preparation.
Russia	Minimum requirements for heating in use.
Slovenia	Not clear
Spain	No Minimum requirements in use
Sweden	They already have OVK which is an obligatory ventilation control for larger buildings. Some buildings built for temporary use are already exempt from some requirements
Swiss	It is not clear if minimum requirements are in use.
UK	Minimum requirements already in use.

Table 3.2.1 Situation in the participating countries regarding article 4 of EPD.

The specific situation in each member state is as follows :

In Belgium – Flemish region, minimum requirements are in a final state of the decision making process, for those building categories for which an EP determination procedure is ready: i.e. new residential buildings, offices and schools. For offices and schools account is taken of the required ventilation flow rates and average lighting level when calculating the minimum requirements.

Denmark already have minimum requirements, but they have to be revised when the calculation method has been changed.

In Finland the EP of buildings are not calculated in the way demanded in EPD. Only transmission losses, ventilation, and internal and solar gains are calculated. No minimum requirements exist for existing buildings.

In France such requirements apply to new buildings. Review of the requirements is planned every 5<sup>th</sup> year. The only small non compliance is that these requirements are not applied to swimming pools and ice skating rings.

In Ireland, the Building Regulations require that new buildings meet minimum energy performance standards, but not according to the methodology set out under heading A of the Annex. The requirements are prescriptive rather than part of a whole-building energy performance indicator.

In Israel, The Ministry of Infrastructures and the Ministry of the Environment are interested in implementing these guidelines, but the mechanism for implementation will probably remain by the enforcement of the relevant Standards via the Building Regulations that are issued by the Ministry of Interiors. The Standards are updated every three to five years In general the requirements are imposed on new construction (entirely new, or additions to older buildings). It is presumed that it will take a much longer time until energy performance requirements will be imposed on existing buildings, including upon renovation.

In Italy, EPR already sets minimum energy performance requirements, which are mostly compatible with the framework set out under heading A in the Annex

Germany fully complies with the requirements of Article 4.

In Greece, no minimum requirements in use. The new regulation has set the minimum requirements according to the EPD.

In the Netherlands, the EP requirements for new buildings calculated with the EP standards seem to meet the EPD requirements of this article. Reviewing the requirements every 5 years won't give problems. There are few mandatory requirements for existing buildings. Before the development of the EPD, no mandatory system was foreseen. Depending on the energy use of buildings (in practice only big buildings) measures with a return on investment of less than 5 years have to be implemented. Calculation methods are lacking, but under construction.

In Norway, all new buildings that are heated regularly, must meet the minimum energy performance standards. If existing buildings, independent of size, goes through major renovations these buildings must also meet the minimum energy performance standards as corresponding buildings must meet. The last 20 years there have been two major revisions of the buildings regulations, and there have been some smaller revisions in between. Such smaller revisions are now under construction.

In Sweden, they already have OVK which is an obligatory ventilation control for larger buildings. Some buildings built for temporary use are already exempt from some requirements

In Portugal, There is an agreement on this item, namely the minimum energy performance standard, and the calculation, and also regarding the different types of buildings (new and existent). The exceptions are also the same, except those related with the residential buildings which are used 4 months per year, there are not yet a final decision how to do it in Portugal.

In Russia, according to the territorial codes of RF the all new buildings and the buildings under renovation have been designed according to the maximum allowed energy demand for heating,  $\text{kJ}/(\text{m}^2 \cdot \text{oC} \cdot \text{day})$  [ $\text{kJ}/(\text{m}^3 \cdot \text{oC} \cdot \text{day})$ ]. These figures are variable for types of buildings (residential, office buildings, education facilities, medical facilities, clinics, longterm care, and pre-schools) and number of stories, and do not depend on from the south to the north (because related to a  $\text{oC} \cdot \text{day}$ ). These energy performance requirements will be reviewed in 5 years in more rigid direction.

In Spain there is nothing about existing buildings or regular energy performance review It will need a big number of well-prepared people working in this point.

In Switzerland, energy in Buildings is a state (canton) business. Most if not all of the 26 Swiss states ask that new and retrofitted buildings comply with SIA 380/1 or better.

In UK. there are detailed requirements in the Building Regulations for all types of buildings (except unheated buildings and other very limited categories). These are not necessarily expressed in EP terms but, apart from the need to look further at renewable technologies, there is probably little action to take. For non domestic buildings Approved Document L2 applies minimum performance standards to all types of new building. It does not yet include a common calculation methodology but seeks to ensure that elements of the building design comply, or that there is overall performance equivalent to a prescriptive compliance route. For existing dwellings, there are now requirements in Approved Document L1 for minimum performance of replacement windows and replacement boilers, and where any building work is undertaken.

Similarly for existing non domestic buildings Approved Document L2 now includes provisions for work that introduces or makes substantial alterations to the building fabric or its systems that are controlled by the new-build Regulations. This includes windows, heating, lighting and

HVAC systems. In the case of HVAC systems the design requirement is relaxed compared to the new-build provision, as it is accepted that design options may be constrained by existing structures. The UK's Building Regulations for all types of buildings have in the past been revised at intervals between 5 and 8 years, each time raising the level of the requirements.

### 3.3 Article 5. Minimum Energy Requirements for New Buildings.

According to article 5 of the EPD :

*'Member States shall take the necessary measures to ensure that new buildings meet the minimum energy performance requirements referred to in Article 4. For new buildings with a total useful floor area over 1 000 m<sup>2</sup>, Member States shall ensure that the technical, environmental and economic feasibility of alternative systems such as:*

- decentralised energy supply systems based on renewable energy,*
- CHP,*
- district or block heating or cooling, if available,*
- heat pumps, under certain conditions,*

*is considered and is taken into account before construction starts.'*

The specific situation in the 13 participating countries is summarized in Table 3.3.1. In four EU countries, (DK, FR, IE and UK), the requirements for large new buildings are almost met. In Finland and Spain there is no provision for minimum energy requirements for large new buildings, while in Belgium – FL, Greece and Portugal, the new regulations will comply with the Directive. As it concerns the non EU members, NO, RUS, and CH complies with this part of the Directive while IL does not satisfy the requirements.

As it concerns the use of the alternative energy systems, Finland, and Denmark are the only EU country that make extensive use of district heating. In Greece, the new regulation offer credit to solar systems, while in UK, there is a recommendation for the use of alternative energy sources.

#### **Question : Minimum Energy Requirements for New Buildings**

Country	Situation
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Belgium – Flemish Region	In Belgium – Flemish region, minimum requirements are in a final state of the decision making process, for those building categories for which an EP determination procedure is ready. No practical initiatives have been taken yet to enforce systematic evaluation of the listed energy technologies (CHP, district heating, etc).
Denmark	Requirements referred to article 5 are partly satisfied. Alternative energy systems are dealt with in local plans.
Finland	Requirements referred to article 5 are not satisfied. District heating systems are widely used.
France	Requirements referred to article 5 are satisfied. Requirements about the alternative energy systems are not met.
Germany	Article 5 seems to be fully met by the german EnEV despite some differences in definitions. In the EnEV there is not the limit of 1000 m <sup>2</sup> and the threshold for renovation is not 25% of the value of the building but 20% of the renovated area
Ireland	Minimum requirements referred to article 5 are in use but not according to the methodology of EPD. Requirements about the alternative energy systems are not met.
Israel	Requirements referred to article 5 are not satisfied. No information about the alternative energy systems.
Italy	Not a clear situation. The Italian EPR provides that for public buildings, both new and under renovation, the energy performance requirements shall be met by assessing the technical and economical feasibility of installing systems based on renewable energy, CHP and heat recovery from any available process or plant.
Greece	Requirements referred to article 5 are not satisfied by the present regulation. Alternative energy systems are not considered as well. The new regulation complies with article 5, and offer credit to solar systems.

Netherlands	Requirements referred to article 5 are satisfied. Requirements about the alternative energy systems are not met.
Norway	Requirements are only met for governmental buildings > 1000 m <sup>2</sup>
Portugal	Requirements referred to article 5 are not satisfied by the present regulation. Alternative energy systems are not considered as well. The new regulation complies with article 5 but does not consider alternative energy systems.
Russia	Requirements referred to article 5 are satisfied. Requirements about the alternative energy systems are not met, except of the use of district heating systems.
Slovenia	Not clear
Spain	Requirements referred to article 5 are not satisfied. No information about the alternative energy systems
Sweden	Partly satisfied
Swiss	Requirements referred to article 5 are partly satisfied. Alternative energy systems are recommended.
UK	Requirements referred to article 5 are partly satisfied. The use of alternative energy systems is encouraged

Table 3.3.1 Situation in the participating countries regarding article 5 of EPD.

The specific situation in each state is as follows :

In Belgium – Flemish region, minimum requirements are in a final state of the decision making process, for those building categories for which an EP determination procedure is ready: i.e. new residential buildings, offices and schools.

In Denmark the requirements for large new buildings referred to article 4 are partly satisfied. No information is available about the use of alternative energy systems.

In Finland, district heating for multi-family houses, offices and public buildings is used almost without exceptions.

In France, today nothing is done regarding the technical, environmental and economic feasibility of installing decentralized energy supply systems based on renewables energy, CHP, or heat pumps. When the building is close to an existing district heating network there are in some cases requirements to use the district heating network, but it is not compulsory. The planned approach to comply with the directive could be based on realising such feasibility studies not for each building but for families of buildings.

In Germany, Article 5 seems to be fully met by the german EnEV despite some differences in definitions. In the EnEV there is not the limit of 1000 m<sup>2</sup> and the threshold for renovation is not 25% of the value of the building but 20% of the renovated area

In Ireland, at present there is no requirement to assess the feasibility of installing decentralized systems based on renewable energy etc in new buildings.

In Israel, Requirements referred to article 4 are not satisfied. No information about the alternative energy systems.

In Italy the situation is not very clear situation. The Italian EPR provides that for public buildings, both new and under renovation, the energy performance requirements shall be met.

In Greece, the requirements referred to article 4 for new buildings are not satisfied by the present regulation. Alternative energy systems are not considered as well. The new regulation complies with article 4, and offer credit to solar systems but not to district energy systems.

In the Netherlands, no specific provision for renewables is taken, but the part that refers to renovation already applies.

In Norway, for all governmental buildings it is mandatory to install flexible heating systems, (hydronic heating systems) before the building permit is granted.

In Portugal, the requirements for new buildings, referred to article 4 are not satisfied by the present regulation. Alternative energy systems are not considered as well. The new regulation complies with article 4 but does not consider alternative energy systems.

In Russia, the requirements for large new buildings referred to article 4 are satisfied. Requirements about the alternative energy systems are not met, except of the use of district heating systems

In Spain, the requirements for large new buildings referred to article 4 are not satisfied. No information is provided about the alternative energy systems

In Sweden, such limitations is in theSwedish regulations however are formulated differently.

In Switzerland, the requirements for large buildings referred to article 4 are partly satisfied. Alternative energy systems are recommended but are not mandatory.

Finally, in UK, consideration of renewable technologies, CHP, etc. is presently optional and not compulsory. Approved Document L2 encourages the use of renewable technologies since it allows the carbon saving due to the use of such technologies to be taken into account when assessing the compliance of systems. The aproach is of encouragement rather than forcing designers to consider their use, and this encouragement is reinforced by the UK government's Enhanced Capital Allowance (ECA) scheme (operated by the Carbon Trust and the Treasury), which provides tax breaks for purchase of certain approved energy efficient equipment such as heat pumps and CHP

### **3.4 Article 6. Minimum Energy Requirements for Existing Buildings.**

According to article 6 of the EPD :

*'Member States shall take the necessary measures to ensure that when buildings with a total useful floor area over 1 000 m<sup>2</sup> undergo major renovation, their energy performance is upgraded in order to meet minimum requirements in so far as this is technically, functionally and economically feasible. Member States shall derive these minimum energy performance requirements on the basis of the energy performance requirements set for buildings in accordance with Article 4. The requirements may be set either for the renovated building as a whole or for the renovated systems or components when these are part of a renovation to be carried out within a limited time period, with the abovementioned objective of improving the overall energy performance of the building.'*

The specific situation in the participating countries is summarized in Table 2.4.1. In Denmark the article is almost satisfied, while in Belgium – FL, UK is partly satisfied. Finland, France , Ireland and Spain do not satisfy the requirements of the article. In Greece and in Portugal, the

actual legislation does not fit with article 6, but the developed new legislations satisfies the requirements.

As it concerns the non EU countries, Norway and Switzerland satisfy the article, while in Israel and Russia they have not any provisions similar to the ones of article 6 of the EPD.

<b>Question : Minimum Energy Requirements for Existing Buildings</b>	
Country	Situation
Belgium – Flemish Region	The Directive is partly satisfied: Some minimum requirements are imposed, but probably not to the extent implied by the EPD. Buildings that are being deconstructed down to their concrete skeleton need to comply with the same minimum requirements as new buildings.
Denmark	The requirement is already satisfied.
Finland	The requirement is not satisfied.
France	The requirement is not satisfied.
Ireland	The requirement is not satisfied. There are some prescriptive requirements
Israel	The requirement is not satisfied.
Italy	The requirement is not satisfied.
Germany	An Energy Performance Certificate is part of the German EnEV, but it is not fully compatible with the EPD certificate. The EnEV certificate contains the information on the energy performance of the building according to construction values or if the building had undergone major changes. Not included are the restricted age of 5 (in the final version 10) years, the recommendations for possible improvements and the public display of the energy performance certificate in public buildings
Greece	The requirement is not satisfied. The new regulation complies fully with article 6.

Netherlands	The requirement is almost satisfied.
Norway	The requirement is almost satisfied.
Portugal	The requirement is not satisfied.
Russia	The requirement is not satisfied.
Slovenia	Not clear
Spain	The requirement is not satisfied
Sweden	Partly satisfied
Swiss	The requirement is partly satisfied
UK	The requirement is partly satisfied

Table 2.4.1 Situation in the participating countries regarding article 6 of EPD.

The specific situation in each state is as follows :

In Belgium-Flemish Region, the Directive is partly satisfied: Some minimum requirements are imposed, but probably not to the extent implied by the EPD (only in framework of building permit, only for some specific works -mostly thermal insulation-, etc.). Buildings that are being deconstructed down to their concrete skeleton need to comply with the same minimum requirements as new buildings.

In Denmark the demands are almost dealt with for all buildings types. The regulations cover extensions to buildings and conversion of and other alterations to buildings and any changes in use of buildings".

In Finland there are not clear EP-demands for buildings, which are renovated, but the local authorities can demand the constructor to improve the EP to the level of new buildings even now. It is not systematic anyway at present.

In France there is today no mandatory requirements regarding energy use of building which undergo major renovation. Ways to comply with the directive will have to be discussed. An approach could be to apply the energy regulations to major retrofit. The best approach to do that will still have to be discussed

In Ireland at present the Building Regulations require that existing buildings undergoing material alterations or changes of use meet certain minimum energy requirements. However, the requirements are prescriptive rather than part of an energy rating method.

In Israel there is no such a provision.

In Germany, An Energy Performance Certificate is part of the german EnEV, but it is not fully compatible with the EPD certificate.

In Greece the requirement is not satisfied by the present regulation. The new regulation complies fully with EPD.

In the Netherlands the requirement is almost satisfied.

In Norway all buildings that undergo major renovations must meet the minimum energy performance requirements. If a renovation measures are defined as major or not, differ some from one municipality to another.

In Portugal, differentiation between buildings with more than 1000m<sup>2</sup> is also planned in the future building regulation. Is intended to have more detailed and feasibility studies for the buildings with systems, when over than 1000 m<sup>2</sup>.

In Russia, the territorial codes of RF are applied to the new buildings and are not applied to existing buildings

In Spain, the requirements article 6 are not considered.

In Switzerland, measures shall be taken in renovation as soon as they are worth their cost (positive LCA).

Finally, in UK, installation, replacement and substantial alteration/extension of systems are all subject to the provisions of Approved Document L2 (for non-domestic/residential buildings). However, not all the items mentioned in Article 3 are covered at present

### **3.5 Article 7. Energy Performance Certificate**

According to article 7 of the EPD :

*'1. Member States shall ensure that, when buildings are constructed, sold or rented out, an energy performance certificate is made available to the owner or by the owner to the*

*prospective buyer or tenant, as the case might be. The validity of the certificate shall not exceed 10 years.*

*Certification for apartments or units designed for separate use in blocks may be based:*

- on a common certification of the whole building for blocks with a common heating system, or*
- on the assessment of another representative apartment in the same block.*

*Member States may exclude the categories referred to in Article 4(3) from the application of this paragraph.*

*2. The energy performance certificate for buildings shall include reference values such as current legal standards and benchmarks in order to make it possible for consumers to compare and assess the energy performance of the building.*

*The certificate shall be accompanied by recommendations for the cost-effective improvement of the energy performance. The objective of the certificates shall be limited to the provision of information and any effects of these certificates in terms of legal proceedings or otherwise shall be decided in accordance with national rules. 3. Member States shall take measures to ensure that for buildings with a total useful floor area over 1 000 m<sup>2</sup> occupied by public authorities and by institutions providing public services to a large number of persons and therefore frequently visited by these persons an energy certificate, not older than 10 years, is placed in a prominent place clearly visible to the public. The range of recommended and current indoor temperatures and, when appropriate, other relevant climatic factors may also be clearly displayed.'*

The specific situation in the participating countries is summarized in Table 3.5.1. In two EU countries, (Denmark and UK), there are already in use mandatory energy certification schemes. Not all types of buildings are covered. In Spain, a voluntary certification scheme is applied. All other EU countries do not apply any certification scheme. However, certification procedures for several types of buildings are almost ready in Belgium – FL, France, Greece and Portugal. As it concerns, non EU countries, Russia applies a mandatory scheme, Norway and Switzerland apply voluntary energy and ecological certification schemes, while in Israel such a procedure is not in use.

#### **Question : Energy Performance Certificate**

Country	Situation
Belgium – Flemish Region	It is foreseen that for new buildings that must meet EP-requirements the Dossier-As-Built will get a practical implementation in such a way that the EPD-certification requirements are satisfied. For apartments, every single flat will be analysed in new buildings
Denmark	A certification scheme exist already but has to be adapted to the new requirements.
Finland	No certification scheme in use
France	Certification for houses almost ready. No certification for public buildings.
Ireland	No certification scheme in use.
Israel	No certification scheme in use.
Italy	No certification scheme in use.
Germany	
Greece	No certification scheme in use. The new regulation satisfies the requirements of article 7 of EPD.
Netherlands	No certification scheme in use.
Norway	There is a voluntary certification scheme were energy performance is part of the method.
Portugal	No certification scheme in use. The new regulation will satisfy the requirements of article 7 of EPD.
Russia	An energy certification scheme is already applied
Slovenia	Not clear
Spain	A voluntary energy certification scheme based on simulation results is in use.

Sweden	Today Sweden does not have any certification of buildings but when a building is sold the seller are required to present the buildings energy consumption.
Swiss	There is a voluntary certification scheme
UK	Certification scheme already in use for new dwellings but not for other buildings.

Table 3.5.1 Situation in the participating countries regarding article 7 of EPD.

The specific situation in each state is as follows :

In Belgium – Flemish Region, it is foreseen that for new buildings that must meet EP-requirements the Dossier-As-Built will get a practical implementation in such a way that the EPD-certification requirements are satisfied. For apartments, every single flat will be analysed in new buildings (and must meet the min. rqmts For existing residential buildings the energy advice procedure (see art. 3) may offer an initial basis for certification.

In Denmark already exists a mandatory labelling scheme. The Danish labelling schemes have to change to include the demands for air-conditioning and the one/off inspection are new demands. It is also new in Denmark that large buildings are labelled when constructed.

In Finlad there is no any certification scheme. Only the construction of the building is controlled

In France, a procedure to provide energy performance certificate is nearly ready for single family houses. The method is publicly available, but not compulsory from the regulation texts. For appartement buildings the method is under development. The format of the final certificate still has to be defined. It is not yet planned to provide recommendations for the improvement of the energy perfomance together with the certificate. That could be done in a second stage. Nothing is planned yet for public building.

In Ireland, currently there is no requirement for an energy certificate to be made available to buyers or tenants when buildings are constructed, sold or rented out, or to be displayed in public buildings.

In Israel, it is doubtful if the certification procedure will be implemented as a mandatory procedure. A voluntary process is already taking place in some cities that claim to promote "Green" neighbourhoods.

In Greece, there is no any certification scheme in use. The new regulation satisfies the requirements of article 7 of EPD.

In the Netherlands, they don't have an energy certificate at this moment. The possibilities of transforming our non-mandatory method for EP advise for existing residential buildings into an energy certificate is under investigation at this moment. New legislation has to be developed. A non-mandatory method for EP advise for (some types of) existing non-residential buildings is under construction. The method needs to be extended with references and benchmarks. The method already contains recommendations for the improvement of the energy performance of the existing building. If and how these have to be improved is also under investigation.

In Norway, no such certificate is mandatory for buildings today. However there is a voluntary labelling system, the Ecoprofile method, which include labels both for energy performance, indoor climate and outdoor climate. Such labels exist both for commercial buildings and residential buildings. About 100 Ecobuild labels have been carried out since the method was lunched in 2000. The Energy labelling system that is under developing now, will also be included into the Ecoprofile method. The energy label can work on its own, or together with the more complete environmental labelling system.

In Portugal, the Building Certification process is an ongoing process, paralel to the building regulation process, and all the requirements regarding the European Directive will be included in the Portuguese Certification process.

In Russia, the territorial building codes of RF require the energy performane certificate ,(the energy passport), for each buildings mentioned in article 4. The energy passport include the requirements which are mentioned in article 4.

In Spain there is an "Energy Labelling" program. It is voluntary and it is based on computer energy simulation (only for new buildings) and not in real energy consumption.

Today Sweden does not have any certification of buildings but when a building is sold the seller are required to present the buildings energy consumption.

In Switzerland, there is no such certificate now, and there is no project of such a mandatory certificate for buildings. However there is a voluntary certificate, the Minergie label, which can be obtained when improved energy performance (much better than the minimum legal requirements) is reached. This certificate is more and more popular.

In UK, Requirements for an energy performance certificate are already in place for new dwellings. Work is under way in order to extend this to existing dwellings, including providing recommendations for improvement. For non domestic buildings, Approved Document L2 includes a provision for designers to supply a design estimate of the energy/carbon performance of the building, for inclusion in the building log-book. This should be accompanied by appropriate reference values or industry benchmarks for comparison. The UK government's Action Energy initiative (formerly known as the Energy Efficiency Best Practice Programme) has published a series of energy consumption guides and related publications and tools which give details of consumption of both typical and good practice buildings in a variety of building sectors. No other information is currently required, and there is no requirement to provide recommendations for improvement, or for the performance estimate to be displayed in any way. This is largely because the scope of application of the Regulations currently only addresses construction work. New provisions will need to be developed to address any issue that involves a commitment after completion of work, i.e. after building handover, and involving the continuing use and occupation of the building. Such requirements would include the display of certificates and the display of temperature/humidity information.

### **3.6 Articles 8-9 . Inspection of Boilers and A/C systems**

According to articles 8-9 of the EPD :

*'With regard to reducing energy consumption and limiting carbon dioxide emissions, Member States shall either:*

*(a) lay down the necessary measures to establish a regular inspection of boilers fired by non-renewable liquid or solid fuel of an effective rated output of 20 kW to 100 kW. Such inspection may also be applied to boilers using other fuels. Boilers of an effective rated output of more than 100 kW shall be inspected at least every two years. For gas boilers, this period may be*

*extended to four years. For heating installations with boilers of an effective rated output of more than 20 kW which are older than 15 years,*

*Member States shall lay down the necessary measures to establish a one-off inspection of the whole heating installation. On the basis of this inspection, which shall include an assessment of the boiler efficiency and the boiler sizing compared to the heating requirements of the building, the experts shall provide advice to the users on the replacement of the boilers, other modifications to the heating system and on alternative solutions; or*

*(b) take steps to ensure the provision of advice to the users on the replacement of boilers, other modifications to the heating system and on alternative solutions which may include inspections to assess the efficiency and appropriate size of the boiler. The overall impact of this approach should be broadly equivalent to that arising from the provisions set out in (a). Member States that choose this option shall submit a report on the equivalence of their approach to the Commission every two years.*

*With regard to reducing energy consumption and limiting carbon dioxide emissions, Member States shall lay down the necessary measures to establish a regular inspection of airconditioning systems of an effective rated output of more than 12 kW. This inspection shall include an assessment of the air-conditioning efficiency and the sizing compared to the cooling requirements of the building. Appropriate advice shall be*

*provided to the users on possible improvement or replacement of the air-conditioning system and on alternative solutions.'*

The specific situation in the participating countries is summarized in Table 3.6.1. As shown only three EU countries, (Denmark, Greece and Spain), apply mandatory boiler inspection. None of the countries apply any A/C control. As it concerns the non EU countries only Switzerland and Norway apply boilers control.

<b>Question : Control of Boilers and Air Conditioners</b>	
Country	Situation
Belgium – Flemish Region	At present there is an still old federal law in force that imposes yearly inspections of oil boilers. New regulations by each of the regions have been under development/discussion for some time, but their present status

	and exact scope are unclear. The present drafts will probably not yet fully satisfy the EPD requirements. There is no practical initiative as yet to set up inspection routines for air conditioning systems.
Denmark	Partly applied for boilers. No inspection of A/C
Finland	No inspection of boilers or A/C
France	No inspection of boilers or A/C
Ireland	No inspection of boilers or A/C
Israel	No inspection of boilers or A/C
Italy	<div style="border: 1px solid black; height: 20px; width: 100%;"></div> <p>The Italian EPR already provides inspection of all boilers, but not the inspection of air-conditioning systems.</p> <p>Boilers having a nominal output of less than 35 kW shall be inspected at least every 2 years.</p> <p>Boilers having a nominal output of more than 35 kW shall be inspected at least once a year.</p> <p>The inspection of boilers shall include a measurement of exhaust gas and ambient temperatures, O<sub>2</sub>, CO<sub>2</sub> and CO concentrations in the exhaust gases, an assessment of the boiler nominal efficiency, and an evaluation of the conditions of insulation</p>
Germany	A yearly inspection of boilers between 4 and 400 kW is already mandatory in Germany. For air conditioning systems the EnEV only demands a competent maintenance and inspection
Greece	Mandatory inspection of boilers, The new regulation asks for a mandatory inspection of A/C units
Netherlands	No regulations for the moment
Norway	Mandatory inspection of boilers.

Portugal	No inspection of boilers or A/C
Russia	No inspection of boilers or A/C
Slovenia	Not clear
Spain	Applied to boilers. No inspection of A/C
Sweden	Control of ventilation systems including central air conditioning systems are regularly done in Sweden every 3-9 years depending on the kind of building..
Swiss	Inspection of boilers. Inspection of A/C is performed only for health reasons.
UK	No inspection of boilers or A/C

Table 3.6.1 Situation in 12 participating countries regarding articles 8-9 of EPD.

The specific situation in each state is as follows :

In Belgium – Flemish region, At present there is an still old federal law in force that imposes yearly inspections of oil boilers. There is no practical initiative as yet to set up inspection routines for air conditioning systems.

In Denmark, air conditioning systems inspection is new and the on/off inspection of the whole heating system for boilers older than 15 year and more than 20 kW is also new.

In Finland, there is no any inspections except sweeping every other year.

In France, there is no any inspection of boilers or A/C systems

In Ireland, currently there are no regulations requiring regular inspection of boilers or air conditioning systems in buildings.

In Israel, any such requirements are mandatory only if they can be related to aspects of health, security or safety.

The Italian EPR already provides inspection of all boilers, but not the inspection of air-conditioning systems. Boilers having a nominal output of less than 35 kW shall be inspected at

least every 2 years. Boilers having a nominal output of more than 35 kW shall be inspected at least once a year. The inspection of boilers shall include a measurement of exhaust gas and ambient temperatures, O<sub>2</sub>, CO<sub>2</sub> and CO concentrations in the exhaust gases, an assessment of the boiler nominal efficiency, and an evaluation of the conditions of insulation

In Germany, yearly inspection of boilers between 4 and 400 kW is already mandatory in Germany. For air conditioning systems the EnEV only demands a competent maintenance and inspection

In Greece, there is a mandatory inspection of boilers, The new regulation asks for a mandatory inspection of A/C units.

In the Netherlands, they don't have such regulations at this moment. Only for boilers > 130kW there are some regulations.

In Norway, the national boiler regulation demands frequent inspections of boilers in a general statement but the regulation do not say anything of how often this inspection should be carried out, and the extension of this inspection. Normally this is done every 5<sup>th</sup> year. The inspection is then more or less concerned by safety reasons and not environmental aspects. The boilers that are inspected are chosen by type of construction, size and others factors, and not only on heat supply

In Portugal and Russia, there is any inspection of boilers or A/C systems.

In Spain, the regulations includes mandatory inspection for installations > 100 kW.

Every concept has a different period, for example:

- CO emission (every month)
- Evaporators and condenser cleaning (every year)
  - Refrigerant and oil level checking (every month)

Control of ventilation systems including central air conditioning systems are regularly done in Sweden every 3-9 years depending on the kind of building.

In Switzerland, all boilers are inspected once or twice a year for their performance since more than 25 years. This was originally intended to improve air quality, but it also strongly improved

the energy efficiency..Air conditioning inspection is oriented towards health and air quality, not on energy

In UK, the Building Regulations apply to construction work carried out on new buildings, when existing buildings undergo a change of use or when existing buildings are subject to substantial work, so that there are currently no provisions that involve actions to be undertaken by the building manager.

Inspections of heating and air conditioning systems are thus not currently included in the UK Regulations, although the idea that some form of ongoing control should be introduced was a widely held view during the public consultations that were held during the development of the current versions of Approved Documents L1 and L2. The concept of periodic testing of buildings and services systems has been discussed, although a suitable mechanism for its introduction using existing UK regulations (primarily the Building Act 1984) had not been determined prior to the introduction of the Directive.

It is likely that any changes that might have been required in UK regulations has now been superseded by the need to transpose the Directive into national legislation. However, it is likely that considerable work will be needed to develop viable and consistent procedures for inspecting and assessing the efficiencies of air conditioning systems in particular. Interpreting this aspect of the Directive, together with "providing advice on possible improvement", is likely to require significant effort and discussion with industry.

### **3.7 Article 10 . Independent Experts**

*According to article 10 of the EPD :*

*' Member States shall ensure that the certification of buildings, the drafting of the accompanying recommendations and the inspection of boilers and air-conditioning systems are carried out in an independent manner by qualified and/or accredited experts, whether operating as sole traders or employed by public or private enterprise bodies'*

The specific situation in the participating countries is summarized in Table 3.7.1. As shown only Denmark and partly Sweden already applies the Directive. In Belgium – FL, France, Greece and Portugal, preparation has been done to apply these requirements. As it concerns the non EU countries, this part of the directive applies to Russia, Norway and Switzerland.

Question : Independent Experts	
Country	Situation
Belgium – Flemish Region	The rapporteur (any architect or engineer) who has to draw up the energetic dossier-as-built in new constructions is appointed by the client/builder, but he bears personal responsibility .
Denmark	Already Applies
Finland	Does not applies
France	Does not applies. Preparation has been done.
Ireland	Does not applies
Israel	Does not applies
Italy	Does not applies
Greece	Does not applies. It is foreseen by the new Regulation
Norway	Applies partly
Portugal	Does not applies. It is foreseen by the new Regulation
Russia	Already applies
Spain	Does not applies
Sweden	All personal controlling air conditioning systems are certified
Swiss	Already Applies
UK	Does not apply.

Table 3.7.1 Situation in the participating countries regarding article 10 of EPD.

The specific situation in each state is as follows :

In Belgium – Flemish region, the rapporteur (any architect or engineer) who has to draw up the energetic dossier-as-built in new constructions is appointed by the client/builder, but he bears

personal responsibility (with stiff administrative fines) for any incorrect reporting. It is believed this will guarantee truthful reporting and EP certificates. For all other cases, further specifications still need to be worked out.

In Denmark, is by law that independent experts who are doing the labelling and the inspections. A lot of energy-consultants already have been educated in Denmark

In Finland, Ireland, Israel, and in Spain, this part of the Directive does not apply.

In France, work has to be done in this direction. The idea today for the certification of buildings was to have it done at low cost by people involved in selling or renting of houses which are not at all experts

In Italy, For the calculation of the energy performance of buildings, reference national technical standards must be used. These standards are going to become fully compatible with CEN standards.

In Greece and in Portugal, currently this part of the directive does not apply, but it is foreseen by the new Regulation

In Norway, authorised sweepers perform the boiler inspection. The Ecoprofile labels are performed of accredited experts, and an official approval organ approves the official labels.

In Russia, The energy passports are prepared by independent experts and organizations which have certified by the State Committee for Standardization

In Sweden all personal controlling air conditioning systems are certified

In Switzerland, Boiler inspection is performed by authorised sweepers. All software used for calculation shall be certified by the Swiss Federal Office of Energy on the base of benchmarks. The results of the calculation of the energy performance according to Art. 3 shall be submitted to town and state authorities together with other documents to obtain a building permit.

In UK, in the case of most existing buildings, techniques for assessment and certification are not well developed. There will be significant issues involved in developing the necessary expertise, and in assuring the quality and consistency of assessments and advice.

A number of "competent person" schemes are in existence, or in development, to address a variety of the issues involved in assessing compliance under the current Building Regulations.

(These schemes allow suitably qualified persons to self-certify that their work meets the requirements of the Building Regulations and is intended to relieve the burden on building control bodies . These include meeting the proposed new requirements for electrical safety and, of most relevance here, the requirements for replacement windows.) However, none of these schemes are suitable to address any new requirements for the inspection or assessment of systems. Further, it is unlikely that there are currently sufficient experts with the necessary knowledge and experience to deal with these aspects of the Directive even if the techniques had been developed and were available now...This aspect of the Directive is therefore likely to take the longest time to bring into effect.

#### **4. Conclusions Regarding the Existing situation of the States regarding the application of the EPD**

Given the replies received, the global situation regarding the application of EPD in the participating countries is as follows:

- articles 3 and 4 are the ones that are much closer to each countries' existing legislation and need the smallest amount of preparation in order to be applied. More work is necessary for the application of articles 5 and 7, while it seems that European countries [Member States?] have to undertake a considerable amount of work in order to apply articles 6,8,9 and 10.

Concerning the participating EU countries, it seems that Denmark is the country that is closest to the full application of the EPD. This is because the EPD is mainly inspired by the Danish regulation. The UK and France seems to be very well prepared and closer to the application of the EPD compared to the other countries. Belgium – Flemish region and Greece have prepared its new regulation almost according to the EPD but it is not yet applied, while Ireland, Spain and Portugal have to adapt an important part of their regulation to the EPD. Finally, it seems that the EPD does not fit with the actual options and priorities of the Finish regulation and thus major preparation work will be required there.

Concerning non EU countries, with the exception of Israel, all of them seem to be very close to the requirements of the EPD. In particular, Norway seems to be the country that complies, either fully or partly, with most of the requirements of the EPD, in comparison to all EU countries.

## ANNEX 1. Situation on the application of national EP regulations to buildings.

Austria	<p>A. <input checked="" type="checkbox"/> New buildings      <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p> <p>Exceptions : Buildings not heated or cooled</p> <p>B. <input type="checkbox"/> Existing buildings      <input type="checkbox"/> Residential      <input type="checkbox"/> Non Residential</p> <p>C. <input type="checkbox"/> Buildings under renovation      <input type="checkbox"/> Residential      <input type="checkbox"/> Non Residential</p> <p>D. <input checked="" type="checkbox"/> Extension to existing buildings <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p> <p>Comments: <u>If one part (e.c. wall) is completely replaced this part has the same requirements as a new one.</u></p>
Belgium (proposal for Flemish region)	<p>A. <input checked="" type="checkbox"/> New buildings      <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p> <p>Exceptions : <u>New buildings other than residential, offices and schools, have no full EP requirements but only insulation requirements. Buildings not designated for human occupation have no requirements.</u></p> <p>B. <input type="checkbox"/> Existing buildings      <input type="checkbox"/> Residential      <input type="checkbox"/> Non Residential</p> <p>C. <input checked="" type="checkbox"/> Buildings under renovation      <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p> <p>Comments: <u>only thermal insulation requirements, no comprehensive EP</u></p> <p>D. <input checked="" type="checkbox"/> Extension to existing buildings      <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p>
Denmark	<p>A. <input checked="" type="checkbox"/> New buildings      <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p> <p>Exceptions : No exceptions</p> <p>B. <input type="checkbox"/> Existing buildings      <input type="checkbox"/> Residential      <input type="checkbox"/> Non Residential</p> <p>Comments: <u>if major renovation</u></p> <p>C. <input checked="" type="checkbox"/> Buildings under renovation      <input type="checkbox"/> Residential      <input type="checkbox"/> Non Residential</p> <p>D. <input checked="" type="checkbox"/> Extension to existing buildings      <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p>
Finland	<p>A. <input checked="" type="checkbox"/> New buildings      <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p> <p>Exceptions : All buildings which are used for permanent living or for permanent use, e.g. apartments, offices, schools, hospitals, but not e.g sommer cottages. Also the regulations do not concern industrial buildings, in which the internal gains are so high, that heating is needed not at all or only very little...</p> <p>B. <input type="checkbox"/> Existing buildings      <input type="checkbox"/> Residential      <input type="checkbox"/> Non Residential</p> <p>C. <input checked="" type="checkbox"/> Buildings under renovation      <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p> <p>Comments: <u>Under major renovations</u></p> <p>D. <input checked="" type="checkbox"/> Extension to existing buildings      <input checked="" type="checkbox"/> Residential      <input checked="" type="checkbox"/> Non Residential</p> <p>Comments: <u>Only when the area of the exterior envelope increases</u></p>
France	<p>A. <input checked="" type="checkbox"/> New buildings      Residential      <input checked="" type="checkbox"/> Non Residential</p> <p>Exceptions : Swimming pools, ice skating rings, agricultural buildings, building heated at less than 12 C, buildings heated for the process and not for comfort.</p> <p>B. <input type="checkbox"/> Existing buildings      <input type="checkbox"/> Residential      <input type="checkbox"/> Non Residential</p> <p>C. <input type="checkbox"/> Buildings under renovation      <input type="checkbox"/> Residential      <input type="checkbox"/> Non Residential</p> <p>D. <input type="checkbox"/> Extension to existing buildings      <input type="checkbox"/> Residential      <input type="checkbox"/> Non Residential</p>

Germany	<p>A. <input checked="" type="checkbox"/>New buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Exceptions : Stables, glasshouses, underground constructions, tents and air domes, works premises</p> <p>B. <input checked="" type="checkbox"/>Existing buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Comments: Existing buildings are affected by only one paragraph of the regulation, that boilers which were installed before October 1 1978 have to be replaced until December 31 2006 if their output is between 4 kW and 400 kW.</p> <p>C. <input checked="" type="checkbox"/>Buildings under renovation                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Comments: Buildings under renovation are only affected, if more than 20 % of a component is changed. In this case the whole component has to be changed according to the new building standards.</p> <p>D. <input checked="" type="checkbox"/>Extension to existing buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Comments: <u>Extensions fall under the regulation if they have a volume of more than 30 m3. Then they have to be treated as new buildings.</u></p>
Greece	<p>A. <input checked="" type="checkbox"/>New buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Exceptions : Buildings not heated or cooled, agricultural buildings</p> <p>B. <input type="checkbox"/>Existing buildings                   <input type="checkbox"/>Residential                   <input type="checkbox"/>Non Residential</p> <p>C. <input checked="" type="checkbox"/>Buildings under renovation                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Comments: <u>Under major renovations</u></p> <p>D. <input checked="" type="checkbox"/>Extension to existing buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p>
Israel	<p>A. <input checked="" type="checkbox"/>New buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Exceptions :</p> <p>B. <input type="checkbox"/>Existing buildings                   <input type="checkbox"/>Residential                   <input type="checkbox"/>Non Residential</p> <p>C. <input type="checkbox"/>Buildings under renovation                   <input type="checkbox"/>Residential                   <input type="checkbox"/>Non Residential</p> <p>D. <input type="checkbox"/>Extension to existing buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Comments: <u>As these require a permit, they must conform to all building regulations.</u></p>
Italy	<p>A. <input checked="" type="checkbox"/>New buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Exceptions : warehouses, buildings for industry,</p> <p>B. <input checked="" type="checkbox"/>Existing buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>C. <input checked="" type="checkbox"/>Buildings under renovation                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>D. <input checked="" type="checkbox"/>Extension to existing buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Comments:</p>
Netherlands	<p>A. <input checked="" type="checkbox"/>New buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p> <p>Exceptions : industrial buildings, monumental buildings, train stations,</p> <p>B. <input type="checkbox"/>Existing buildings                   <input type="checkbox"/>Residential                   <input type="checkbox"/>Non Residential</p> <p>C. <input checked="" type="checkbox"/>Buildings under renovation                   <input type="checkbox"/>Residential                   <input type="checkbox"/>Non Residential</p> <p>D. <input checked="" type="checkbox"/>Extension to existing buildings                   <input type="checkbox"/>Residential                   <input type="checkbox"/>Non Residential</p> <p>Comments: <u>Major extensions</u></p>
Norway	<p>A. <input checked="" type="checkbox"/>New buildings                   <input checked="" type="checkbox"/>Residential                   <input checked="" type="checkbox"/>Non Residential</p>

	<p>Exceptions : Farm buildings, dwellings in part time use (ie cottages) and industrial buildings with heat gain from production processes</p> <p>B. <input type="checkbox"/> Existing buildings                      <input type="checkbox"/> Residential                      <input type="checkbox"/> Non Residential</p> <p>C. <input checked="" type="checkbox"/> Buildings under renovation                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>Comments: <u>Major renovation only</u></p> <p>D. <input checked="" type="checkbox"/> Extension to existing buildings                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>Comments: <u>Only the extension are involved, unless it is also a major renovation</u></p>
Portugal	<p>A. <input checked="" type="checkbox"/> New buildings                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>Exceptions : Historic and industrial buildings and buildings with operative conditions open to the outdoors.</p> <p>B. <input type="checkbox"/> Existing buildings                      <input type="checkbox"/> Residential                      <input type="checkbox"/> Non Residential</p> <p>C. <input checked="" type="checkbox"/> Buildings under renovation                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>Comments: <u>The regulations are also applied in retrofitting whenever the amounts involved are larger than half of its value</u></p> <p>D. <input checked="" type="checkbox"/> Extension to existing buildings                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p>
Spain	<p>A. <input checked="" type="checkbox"/> New buildings                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>Exceptions : No exceptions (?)</p> <p>B. <input type="checkbox"/> Existing buildings                      <input type="checkbox"/> Residential                      <input type="checkbox"/> Non Residential</p> <p>C. <input type="checkbox"/> Buildings under renovation                      <input type="checkbox"/> Residential                      <input type="checkbox"/> Non Residential</p> <p>D. <input type="checkbox"/> Extension to existing buildings                      <input type="checkbox"/> Residential                      <input type="checkbox"/> Non Residential</p>
Sweden	<p>A. <input checked="" type="checkbox"/> New buildings                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>Exceptions : All buildings except vacation homes with no more than 2 apartments and other building constructed for only short term use such as seasonal restaurants.</p> <p>B. <input checked="" type="checkbox"/> Existing buildings                      <input type="checkbox"/> Residential                      <input type="checkbox"/> Non Residential</p> <p>Comments: The regulations at the time the building was first built is valid for the building</p> <p>C. <input checked="" type="checkbox"/> Buildings under renovation                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>Comments: Current building regulation applies to the altered part. If the alteration considerably prolongs the buildings expected life span or drastically changes the buildings use also neighbouring parts of the building must comply with current regulations.</p> <p>D. <input checked="" type="checkbox"/> Extension to existing buildings                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>Comments: <u>Current building regulation applies to the added part..</u></p>
Swiss	<p>A. <input checked="" type="checkbox"/> New buildings                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>Exceptions : Buildings that are neither heated nor cooled</p> <p>B. <input type="checkbox"/> Existing buildings                      <input type="checkbox"/> Residential                      <input type="checkbox"/> Non Residential</p> <p>C. <input checked="" type="checkbox"/> Buildings under renovation                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p> <p>D. <input checked="" type="checkbox"/> Extension to existing buildings                      <input checked="" type="checkbox"/> Residential                      <input checked="" type="checkbox"/> Non Residential</p>
UK	<p>A. <input checked="" type="checkbox"/> New buildings                      <input checked="" type="checkbox"/> Residential                      <input type="checkbox"/> Non Residential</p> <p>Exceptions All buildings except new dwellings.:</p> <p>B. <input type="checkbox"/> Existing buildings                      <input type="checkbox"/> Residential                      <input type="checkbox"/> Non Residential</p>

C.  Buildings under renovation       Residential       Non Residential

D.  Extension to existing buildings       Residential       Non Residential

Comments: The procedure is extremely unlikely to be practical for extensions because it is based on the energy performance of the whole building, and the existing dwelling usually has inferior energy performance.

Table 2.2.1. Situation Regarding the application of national EP regulations to buildings.

## ANNEX 2. Main characteristics of the EP regulation during the design phase

Austria	<p><u>Responsibility of the Owner</u> : Give contracts to other actors No further responsibility</p> <p><u>Responsibility of the Architect/Consultant</u> : The architect and the master builder: define the envelope and are responsible for the energy calculation.</p> <p><u>Responsible of EP calculations</u> : Every architect, master builder or planner</p> <p><u>Controller of the EP Calculation</u> :The local Community who grants the permission</p> <p><u>Final Requirement of the EP</u> : annual energy consumption in kWh/m<sup>2</sup></p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : Yes, for various levels of energy consumption</p> <p><u>Application of the Principle of Equivalence</u> : Yes. The innovative system has to ensure that the energy consumption is equal or less than a conventional system. No special form is required. The architect or planner has to demonstrate the equivalence.</p>
Belgium (proposal for Flemish region)	<p><u>Responsibility of the Owner</u> : Give contracts to other actors .</p> <p><u>Responsibility of the Architect/Consultant</u> : The Architect/Consultant of the future building and EP expert: at the time of the request for the building permit, both commit themselves to observe the requirements, and they provide an indicative, non-binding list of practical measures they anticipate to implement in order to achieve the required overall energy efficiency</p> <p><u>Responsible of EP calculations</u> : The architect assisted by experts</p> <p><u>Controller of the EP Calculation</u> : No control</p> <p><u>Final Requirement of the EP</u> : Not applicable</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : No</p> <p><u>Application of the Principle of Equivalence</u> : Yes, but only the principle is stated, no practical development as yet.</p>
Denmark	<p><u>Responsibility of the Owner</u> : Give contracts to other actors Responsible to get the permit.</p> <p><u>Responsibility of the Architect/Consultant</u> : Responsible for the overall design and it is common to carry out the EP calculations</p> <p><u>Responsible of EP calculations</u> : Anyone</p> <p><u>Controller of the EP Calculation</u> : The local Community who grants the permission</p> <p><u>Final Requirement of the EP</u> : Final energy in MJ/m<sup>2</sup>/year, or U value or sum of UxA</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : In Denmark there is a mandatory energy labelling of commercial and residential buildings.</p> <p>For small buildings (less than 1500 m<sup>2</sup>) the labelling is done when a building is sold. The rating is calculated. The energy rating include efficiency of boilers, hot water production and electricity consumption. It is expected that the coming energy frame in Danish Building Regulation in 2005 will include these factor. The seller of a small building is responsible to ensure that the energy rating and energy plan is not older than 3 years. For larger buildings (1500 m<sup>2</sup> or more) it is obliged to have an energy rating and an energy plan drawn up for the building once a year. The energy rating include efficiency of boilers, hot water production and electricity consumption. The rating is measured data and not calculated as for the small buildings.</p> <p><u>Application of the Principle of Equivalence</u> : No</p>
Finland	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> : The architect: is responsible for the main design and at responsibility at some level also on construction and HVAC design. The construction designer:is responsible to calculate U-values of walls and windows, while the HVAC designer is</p>

	<p>responsible for the HVAC design and all EP-calculations.</p> <p><u>Responsible of EP calculations</u> : Anyone, but only experts are performing calculations</p> <p><u>Controller of the EP Calculation</u> : The local Community who grants the permission</p> <p><u>Final Requirement of the EP</u> :U-values of exterior walls, efficiency of heat recovery from exhaust air and the principle of energy equivalence, if it is used.</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : No</p> <p><u>Application of the Principle of Equivalence</u> : Yes, A national energy calculation method whose principles are very similar than those of EN 832.. There is no standard procedure for report. Every designer has freedom to use his/her own presentation.</p>
France	<p><u>Responsibility of the Owner</u> : Give contracts to other actors. Hire (not mandatory) a control officer who will check the compliance to regulation. Decide to apply for a voluntary certification procedure for the building.</p> <p><u>Responsibility of the Architect/Consultant</u> The architect: design the building and could (optionnal) follow installation work. Small buildings (less than 170m2) can be designed without an architect. the technical design consultant design the technical installations and perform energy calculations. In large buildings electrical consultant and mechanical consultant are often different this lead to a need of coordination when one assess in EP regulation the impact of heating as well as of lighting. The design is often done only at the system level by the technical consultant. The design at the component level is often done by the installer. The control officer: is a consultant paid by the building owner to check compliance of different aspects of the building regulation. It is mandatory to use in large projects a control officer. The use of a control officer is not mandatory to check energy regulations. Finally, the installer: for most of the time realize the design at the component level, installation and commissioning of the system. This splitting of tasks varies from one project to an other one.</p> <p><u>Responsible of EP calculations</u> : Any one, but calculations are not mandatory</p> <p><u>Controller of the EP Calculation</u> : No Control</p> <p><u>Final Requirement of the EP</u> : Primary energy consumption</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : Different certification schemes exists.</p> <p>A first label with two levels HPE(high energy performance) and THPE(very high energy performance) is directly linked to the energy regulation.</p> <p>A second label "qualitel" covers broadly "construction quality" and is mainly applied to apartment buildings, HPE and THPE labels can be obtained as an option to the qualitel label.</p> <p>A third label "vivrelec" is developed by Electricite de France. It covers energy performance as well as comfort in the building using electricity for heating.</p> <p>A fourth label "NF maison individuelle" covers single family houses. It is a global quality label. It includes a systematic verification of technical regulations.</p> <p><u>Application of the Principle of Equivalence</u> : Yes.</p>
Germany	<p><u>Owner</u> : Give contracts to other actors</p> <p><u>Architect/Consultant</u> Responsible for the design and the EP calculations</p> <p><u>Responsible of EP calculations</u> : Accredited architects or engineers</p> <p><u>Controller of the EP Calculation</u> : The building office who grants the permission</p> <p><u>Final Requirement of the EP</u> : Primary energy consumption</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : No</p> <p><u>Application of the Principle of Equivalence</u> : Yes, innovative systems may be treated as conventional components. Construction details or manufacturer certificates may be asked for by</p>

	the building office.
Greece	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design and the EP calculations</p> <p><u>Responsible of EP calculations</u> : Accredited Experts</p> <p><u>Controller of the EP Calculation</u> : The authority who grants the permission</p> <p><u>Final Requirement of the EP</u> : Final Energy Consumption and some prescriptive parameters</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : Yes, for different energy levels</p> <p><u>Application of the Principle of Equivalence</u> : Yes., but has not yet applied.</p>
Ireland	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design and it is common to perform the EP calculations</p> <p><u>Responsible of EP calculations</u> : Anyone.</p> <p><u>Controller of the EP Calculation</u> : The local Community who grants the permission</p> <p><u>Final Requirement of the EP</u> : Standardized annual energy use for space and water heating in kWh/m<sup>2</sup></p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : No</p> <p><u>Application of the Principle of Equivalence</u> : Yes for the energy requirements in the Building Regulations generally, No for the Heat Energy Rating method..</p>
Israel	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design</p> <p><u>Responsible of EP calculations</u> : Not yet defined</p> <p><u>Controller of the EP Calculation</u> : No control</p> <p><u>Final Requirement of the EP</u> :The G-value for residential buildings and the mean U-value for other building types..</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> The suggested Energy Code includes a labeling part as well.</p> <p><u>Application of the Principle of Equivalence</u> : No</p>
Italy	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design</p> <p><u>Responsible of EP calculations</u> : Engineer</p> <p><u>Controller of the EP Calculation</u> : No control</p> <p><u>Final Requirement of the EP</u> :The Energy Consumption</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u></p> <p><u>Application of the Principle of Equivalence</u> : No</p>
Netherlands	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design and it is common to perform the EP calculations</p> <p><u>Responsible of EP calculations</u> : Anyone</p> <p><u>Controller of the EP Calculation</u> : The local Community who grants the permission</p> <p><u>Final Requirement of the EP</u> : Annual Primary Energy</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : :No</p> <p><u>Application of the Principle of Equivalence</u> : Yes. applicant may try to convince the Municipality that his/her solution is equivalent to the intention of the performance as required/ to the level of performance as required.</p>

Norway	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design and it is common to perform the EP calculations</p> <p><u>Responsible of EP calculations</u> : Anyone</p> <p><u>Controller of the EP Calculation</u> : The local Community who grants the permission, but a self control procedure is mainly applied</p> <p><u>Final Requirement of the EP</u> : Either U-values of the building, <math>\Sigma UA</math> or net heat demand in kWh pr. month or year</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : No</p> <p><u>Application of the Principle of Equivalence</u> : Yes, the building code is to a large extent based on functional requirements, with very few detailed descriptions on how the building elements should look like. This gives freedom to the designers, as long as they can document that the general requirements in the code are fulfilled</p>
Portugal	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design and it is common to perform the EP calculations</p> <p><u>Responsible of EP calculations</u> : Anyone</p> <p><u>Controller of the EP Calculation</u> : Usually there is no control but the local Municipality may check</p> <p><u>Final Requirement of the EP</u> : Final Energy</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : No</p> <p><u>Application of the Principle of Equivalence</u> : Yes, The professional have to explain and prove that the alternative is equal or better than the initial solution</p>
Spain	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design and the EP calculations</p> <p><u>Responsible of EP calculations</u> : Engineers of the building</p> <p><u>Controller of the EP Calculation</u> : Usually there is no control but the local Municipality may check</p> <p><u>Final Requirement of the EP</u> : Only area-weighted U-value of the building</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : No</p> <p><u>Application of the Principle of Equivalence</u> : No</p>
Sweden	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design and it is common to perform the EP calculations</p> <p><u>Responsible of EP calculations</u> : Anyone</p> <p><u>Controller of the EP Calculation</u> : The local building Committee.</p> <p><u>Final Requirement of the EP</u> : Final Annual Energy Consumption</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : No</p> <p><u>Application of the Principle of Equivalence</u> : Yes,</p>
Swiss	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design and it is common to perform the EP calculations</p> <p><u>Responsible of EP calculations</u> : Anyone</p> <p><u>Controller of the EP Calculation</u> : No control</p> <p><u>Final Requirement of the EP</u> : Annual heat use in MJ/m<sup>2</sup> gross heated floor area.</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> This classification is not mandatory. Regulation asks to fulfill just the requirement.. However, if the heat use is lower</p>

	<p>than a much lower limit, the building may get the MINERGIE label that allows to obtain subventions in some states.</p> <p><u>Application of the Principle of Equivalence</u> : No</p>
UK	<p><u>Responsibility of the Owner</u> : Give contracts to other actors</p> <p><u>Responsibility of the Architect/Consultant</u> Responsible for the design and it is common to perform the EP calculations</p> <p><u>Responsible of EP calculations</u> : Anyone</p> <p><u>Controller of the EP Calculation</u> : Usually there is no control but it is at the discretion of the building control authority</p> <p><u>Final Requirement of the EP</u> : 1) Index in the range 1 to 120, based on the costs per unit floor area per year, for space and water heating.</p> <p>2) Index in the range 0.0 to 10.0, based on the CO2 emissions per unit floor area per year, attributable to space and water heating (for a standard occupancy and heating level).</p> <p><u>Existence of an Energy Label based on Calculated Energy Consumption</u> : Yes. As above, but the requirements is at the completion of the building.</p> <p><u>Application of the Principle of Equivalence</u> : No. Systems not directly covered are handled on an ad-hoc basis. A more specific treatment would then be incorporated as part of the next review.</p>

### ANNEX 3. Main characteristics of the EP regulation during the construction phase

Austria	<p><u>Inspection During the Construction</u> : No The community controller can (but does not have to) make inspections during the construction phase. Most of the time there is no inspection during the construction. There is no predetermined procedure - it depends on the controller.</p> <p><u>Who may control</u> : The local community</p> <p><u>Possible Penalties or Sanctions</u> : No penalties or sanctions</p> <p><u>Responsibility of non Compliance</u> : Not clear</p>
Belgium (proposal for Flemish region)	<p><u>Inspection During the Construction</u> Yes , there are some random checks. Officials can inspect the construction site or the finished building at any time up to 5 years after submittance of the dossier-as-built. In principle anything that enters the EP calculation may be checked.</p> <p><u>Who may control</u> : Officials of the central Flemish administration</p> <p><u>Possible Penalties or Sanctions</u> : Financial penalties can be imposed.</p> <p><u>Responsibility of non Compliance</u> : As it concerns responsibility, if the dossier-as-built is not correct: the rapporter, if requirements are not met: the owner. For the moment there is no practical experience.</p>
Denmark	<p><u>Inspection During the Construction</u> Yes Sometimes - the municipality can come on a visit. In practice the building owner hires an engineering firm to control the construction (insulation level of constructions and pipes). It is voluntary to have a quality assurance.</p> <p><u>Who may control</u> : In principle the municipality and in practice in larger building projects a hired firm.</p> <p><u>Possible Penalties or Sanctions</u> : Change the constructions to the promised insulation level. In practice to be solved between the building owner and the building contractor. Also, The building owner can stop the building process or stop the payment to the contractor.</p> <p><u>Responsibility of non Compliance</u> The building contractor.</p>
Finland	<p><u>Inspection During the Construction</u> Yes. The communal authorities have right to do intermediate inspections.. The control procedures concern mainly water and sewage systems, ventilation systems and thermal insulation, but not e.g. heating systems. The control is made mainly in those points, in which security and healthy considerations must be taken into account The control is made for the design, the final systems and structures and also for some intermediate constructions..</p> <p><u>Who may control</u> : Mainly municipal authorities, for tap water and electrical networks the representatives of the corresponding utilities. In addition there can be voluntary selfcontrol by the experts of the owner.</p> <p><u>Possible Penalties or Sanctions</u> : Municipal authorities can demand corrections, stop the building process or determine fines.</p> <p><u>Responsibility of non Compliance</u> : If the fault is in the desing, then the designer has the responsibility. If the fault is in real constructions or systems, so that they are not according to the design, then the head of the construction or the installation works has the responsibility.</p>
France	<p><u>Inspection During the Construction</u> some random control for standard buildings, a very significant part of building requiring certification</p> <p><u>Who may control</u> : in practice local controleurs from Ministry of Housing</p> <p><u>Possible Penalties or Sanctions</u> : At this stage no, people have to make modifications</p> <p><u>Responsibility of non Compliance</u> : Building owner</p>

	<p>nothing mandatory for all buildings, part of the different certification procedures</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p>
Germany	<p><u>Inspection During the Construction</u> Yes . The building office is authorised to check the compliance of the building with the regulations at any time. It checks the thickness of insulation, the type of boilers, etc.</p> <p><u>Who may control</u> : Representatives from the Building Office</p> <p><u>Possible Penalties or Sanctions</u> : The builder-owner or his representative are ordered to change the parts which are sub-standard., or the construction may stop.</p> <p><u>Responsibility of non Compliance</u> : The builder-owner or his representative</p>
Greece	<p><u>Inspection During the Construction</u> Yes . The building control office is authorised to check the compliance of the building with the regulations at any time.. However, the procedure has not yet applied.</p> <p><u>Who may control</u> : The representatives of the building control office.</p> <p><u>Possible Penalties or Sanctions</u> : The owner has to change the parts that do not comply with the regulation or in case of a serious bias, construction may stop.</p> <p><u>Responsibility of non Compliance</u> : The Owner</p>
Ireland	<p><u>Inspection During the Construction</u> Yes: A building control officer may visit and monitor the building during construction. Most buildings are not monitored, but a proportion are. Any aspect covered by the Building Regulation may be inspected.</p> <p><u>Who may control</u> : A building control officer from the local authority</p> <p><u>Possible Penalties or Sanctions</u> : The builder/developer may be asked to make good the non-compliant aspect. An Enforcement Order may be served, the building project would be halted (this can be served during and up to five years after the completion of the building)</p> <p><u>Responsibility of non Compliance</u> : The individual/organization responsible for the project as specified in the application to the local authority.</p>
Israel	<p><u>Inspection During the Construction</u> Yes .Only by the contractor on one hand and by the owner and the designer on the other. No inspection by the Municipalities.. It is mandatory for the contractor to have an inspection engineer. It is mandatory for the designer to perform upper-supervision. It is mandatory for the owner to have a person "responsible for the supervision", who signs the request for the Completion Certificate.</p> <p><u>Who may control</u> : Self control Procedure</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : Not a clear, it has to be decided by the court</p>
Italy	<p><u>Inspection During the Construction</u> Yes</p> <p><u>Who may control</u> : Officers from the Municipality</p> <p><u>Possible Penalties or Sanctions</u> : Changes must be done</p> <p><u>Responsibility of non Compliance</u> : Not clear</p>
Netherlands	<p><u>Inspection During the Construction</u> No but the municipality can always check</p> <p><u>Who may control</u> : Officers from the Municipality</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p>
Norway	<p><u>Inspection During the Construction</u> Yes. The control procedure is again based on a documented self-control, carried through by the contractor or by an independent assessor hired by the</p>

	<p>contractor or the owner of the building</p> <p><u>Who may control</u> : Self control Procedure</p> <p><u>Possible Penalties or Sanctions</u> : A "completed"-certificate is not given. The authorities normally do not themselves control that the building process are in line with the official requirements concerning energy performance. They shall control that the documentation and control plans exist.</p> <p><u>Responsibility of non Compliance</u> : The contractor has the full responsibility</p>
Portugal	<p><u>Inspection During the Construction</u> No : In the overall process of control, in the construction phase the inspector from the Municipality can ask or control some of the requirements of the Building Thermal Regulation, but it is not mandatory and in practice this procedure is very rare.</p> <p><u>Who may control</u> : The municipality</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p>
Spain	<p><u>Inspection During the Construction</u> No</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p>
Sweden	<p><u>Inspection During the Construction</u> Yes : By quality liable person assigned by owner, the control plan is decided by local building committee after suggestion by the Byggherre(owner) and his staff. The control plan is decided by local building committee after suggestion by the Byggherre(owner) and his staff.</p> <p><u>Who may control</u> : Self control procedure</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : The owner</p>
Swiss	<p><u>Inspection During the Construction</u> No Not for energy. only safety is checked</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p>
UK	<p><u>Inspection During the Construction</u> No</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p>

## ANNEX 4. Main characteristics of the EP regulation during the upon Delivery phase

Austria	<p><u>Inspection During the Delivery</u> : No The community controller can (but does not have to) make inspections during upon delivery phase.</p> <p><u>Who may control</u> : The local community</p> <p><u>Possible Penalties or Sanctions</u> : No penalties or sanctions</p> <p><u>Responsibility of non Compliance</u> : Not clear</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Belgium (proposal for Flemish region)	<p><u>Inspection During the Delivery</u> Yes , there are some random checks whether the dossier as built is correct.</p> <p><u>Who may control</u> : Officials of the central administration</p> <p><u>Possible Penalties or Sanctions</u> : Financial penalties proportional to the extent of non compliance.</p> <p><u>Responsibility of non Compliance</u> : As it concerns responsibility, if the dossier-as-built is not correct: the rapporteur, if requirements are not met: the owner. For the moment there is no practical experience.</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Denmark	<p><u>Inspection During the Delivery</u> No.</p> <p><u>Who may control</u> None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> None</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Finland	<p><u>Inspection During the Delivery</u> Yes. E.g. the water flow rates in heating systems and the air flow rates in ventilation systems and vents are measured and balanced. The working of control systems is tested. These are done by the designers and the installers.</p> <p><u>Who may control</u> : Mainly municipal authorities, for tap water and electrical networks the representatives of the corresponding utilities. In addition there can be voluntary selfcontrol by the experts of the owner.</p> <p><u>Possible Penalties or Sanctions</u> The sanctions can be fines or prohibition to take the building into use.</p> <p><u>Responsibility of non Compliance</u> : The responsibility remains to them who have made faults</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
France	<p><u>Inspection During the Delivery</u> possible</p> <p><u>Who may control</u> : local representative of Ministry of housing</p> <p><u>Possible Penalties or Sanctions</u> : yes</p> <p><u>Responsibility of non Compliance</u> : building owner</p> <p><u>Certification Schemes applied upon the delivery</u> : yes</p>
Germany	<p><u>Inspection During the Delivery</u> Yes . The building office is authorised to check the compliance of the building with the regulations at any time. It checks the thickness of insulation, the type of boilers, etc.</p> <p><u>Who may control</u> : Representatives from the Building Office</p> <p><u>Possible Penalties or Sanctions</u> : Change Off the sub standard construction parts</p> <p><u>Responsibility of non Compliance</u> : The builder-owner</p>

	<p><u>Certification Schemes applied upon the delivery</u> : : The certification must contain the calculation procedures, the heat loss coefficient of the walls, the efficiency of the heating and air conditioning devices and the calculated primary energy consumption of the building.</p>
Greece	<p><u>Inspection During the Delivery</u> Yes . The building control office is authorised to check the compliance of the building with the regulations at any time.. However, the procedure has not yet applied.</p> <p><u>Who may control</u> : The representatives of the building control office.</p> <p><u>Possible Penalties or Sanctions</u> : The owner has to change the parts that do not comply with the regulation.</p> <p><u>Responsibility of non Compliance</u> : The Owner</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Ireland	<p><u>Inspection During the Delivery</u> No</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> :None .</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Israel	<p><u>Inspection During the Delivery</u> No</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Italy	<p><u>Inspection During the Delivery</u> Yes</p> <p><u>Who may control</u> : Municipality</p> <p><u>Possible Penalties or Sanctions</u> : Mandatory Changes and economic sanctions</p> <p><u>Responsibility of non Compliance</u> : Yes the owner is responsible</p> <p><u>Certification Schemes applied upon the delivery</u> : Yes</p>
Netherlands	<p><u>Inspection During the Delivery</u> No but the municipality can always check</p> <p><u>Who may control</u> : Officers from the Municipality</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Norway	<p><u>Inspection During the Delivery</u> Yes. A "completed" certificate is given based on running reports to the authorities about documented self-controls during the building process and a "completed" report worked out by the contractor</p> <p><u>Who may control</u> : Self control Procedure</p> <p><u>Possible Penalties or Sanctions</u> : A "completed"-certificate is not given</p> <p><u>Responsibility of non Compliance</u> : The contractor (?)</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Portugal	<p><u>Inspection During the Delivery</u> No, :</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Spain	<p><u>Inspection During the Delivery</u> No</p> <p><u>Who may control</u> : None</p>

	<p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Sweden	<p><u>Inspection During the Delivery</u> Yes :The control report is turned in to the local building committee this is required to get an "end of construction" certificate.</p> <p><u>Who may control</u> : Self control procedure</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : The owner</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
Swiss	<p><u>Inspection During the Delivery</u> No _Not for energy. only safety is checked</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied upon the delivery</u> : None</p>
UK	<p><u>Inspection During the Delivery</u> Yes. : Buildings are usually inspected by building control on completion; however this does not cover the details of the EP procedure. Checking is to establish that the building was constructed according to the plans that were approved.</p> <p><u>Who may control</u> : The Building Control Authority</p> <p><u>Possible Penalties or Sanctions</u> : Completion certificate, necessary before building can be occupied, is withheld until the building control authority is satisfied.</p> <p><u>Responsibility of non Compliance</u> : The builder / developer</p> <p><u>Certification Schemes applied upon the delivery</u> : The SAP rating must be displayed (or conveyed to occupier) for each new dwelling</p>

## ANNEX 5. Main characteristics of the EP regulation during the 'After Construction' phase

Austria	<p><u>Inspection After the Construction</u> : Yes. The controller compares the real building with the data from the architect's plan.</p> <p><u>Systems or Components to be tested</u> : The outside dimensions and the structure of the walls, roof, ceiling, windows and doors. The g-value of the windows.</p> <p><u>Who may control</u> : The local community</p> <p><u>Possible Penalties or Sanctions</u> : There will be a new inspection after the necessary modifications. The building gets no authorisation of use.</p> <p><u>Responsibility of non Compliance</u> : The owner is responsible for compliance.</p> <p><u>Certification Schemes applied after construction</u> : Certification is made upon the real building</p>
Belgium (proposal for Flemish region)	<p><u>Inspection After the Construction</u> Yes , the random checking may be done in any building</p> <p><u>Systems or Components to be tested</u> : any input in the EP</p> <p><u>Who may control</u> : Officials of the central administration</p> <p><u>Possible Penalties or Sanctions</u> : Financial sanctions can be imposed. The dossier as built need to be corrected. Sanction is proportional to the infringement.</p> <p><u>Responsibility of non Compliance</u> : As it concerns responsibility, if the dossier-as-built is not correct: the rapporteur, if requirements are not met: the owner. For the moment there is no practical experience.</p> <p><u>Certification Schemes applied after construction</u> : None for the time being</p>
Denmark	<p><u>Inspection After the construction</u> Yes. The municipality can come on a visit but in practice they do not. If it is a bigger building project with a firm to control sometimes they make a control of the energy consumption of the ventilation system.</p> <p><u>Systems or Components to be tested</u> : Boilers, Ventilation system. Energy consumption</p> <p><u>Who may control</u> Representatives of the Municipality</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> None</p> <p><u>Certification Schemes applied after construction</u> : None</p>
Finland	<p><u>Inspection After the Construction</u> Yes. : After the construction there is a final, official inspection by the communal authorities, before the building can be taken into use.</p> <p><u>Systems or Components to be tested</u> : The communal authorities have freedom to decide the content and width of the final inspection. Usually they concentrate on issues, which are coupled with safety and healthy issues. In general may control : Exterior walls and windows, stoves, ventilation systems and tap water and electric network systems.</p> <p><u>Who may control</u> : Communal authorities in ventilation systems and stoves. Representatives of utilities in tap water and electric network systems.</p> <p><u>Possible Penalties or Sanctions</u> Not Defined.</p> <p><u>Responsibility of non Compliance</u> : The responsibility remains to them who have made faults</p> <p><u>Certification Schemes applied after construction</u> : None</p>
France	<p><u>Inspection After the Construction</u> Yes, the control is not systematic, a part of the building is controlled. The strategy to control buildings is defined at a regional level. The approach is to use the control as a mean to enhance quality. .</p>

	<p><u>Systems or Components to be tested</u> : Controls are focus on type of buildings and part of the regulations where quality problems are referenced</p> <p><u>Who may control</u> : Inspectors are civil servant from the regional offices of ministry of housing</p> <p><u>Possible Penalties or Sanctions</u> : if a certification was requested the certificate can be withdrawn. Sanctioning system is seldom used.</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied after construction</u> : As described in Annex 2</p>
Germany	<p><u>Inspection After the Construction</u> Yes . There is a yearly inspection by the chimney sweep independent of the type of building for all heating systems between 4 and 400 kW with gaseous or liquid fuels.</p> <p><u>Systems or Components to be tested</u> : CO<sub>2</sub>, CO and soot content of the exhaust fumes are measured, which provides information on the efficiency of the boiler, the rest of the system is inspected</p> <p><u>Who may control</u> : Representatives from the Building Office</p> <p><u>Possible Penalties or Sanctions</u> : The attention of the owner is called to bad or non compliant values. There is the theoretical possibility to shut down a bad system but this is never done in practice.</p> <p><u>Responsibility of non Compliance</u> : The owner</p> <p><u>Certification Schemes applied after construction</u> : : Every year a certification according to the controls on the boiler efficiency is provided.</p>
Greece	<p><u>Inspection After the Construction</u> Yes . The building control office is authorised to check the compliance of the building with the regulations at any time.. However, the procedure has not yet applied.</p> <p><u>Systems or Components to be tested</u> : Everything related to EP</p> <p><u>Who may control</u> : The representatives of the building control office.</p> <p><u>Possible Penalties or Sanctions</u> : The owner has to change the parts that do not comply with the regulation.</p> <p><u>Responsibility of non Compliance</u> : The Owner</p> <p><u>Certification Schemes applied after construction</u> : A certification scheme based on the energy consumption is mandatory for large buildings.</p>
Ireland	<p><u>Inspection After the Construction</u> No</p> <p><u>Systems or Components to be tested</u> :None</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> :None .</p> <p><u>Certification Schemes applied after construction</u> : None</p>
Israel	<p><u>Inspection After the Construction</u> No</p> <p><u>Systems or Components to be tested</u> :</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied after construction</u> : None</p>
Italy	<p><u>Inspection After the Construction</u> : Yes</p> <p><u>Systems or Components to be tested</u> : Building Envelope and Heating system</p> <p><u>Who may control</u> : Officers from the Municipality</p>

	<p><u>Possible Penalties or Sanctions</u> : Economic Sanctions</p> <p><u>Responsibility of non Compliance</u> : the owner has the responsibility</p> <p><u>Certification Schemes applied after construction</u> : None</p>
Netherlands	<p><u>Inspection After the Construction</u> No but the municipality can always check</p> <p><u>Systems or Components to be tested</u> : Not defined</p> <p><u>Who may control</u> : Officers from the Municipality</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied after construction</u> : None</p>
Norway	<p><u>Inspection After the Construction</u> Yes.</p> <p><u>Systems or Components to be tested</u> :Not Defined</p> <p><u>Who may control</u> : Self control Procedure</p> <p><u>Possible Penalties or Sanctions</u> : A "completed"-certificate is not given</p> <p><u>Responsibility of non Compliance</u> : Not defined</p> <p><u>Certification Schemes applied after construction</u> : None</p>
Portugal	<p><u>Inspection After the Construction</u> No, :</p> <p><u>Systems or Components to be tested</u> : None</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied after construction</u> : None</p>
Spain	<p><u>Inspection After the Construction</u> No</p> <p><u>Systems or Components to be tested</u> :</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied after construction</u> : None</p>
Sweden	<p><u>Inspection After the Construction</u> Yes : For some parts such as ventilation, chimneys also the buildings position and size is controlled but not for EP more for safety compliance these certificates are needed to get an "end of construction" certificate</p> <p><u>Systems or Components to be tested</u> : Ventilation, chimneys, building size and position</p> <p><u>Who may control</u> : Certified personnel.</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : The owner</p> <p><u>Certification Schemes applied after construction</u> : None</p>
Swiss	<p><u>Inspection After the Construction</u> No</p> <p><u>Systems or Components to be tested</u> : None</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p> <p><u>Responsibility of non Compliance</u> : None</p> <p><u>Certification Schemes applied after construction</u> : None</p>
UK	<p><u>Inspection After the construction</u> No</p> <p><u>Systems or Components to be tested</u> : None</p> <p><u>Who may control</u> : None</p> <p><u>Possible Penalties or Sanctions</u> : None</p>

Responsibility of non Compliance : None

Certification Schemes applied after construction : None